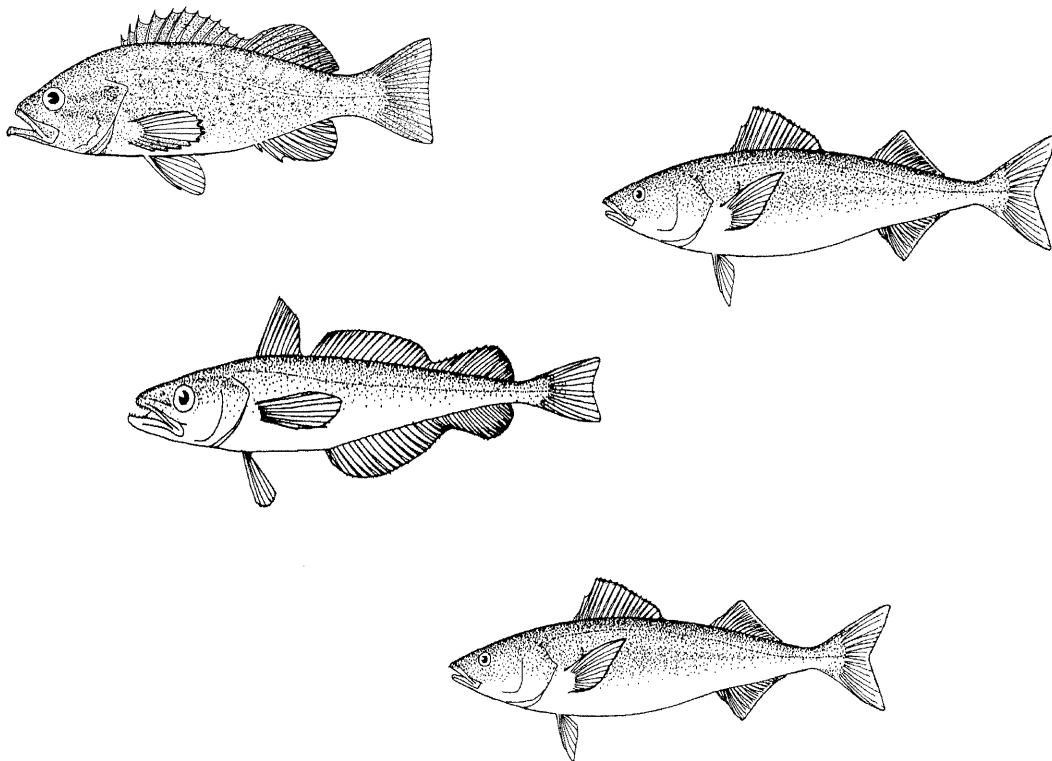


STATUS OF THE PACIFIC COAST GROUND FISH FISHERY THROUGH 2001 AND ACCEPTABLE BIOLOGICAL CATCHES FOR 2002

STOCK ASSESSMENT AND FISHERY EVALUATION



**Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, OR 97220-1384
(503) 820-2280
www.pcouncil.org**

JULY 2002

ACKNOWLEDGMENTS

This is the eighteenth in a series of documents which review past years' fishery performance and Council management actions, in addition to assessing the status of 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.

GROUNDFISH MANAGEMENT TEAM

Mr. J. Thomas Barnes, California Department of Fish and Game, La Jolla, California
Mr. Brian Culver, Washington Department of Fish and Wildlife, Montesano, Washington
Dr. James Hastie, National Marine Fisheries Service, Seattle Washington
Dr. Kevin Piner, National Marine Fisheries Service, Newport, Oregon
Dr. Alec MacCall, National Marine Fisheries Service, Santa Cruz, California
Mr. Mark Saelens, Oregon Department of Fish and Game, Newport, Oregon
Mr. David Thomas, California Department of Fish and Game, Castro Valley, California

PACIFIC FISHERY MANAGEMENT COUNCIL STAFF

Mr. John D. DeVore, Fishery Management Staff Officer for Groundfish
Mr. Jim W Glock, Staff Officer for Groundfish
Mr. James L. Seger, Fishery Economics Staff Officer
Mr. Charles A. Tracy, Fishery Management Staff Officer for Salmon, Habitat, Pacific Halibut,
and Groundfish
Mr. Daniel A. Waldeck, Fishery Management Staff Officer for Coastal Pelagic Species,
Highly Migratory Species, and Groundfish

Ms. Kerry L. Aden, Administrative Specialist
Ms. Donde S. Hayes, Administrative Assistant
Ms. Renee D. Heyden, Administrative Specialist
Ms. Sandra J. Krause, Information Technology Specialist

This document may be cited in the following manner:

Pacific Fishery Management Council. 2002. *Status of the Pacific Coast Groundfish Fishery Through 2001 and Acceptable Biological Catches for 2002: Stock Assessment and Fishery Evaluation*. (Document prepared for the Council and its advisory entities.) Pacific Fishery Management Council 7700 NE Ambassador Place, Suite 200, Portland, Oregon 97220-1384.



A report of the Pacific Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award Number NA17FC2235.

PACIFIC FISHERY MANAGEMENT COUNCIL

7700 NE Ambassador Place, Suite 200

Portland, Oregon 97220-1384

Telephone: 503-820-2280

Fax: 503-820-2299

www.pcouncil.org

EXECUTIVE DIRECTOR

Donald O. McIsaac

CHAIRMAN
Hans Radtke

July 15, 2002

Dear Reviewer:

The enclosed document – *Status of the Pacific Coast Groundfish Fishery Through 2001 and Acceptable Biological Catches for 2002: Stock Assessment and Fishery Evaluation* (SAFE document)– provides historical catch, economic, and management information, as well as the Pacific Fishery Management Council (Council) adopted acceptable biological catches (ABCs) and harvest guidelines for the year 2002. This document discusses major reductions that have been proposed for several species in 2002. Individual stock assessments for four of the species discussed in this document are contained in the Appendix, and are also available from the Council office. Those assessments include: Dover sole, sablefish, shortspine thornyhead, and yelloweye rockfish.

At its October 29 - November 2, 2001 meeting, the Council established 2002 catch limits for groundfish species managed under the Pacific Coast groundfish fishery management plan (FMP). The FMP authorizes the Council to propose target harvest levels (either harvest guidelines or quotas) for any groundfish species or species complex in need of individual management attention and to establish allocations for limited entry and open access fisheries. The FMP also authorizes the Council to establish management measures to ensure harvest targets are achieved. For example, to participate in a limited entry fishery, vessels using trawl, longline, or fishpot gear must possess a limited entry permit. Vessels without limited entry permits may participate in the open access fishery using any legal groundfish gear (except groundfish trawl gear), but are subject to specified catch limits.

This document is intended to provide a general understanding of Pacific Coast groundfish fishery management, including the process for determining recommended ABCs and harvest guidelines. In the past it was also used as a decision document for the Council to use in determining ABCs and harvest guidelines at its November meeting; however this year, an Environmental Assessment and Regulatory Impact Review served that purpose. Therefore, this SAFE document serves primarily as a reference document. Please note that the Groundfish Management Team statement and summary of 2001 fisheries was not provided in time to be included in this document. Some of the summary data is included in the footnotes of Table 59.

Future versions of this document will change significantly. There will be two volumes of the SAFE document that will be published at different times of the year. Volume 1 will contain groundfish species stock assessments, STAR Panel reports, and rebuilding analyses. This will be published and distributed prior to the Council meeting where final groundfish management measures are adopted. For instance, Volume 1 of the 2002 SAFE document will be available prior to the September 2002 Council meeting. Volume 2 of the SAFE document will contain the fishery catch data and other biological, management, and socioeconomic data references relevant to West Coast groundfish management. This will be published and distributed in the spring and will include catch accountability data from the previous year. For instance, Volume 2 of the 2002 SAFE document will be available in the spring of 2003.

Sincerely,



D. O. McIsaac, Ph.D.
Executive Director

CAT:rdh

TABLE OF CONTENTS

	<u>Page</u>
TABLE OF CONTENTS	i
LIST OF ACRONYMS	vii
INTRODUCTION	1
RECENT HISTORY OF MANAGEMENT	2
1998 Fishery	2
1999 Fishery	7
2000 Fishery	12
2001 Fishery	14
FOREIGN AND JOINT VENTURE FISHING	15
WHITING SEASON SUMMARY, 1994-2001	17
FINAL GROUNDFISH MANAGEMENT TEAM ACCEPTABLE BIOLOGICAL CATCH AND HARVEST GUIDELINE RECOMMENDATIONS FOR 2002	26

LIST OF TABLES

	<u>Page</u>
Table 1. Estimated domestic commercial groundfish landings (mt) for all management areas, 1984-2000.	T-1
Table 2. Estimated domestic commercial groundfish landings (in thousands of dollars) for all management areas, 1984-2000	T-2
Table 3. Estimated commercial groundfish landings (mt) for the U.S. portion of the Vancouver management area, 1984-2000	T-3
Table 4. Estimated commercial groundfish landings (in thousands of dollars) for the U.S. portion of the Vancouver management area, 1984-2000	T-4
Table 5. Estimated commercial groundfish landings (mt) for the Columbia management area, 1984-2000	T-5
Table 6. Estimated commercial groundfish landings (in thousands of dollars) for the Columbia management area, 1984-2000	T-6
Table 7. Estimated commercial groundfish landings (mt) for the Eureka management area, 1984-2000	T-7
Table 8. Estimated commercial groundfish landings (in thousands of dollars) for the Eureka management area, 1984-2000	T-8
Table 9. Estimated commercial groundfish landings (mt) for the Monterey management area, 1984-2000	T-9
Table 10. Estimated commercial groundfish landings(in thousands of dollars) for the Monterey management area, 1984-2000	T-10

Table 11.	Estimated commercial groundfish landings (mt) for the Conception area, 1984-2000	T-11
Table 12.	Estimated commercial groundfish landings (in thousands of dollars) for the Conception management area, 1984-2000	T-12
Table 13.	Estimated commercial groundfish landings (mt) for Washington, 1984-2000	T-13
Table 14.	Estimated commercial groundfish landings (in thousands of dollars) for Washington, 1984-2000	T-14
Table 15.	Estimated commercial groundfish landings (mt) for Oregon, 1984-2000	T-15
Table 16.	Estimated commercial groundfish landings (in thousands of dollars) for Oregon, 1984-2000	T-16
Table 17.	Estimated commercial groundfish landings (mt) for California, 1984-2000	T-17
Table 18.	Estimated commercial groundfish landings (in thousands of dollars) for California, 1984-2000	T-18
Table 19.	Total ocean recreational harvest in metric tons, 1981-2000	T-19
Table 20.	Washington ocean recreational harvest in metric tons, 1981-2000	T-20
Table 21.	Oregon ocean recreational harvest in metric tons, 1981-2000	T-21
Table 22.	California ocean recreational harvest in metric tons, 1981-2000	T-22
Table 23.	Washington ocean recreational harvest from private vessels in metric tons, 1981-2000	T-23
Table 24.	Washington ocean recreational harvest from charter vessels in metric tons, 1981-2000	T-24
Table 25.	Oregon ocean recreational harvest from private vessels in metric tons, 1981-1989 and 1993-2000	T-25
Table 26.	Oregon ocean recreational harvest from charter vessels in metric tons, 1981-1990 and 1993-2000	T-26
Table 27.	California ocean recreational harvest from private vessels in metric tons, 1981-1989 and 1993-2000	T-27
Table 28.	California ocean recreational harvest from charter vessels in metric tons, 1981-1989 and 1993-2000	T-28
Table 29.	Council groundfish management/regulatory actions since 1982	T-29
Table 30.	Final OY and ABC specifications made under the FMP, 1982-1990	T-87
Table 31.	ABCs for 1983 (mt) for the Washington, Oregon, and California region by management areas	T-88

Table 32.	ABCs for 1984 (mt) for the Washington, Oregon, and California region by management areas	T-89
Table 33.	ABCs for 1985 (mt) for the Washington, Oregon, and California region by management areas	T-90
Table 34.	ABCs for 1986 (mt) for the Washington, Oregon, and California region by management areas	T-91
Table 35.	ABCs for 1987 (mt) for the Washington, Oregon, and California region by management areas	T-92
Table 36.	ABCs for 1988 (mt) for the Washington, Oregon, and California region by management areas	T-93
Table 37.	ABCs for 1989 (mt) for the Washington, Oregon, and California region by management areas	T-94
Table 38.	ABCs for 1990 (mt) for the Washington, Oregon, and California region by management areas	T-95
Table 39.	ABCs, harvest guidelines, and quotas for 1991 (mt) for the Washington, Oregon, and California region by management areas	T-96
Table 40.	Council ABCs and harvest guidelines for 1992 (mt) for the Washington, Oregon, and California region by management areas	T-97
Table 41.	Council ABCs and harvest guidelines for 1993 (mt) for the Washington, Oregon, and California region by INPFC areas	T-98
Table 42.	Council ABCs and harvest guidelines for 1994 for the Washington, Oregon, and California region by management areas	T-99
Table 43.	Open access and limited entry allocations for 1994	T-101
Table 44.	Council ABCs and harvest guidelines for 1995 (mt) for the Washington, Oregon, and California region by management areas	T-102
Table 45.	Open access and limited entry allocations for 1995	T-104
Table 46.	Council ABCs and harvest guidelines for 1996 (mt) for the Washington, Oregon, and California region by management areas	T-105
Table 47.	Open access and limited entry allocations for 1996	T-107
Table 48.	Council ABCs and harvest guidelines for 1997 for the Washington, Oregon, and California region by management areas	T-108
Table 49.	Open access and limited entry allocations for 1997	T-110
Table 50.	Final Council recommendations for 1998 ABCs and harvest guidelines for the Washington, Oregon, and California region by management area	T-111
Table 51.	Open access and limited entry allocations for 1998	T-114

Table 52.	Final 1999 ABCs and optimum yields (harvest guidelines) for the Washington, Oregon, and California region by management area	T-115
Table 53.	Expected limited entry and open access allocations in 1999	T-118
Table 54.	Final Council recommendations for year 2000 ABC and OY specifications for the Washington, Oregon, and California region by management area	T-119
Table 55.	Overview of ABCs, OYs, and allocations for 2000	T-123
Table 56.	2001 Specifications of ABC and OYs, by International North Pacific Fisheries Commission Areas	T-124
Table 57.	Overview of ABC, OY and allocations (mt) for 2001 West Coast groundfish fisheries	T-128
Table 58.	Landings and quotas/harvest guidelines for Pacific whiting, 1978-2000	T-129
Table 59.	2002 specifications of ABC, OYs, and limited entry and open access allocations, by International North Pacific Fisheries Commission areas	T-130
Table 60.	Council-adopted 2002 trip limits and gear requirements	T-136

LIST OF FIGURES

	<u>Page</u>
Figure 1. International North Pacific Fishery Commission management statistical areas in the U.S. exclusive economic zone seaward of Washington, Oregon and California	F-1
Figure 2. Estimated domestic commercial groundfish landings (mt) for all management areas, 1974-1999	F-2
Figure 3. Landings of Pacific whiting	F-3

SPECIAL SECTIONS

ECONOMIC STATUS OF THE WASHINGTON, OREGON, AND CALIFORNIA GROUND FISH FISHERIES

STOCK ASSESSMENT AND REVIEW PROCESS DURING 2001

2001 STOCK ASSESSMENT EXECUTIVE SUMMARIES

- ★ Dover Sole Stock Assessment Executive Summary
- ★ Sablefish Stock Assessment Executive Summary (1)
- ★ Sablefish Stock Assessment Executive Summary (2)
- ★ Shortspine Thornyhead Stock Assessment Executive Summary
- ★ Pacific Whiting Stock Assessment Executive Summary
- ★ Yelloweye Rockfish Stock Assessment Executive Summary

2001 STAR PANEL REPORTS

- ★ Dover Sole STAR Panel Report
- ★ Sablefish STAR Panel Report
- ★ Shortspine Thornyhead STAR Panel Report
- ★ Yelloweye Rockfish STAR Panel Report

2000 STOCK ASSESSMENT ERRATA

REBUILDING ANALYSES FOR OVERFISHED STOCKS

- ★ Bocaccio Rebuilding Analysis
- ★ Canary Rockfish Rebuilding Analysis
- ★ Cowcod Rebuilding Analysis
- ★ Darkblotched Rockfish Rebuilding Analysis
- ★ Lingcod Rebuilding Analysis
- ★ Pacific Ocean Perch Rebuilding Analysis
- ★ Widow Rockfish Rebuilding Analysis

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

Stock Status of Dover Sole off the U.S. West Coast in 2000

David B. Sampson, Oregon State University
Claire Wood, Oregon State University

Status of the Sablefish Resource off the U.S. Pacific Coast in 2001

Ray Hilborn, University of Washington
Juan L. Valero, University of Washington
Mark Maunder, University of Washington

Status of the Sablefish Resource off the U.S. Pacific Coast in 2001

Michael J. Schirripa, National Marine Fisheries Service
Richard Methot, National Marine Fisheries Service

Stock Status of Shortspine Thornyhead off the Pacific West Coast of the United States in 2001

Kevin Piner, National Marine Fisheries Service
Richard Methot, National Marine Fisheries Service

Pacific Whiting Assessment Update for 2000

Thomas E. Helser, National Marine Fisheries Service
Martin W. Dorn, National Marine Fisheries Service
Mark W. Saunders, Department of Fisheries and Oceans - Canada

Status of the Yelloweye Rockfish Resource in 2001 for Northern California and Oregon Waters

Farron R. Wallace, Washington Department of Fish and Wildlife

LIST OF ACRONYMS

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

INTRODUCTION

The *Guidelines for Fishery Management Plans* published by the National Marine Fisheries Service (NMFS) require that a stock assessment and fishery evaluation (SAFE) report be prepared and reviewed annually for each fishery management plan (FMP). SAFE reports are intended to summarize the best available scientific information concerning the past, present, and possible future condition of the stocks, marine ecosystems, and fisheries being managed under Federal regulation. Regional councils use this information to determine annual harvest levels for each managed stock; document significant trends or changes in the resources, marine ecosystems, and fishery over time; and assess the relative success of existing state and Federal fishery management programs.

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

Included in this report are a description of landings, fishing patterns, summaries of the status of stocks assessed in 2001 (including appended full stock status reports), rebuilding analyses for overfished species, and acceptable biological catches (ABC) for 1997-2001, as well as those adopted by the Council for 2002. Historical ABC information is included for 1983 through 1998. Brief discussions of the history of foreign and joint venture fishing, as well as the Americanization of the Pacific whiting fishery are also included.

RECENT HISTORY OF MANAGEMENT, 1998-2001

1998 Fishery

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

Limited entry and open access allocation percentages were identical to 1997. Harvest guidelines were generally set for landed catch, less than the respective ABCs in many cases to take into account anticipated discard resulting from trip limit management. Species for which the landed catch harvest guideline was below the ABC include Dover sole, lingcod, *Sebastes* complex, widow, yellowtail, and canary rockfish, sablefish, shortspine thornyhead, and longspine thornyhead.

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

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

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

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

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

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

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

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

landings were prohibited north of Cape Blanco (the southern border of the Columbia management area), and all canary rockfish landings were prohibited coastwide.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1999 Fishery

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

Limited entry and open access allocations were identical to 1998. Optimum yields were generally set for total catch, less than the respective ABCs in many cases as dictated by stock abundance and the Council's

default 40-10 harvest policy. Species for which the OY was below the ABC include lingcod, sablefish, Pacific ocean perch, widow rockfish, shortspine thornyhead, *Sebastes* complex, canary and yellowtail rockfish. Landed catches for a number of species are less than total catch OYs due to discard resulting from trip limit management or market acceptability.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Nontrawl sablefish south of 36° N latitude.

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

2000 Fishery

Faced with harvest reductions for various rockfish species, the Council adopted a strategy to separate the major rockfish stocks from the *Sebastes* complex and divide the remaining species into assemblages. This was intended to bring harvest levels more closely in line with the ABCs for individual species and the various rockfish groups. Most of the stocks known to be overfished or depleted are shelf species and, by separating rockfish into species groups according to where and how they are caught, the Council hoped to maintain fishing opportunities for abundant stocks while improving protection for depleted ones. More specifically, the intent was to reduce catch and bycatch of shelf rockfish while allowing continued fishing for other shelf species, as well as nearshore and slope species. However, commercial fishing opportunities for nearshore species were greatly reduced in the process because anticipated recreational catch is deducted before commercial harvest guidelines are set. In Washington and Oregon, most recreational fishing targets nearshore stocks, with a lower level of fishing for shelf species and virtually no fishing for slope species. The commercial fishing sectors got a higher proportion of the shelf and slope stocks, but less of the nearshore rockfish. The primary commercial harvesters of nearshore stocks are open access and limited entry nontrawl fishers; their fishing opportunities were greatly reduced. Although the commercial sector received most of the shelf and slope species, the need to reduce harvest of depleted shelf rockfish stocks limited fishing for shelf rockfish and also for other co-occurring species.

To reduce harvest of shelf rockfish species, the Council endorsed an idea proposed by commercial fishing industry representatives to restrict the use of bottom trawls with large rollers on the footrope. Without the protection of large rollers, trawls cannot be fished as effectively in the rocky areas where canary rockfish and lingcod live. Vessels using large footropes, defined as more than 8 inches maximum diameter, were prohibited from landing nearshore and shelf rockfish and most flatfish species. Trawl vessels were also prohibited from attaching chafing gear to protect their nets. (Vessels were not prohibited from using large footrope trawl gear in nearshore and continental shelf areas, but they were not allowed to retain and sell most of the fish they could catch there). The Council believed this would be enough disincentive to prevent inappropriate trawl activity in these areas and effectively reduce both catch and bycatch of shelf rockfish species. Any trawls, including those with footropes larger than 8 inches diameter, could be used to harvest a limited number of species that inhabit the deeper areas of the shelf and continental slope, primarily Dover and rex soles, thornyheads, sablefish, and deep-water rockfish. During some periods, large-diameter footrope trawls could also be used for arrowtooth flounder and Petrale sole.

Another part of the strategy to allow harvest of relatively abundant stocks without impacting depleted ones involved the use of midwater or pelagic trawls. Midwater trawls are effective for catching schooling species that live above the ocean floor, such as Pacific whiting and widow rockfish. Bottom trawl nets can also catch widow rockfish, but typically canary and yellowtail rockfish are caught at the same time. The Council believed the only way the widow rockfish OY could be caught without impacting canary rockfish was with midwater trawl gear, and provided fishing opportunities for vessels using that gear. Midwater fishing opportunities were also provided for vessels targeting chilipepper and yellowtail rockfish. Landing limits, closed periods, and gear restrictions were used extensively to reduce total catch to specified levels.

Commercial fisheries were again managed with two-month cumulative limits, including monthly sub-limits for nontarget species. As part of the lingcod rebuilding program, all commercial vessels were prohibited from landing lingcod from January through April and during November and December. For limited entry trawl vessels, different trip limits were established based on the types of trawl gear on board when fish were landed. Vessels using bottom trawl gear with footropes larger than 8 inches maximum diameter were allowed to land slope species such as the Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex, and slope rockfish. Vessels using midwater or small footrope trawl gear had additional opportunities for nearshore and shelf species (primarily flatfish and some rockfish). Trawl vessels with large footrope trawl gear on board were limited to the large footrope landing restrictions, even if other gear is used during the trip. Likewise, vessels with small footrope trawl gear on board were limited to the small footrope landing allowances, even if they fished with midwater gear during the trip. Vessels could change gear between trips, but not before all fish were offloaded.

Opportunities for nontrawl vessels, both limited entry and open access, were also substantially reduced. Retention of lingcod was prohibited for six months during 2000. In addition, hook-and-line, pot, and setnet vessels fishing south of 40°10' N latitude (about 20 miles south of Cape Mendocino) were prohibited from landing any nearshore and shelf rockfish for two months, coincident with closure of recreational groundfish fishing: between 40°10' N latitude and 36°N latitude during March and April, and south of 36°N latitude (in the Conception area) during January and February. During those periods, vessels were allowed to fish for sablefish in the daily-trip-limit fishery and also slope rockfish. During the open season, trip limits for nearshore rockfish were substantially reduced from 1999 levels. Restrictions on shelf rockfish species were also in effect.

The new trip limit categories required commercial fishers to sort these species and species groups before weighing their catch onshore. In addition, trawl vessels were required to specify which type of trawl gear they had onboard for each fishing trip. Sorting of rockfish into the three new categories (nearshore, shelf, and slope) was a major change for commercial fishers and fish buyers and a major challenge as well.

As the Council anticipated in November 1999, problems with the new management approach quickly became apparent. Trawlers using large footrope gear in deep water targeting Petrale and rex soles often found it impossible to completely avoid English sole, which is typically a nearshore-shelf species. No provision for retention of small amounts of English sole had been provided, and trawlers had to discard all they caught. The Council considered this discard unnecessary, but did not want to create an opportunity for trawlers to target English sole with large footrope gear due to potential impacts on shelf rockfish. The solution approved at the April 2000 meeting was to provide a 400-pound retention allowance of flatfish species other than Dover, Petrale, and rex soles, beginning May 1, 2000. This was intended to eliminate most of the discard of English sole and other flatfish in the deepwater flatfish fisheries for the remainder of the year.

Landings of nearshore rockfish by the limited entry fleet were far below expectations early in the year, prompting the Council to increase the limits at each of the Council meetings. The limited entry daily-trip-limit fishery for sablefish north of 36° N latitude also was very slow and the cumulative limits were increased.

Landings by the open access fishery were also far below expectations, indicating the initial limits nearly shut down the fishery. The Council relaxed the nearshore rockfish trip limit slightly, including the black rockfish sublimit, so open access fishers would be able to reach the year 2000 allocation.

The Council made a special provision for open access fishers landing in Pacific City, Oregon by increasing the monthly rockfish limit from May 1 through September 30 for landings in Pacific City, but then no groundfish could be landed in Pacific City after that date. During this five-month period, Pacific City fishers were expected to be able to take about as much rockfish as fishers on other parts of the West Coast during the entire year. The open access nontrawl sablefish daily fishery cumulative limits were also increased during the year.

Although inseason reports indicated landings of several species were far below expectations, the Council was concerned increases for some species could result in overharvesting of bocaccio, canary rockfish and other species.

Trawl fishers using small footrope trawl gear were unable to avoid yellowtail rockfish when trawling for flatfish, especially during summer, so the Council changed the provisions. Vessels using small footrope trawls were allowed to retain yellowtail rockfish only if they had flatfish onboard, but were allowed to retain yellowtail up to 33% of the weight of all flatfish (except arrowtooth flounder) on board, plus 10% of the weight of all arrowtooth flounder on board.

Lingcod landings by open access fishers were higher than expected, and the season was closed coastwide August 1 for the remainder of the year. This included the pink shrimp fishery. The open access fishery reached its allocation before the end of July.

Rebuilding requirements for lingcod and bocaccio also impacted recreational fisheries in 2000, as did canary rockfish. Each of the three states developed management proposals for lingcod and rockfish. California and Washington recommended seasonal closures for lingcod, while Oregon achieved the necessary catch reduction with a combination of minimum and maximum size limits. Recreational fishers in California (South of Cape Mendocino) faced two months of closures for all rockfish in addition to the lingcod closures. In spite of these closed periods and reduced bag rockfish limits, the catch of lingcod and bocaccio by the California recreational fishery was higher than anticipated, resulting in the threat of a late season closure.

2001 Fishery

No summary of the 2001 fishery was provided.

FOREIGN AND JOINT VENTURE FISHING

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

Consistent with the intent of the Magnuson-Stevens Act to encourage development of domestic fisheries, joint venture, and shore-based landings of whiting generally increased after 1978 (Table 56). Although shore-based deliveries of whiting grew during this period, they comprised less than 5% of the total foreign and domestic harvest of whiting each year from 1978 to 1990. However, with the introduction of the domestic at-sea processing fleet in late 1990, U.S. processors took 7% of the whiting quota (8,115 mt by shore-based plants and 4,713 mt by at-sea processing vessels). In 1991, U.S. processors completely displaced joint venture foreign processing.

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

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

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

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

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

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

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

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

WHITING SEASON SUMMARY, 1994-2001

1994 Fishery

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

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

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

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

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

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

For the year, a total of 252,729 mt of whiting had been caught by both the at-sea and shore-based sectors (179,073 mt at-sea and 73,656 mt shoreside), over 97% of the 260,000 mt harvest guideline. In 1994 as in 1991 to 1993, National Marine Fisheries Service (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 Fishery

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

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

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

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

Note: Catch data in this section are preliminary and may differ from those found elsewhere in this document. The catch of whiting in this section includes approximately 1,837 mt of whiting discarded from at-sea

processors in 1995. These discards were counted against the allocations and harvest guideline. There were virtually no discards from shore-based vessels participating in the 1995 experimental fishery (predominantly in Oregon), because these vessels were not allowed to discard groundfish or salmon at sea. There is no estimate for discards from catcher vessels delivering to at-sea processors or for the catcher vessels delivering shoreside that did not participate in the experimental fishing permit program.

1996 Fishery

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

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

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

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

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

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

Note: Catch data in this section are preliminary and may differ from those found elsewhere in this document. The catch of whiting in this section includes approximately 6,570 mt of whiting discarded from at-sea processors in 1996. These discards were counted against the allocations and harvest guideline. There were

virtually no discards from shore-based vessels participating in the 1996 experimental fishery (predominantly in Oregon), because these vessels were not allowed to discard groundfish or salmon at sea. There is no estimate for discards from catcher vessels delivering to at-sea processors or for the catcher vessels delivering shoreside that did not participate in the experimental fishing permit program.

1997 Fishery

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

A new framework was established for setting primary season dates based on the following factors: size of the harvest guidelines for whiting and bycatch species, age/size structure of the whiting population, expected harvest of bycatch and prohibited species, availability and stock status of prohibited species, expected participation by catchers and processors, environmental conditions, timing of alternate or competing fisheries, industry agreement, fishing or processing rates, and other relevant information. The starting dates are also constrained by the incidental take statement to protect threatened or endangered salmon, requiring the fishery north of 42° N latitude to start after May 14. The California shore-based season (south of 42° N latitude) opened in late April, closed at noon on May 27 when the 5% cap (4,334 mt) was attained, and resumed June 15 when the shore-based "regular" (north of 42° N latitude) season and the mothership and catcher/processor sectors opened on May 15.

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

In 1997, preliminary figures indicate chinook salmon bycatch in catcher/processor and mothership processing sectors remained similar to the low levels of 1996. The chinook bycatch rate in the catcher-processor fishery was about .008 chinook per metric ton of whiting, down from 0.009 in 1996 and well below the guideline of 0.05 chinook per mt. Chinook bycatch in the mothership fishery increased slightly from 0.018 to 0.026 salmon per mt of whiting. Chinook bycatch taken during the tribal whiting fishery was 0.102 chinook per metric ton of whiting, which exceeded the chinook guideline of 0.05 per metric ton of whiting. However, when the tribal and non-tribal mothership data are combined they are just at the 0.05 rate. Based on preliminary ODFW data, the coastwide salmon bycatch rate for the shore-based sector was 0.017, well below the 0.05 guideline.

Preliminary NMFS data indicates that yellowtail rockfish bycatch in the catcher/processor and mothership fisheries was 290 mt (116 mt for catcher/processors and 174 mt for non-tribal motherships) and 113 mt in the tribal fishery. Widow rockfish bycatch rate in the catcher/processor and mothership fisheries was 207 mt (73 mt for catcher/processors and 134 mt for non-tribal motherships) and 9 mt in the tribal fishery. Industry

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

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

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

1998 Fishery

In 1998, the U.S. whiting allocation continued to be fully utilized by the domestic and tribal fishing industries. 8% or 232,000 mt of the 290,000 mt transboundary whiting acceptable biological catch (ABC) was apportioned to the U.S. As in 1997, 25,000 mt was set aside for treaty Indian tribes on the coast of Washington State, resulting in a commercial harvest guideline of 207,000 mt. The commercial harvest guideline was further divided with 34% going to the catcher/processor sector; 24% going to the mothership sector; and 42% going to the shoreside sector. When applied to the 1998 commercial harvest guideline of 207,000 mt, these percentages resulted in whiting allocations of 70,400 mt for the catcher/processor sector, 49,700 mt for the mothership sector, and 86,900 mt for the shoreside sector. Provisions for reallocating any unused allocation to other sectors were not needed in 1998.

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

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

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

Six mothership vessels received 50,087 mt of whiting (1% over its allocation of the commercial harvest guideline) and closed on May 31, 1998. Seven catcher/processor vessels took 70,365 mt of whiting (virtually equal to its allocation) and closed on August 7, 1998. For the tribal fishery, one mothership processed 24,509 mt of whiting (2% below the tribal allocation). Thirty eight vessels in the Washington, Oregon, and

California shore-based sector delivered 87,862 mt (1% over its allocation) to 13 processors (7 in Oregon, 3 in Washington, and 3 in California) before the October 13, 1998 closure. Upon closure of the primary season for the shore-based sector, the 10,000 pound trip limit resumed as before the primary season. This small trip limit is intended to accommodate small bait and fresh fish markets and bycatch in other fisheries.

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

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

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

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

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

1999 Fishery

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

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

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

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

A total of 224,453 mt was harvested in 1999, 7,547 mt (3.3%) under the OY of 232,000 mt. About 1,080 mt of whiting were discarded due to small size and poor quality (364 mt by catcher-processors, 621 mt by non-tribal motherships and 95 mt by the tribal mothership). Because the shore-based fishery operates under exempted fishing permits that allow unsorted catch to be landed, there were no discards.

Preliminary data indicate that the six non-tribal mothership vessels received 47,580 mt of whiting (0.7% under its allocation) and closed on June 2, 1999. Six catcher-processor vessels took 67,679 mt of whiting (0.2% under its allocation) and closed on July 21, 1999. The tribal mothership received 25,844 mt of whiting (20.5% under its allocation). The tribal vessels elected to cease fishing on November 6 before the tribal allocation was taken, because of low whiting catch rates and high incidental catch of chinook salmon. In the shore-based sector, 37 vessels delivered 83,350 mt (0.5% under its allocation) to 12 (8 in Oregon, 2 in Washington, and 2 in California) processors and closed September 13, 1999. Upon closure of the primary season for the shore-based sector, the 10,000 pound trip limit resumed as before the primary season. This small trip limit was intended to accommodate small bait and fresh fish markets and bycatch in other fisheries.

The major groundfish bycatch species in the whiting fishery are yellowtail and widow rockfish. Bycatch of yellowtail rockfish in the at-sea processing portion of the whiting fishery was 1,135 mt (431 mt by catcher-processors, 253 mt by non-tribal motherships, 451 mt by the tribal fishery) exceeding the 600 mt which was expected to be taken. Bycatch of widow rockfish in the at-sea processing portion of the whiting fishery was 186 mt (101 mt by catcher-processors, 48 mt by non-tribal motherships, 37 mt by the tribal fishery). Yellowtail and widow rockfish bycatch levels from the shore-based sector were 481 mt and 192 mt, respectively.

Chinook salmon bycatch in the at-sea processing fleet increased over levels seen in recent years. The chinook bycatch rate of 0.040 chinook per metric ton of whiting in the catcher-processor fleet was up from the 1998 rate of 0.007 chinook per metric ton of whiting, but was well below the guideline of 0.05 chinook per mt of whiting. Chinook bycatch in the non-tribal mothership fishery was 0.036. This is greater than the 1998 rate of 0.019 chinook per mt of whiting, but less than the 0.05 chinook per mt guideline. Chinook bycatch in the tribal whiting fishery was 0.174 chinook per metric ton of whiting, up from the 1998 rate of 0.085 chinook per metric ton of whiting. The at-sea fishery as a whole incidentally caught 8,888 chinook salmon (2,704 by catcher-processors, 1,687 by non-tribal motherships, and 4,497 by the tribal mothership). The bycatch rate of chinook salmon species taken by the shore-based sector was 0.020 chinook per mt of whiting, up from 0.016 per metric ton of whiting in 1998. The number of chinook taken by the shore-based fleet was 1,696.

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

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

2000 Fishery

Pacific Whiting As in 1999, the U.S.-Canada average ABC of 310,000 mt (based on a maximum sustainable yield (MSY) proxy of $F_{40\%}$) for 1999-2000 was reduced to 290,000 mt following the application of the 40-10 default harvest policy (because whiting is at 37% of its unfished biomass). The U.S. ABC was 80% of the U.S.-Canada ABC, resulting in a U.S. ABC of 232,000 mt. The U.S. total catch OY was then set equal to the U.S. ABC.

A set aside of 32,500 mt for treaty Indian tribes on the coast of Washington state was deducted from the OY, the resulting commercial OY was 199,500 mt. The commercial OY was further divided with: 34% going to the catcher-processor sector, 24% going to the mothership sector, and 42% going to the shore-based sector. When applied to the commercial OY, these percentages resulted in whiting allocations of 67,830 mt for the catcher-processor sector, 47,880 mt for the mothership sector, and 83,790 mt for the shore-based sector.

The primary seasons for the mothership and catcher-processor sectors began May 15. The catcher-processor sector continued to operate as a voluntary quota sharing program where each of the catcher-processor companies agreed to harvest a specific share of the allocation, while the mothership and shore-based sectors operated under more competitive conditions (first come, first served) for their sector's allocation. The shore-based season in most of the Eureka area (between 42°00'- 40°30' N latitude) began on April 1 and the fishery south of 40°30' N latitude opened April 15. The shore-based whiting fishery south of 42°00' N latitude reached its allocation (5% of the shore-based whiting allocation or 4,190 mt) early and was restricted to per-trip limits (20,000 lb per trip limit with a 10,000 lb per trip limit shoreward of the 100 fathom contour in the Eureka area) from June 8 until June 15. The primary season for the shore-based fishery north of 42°00' N latitude began on June 15.

The pace of the fishery was slower in 2000 than in recent years. The distribution of whiting and efforts to avoid incidental catch of chinook salmon and yellowtail rockfish contributed to the slower pace. Six non-tribal mothership vessels received 46,840 mt of whiting (2% under their allocation) before the fishery closed on June 9. Eight catcher-processor vessels took 67,815 mt of whiting (100% of their allocation) before the fishery closed on November 6. The tribal mothership received 6,251 mt of whiting (81% under their allocation). The tribal vessels elected to cease fishing on September 19, before the tribal allocation was completely taken. In the shore-based sector, 35 vessels delivered 85,828 mt (2% over their allocation) to 12 processors in Oregon, Washington, and California. The shore-based fishery reached its allocation of 87,790 mt on September 15. Upon reaching the allocation, the per-trip limits, which were in place prior to the primary season, were resumed. This small trip limit was intended to accommodate small bait and fresh fish markets and bycatch in other fisheries.

On September 28, NMFS received notification from the treaty Indian fishery participants indicating that 10,000 mt of the tribal allocation was not expected to be harvested before the end of the fishing year. NMFS considered reapportioning the surplus whiting from the tribal allocation to the catcher-processor, mothership, and shore-based sectors. However, because the 11,000 chinook salmon threshold, defined in the biological opinion for chinook salmon in the whiting fishery, had been exceeded, no reapportionment occurred. A total of 206,734 mt of whiting was harvested by all sectors in 2000, 25,266 mt (11%) under the OY of 232,000 mt. About 295 mt of whiting were discarded due to small size and poor quality (165 mt by catcher-processors, 130 mt by non-tribal motherships, and 0 mt by the tribal mothership). Because the shore-based fishery operated under exempted fishing permits (EFPs) that allowed unsorted catch to be landed, there were no discards for the shore-based fishery.

The major groundfish bycatch species in the whiting fishery are yellowtail and widow rockfish. Bycatch of yellowtail rockfish in the at-sea processing portion of the whiting fishery was 656 mt (270 mt by catcher-processors, 286 mt by non-tribal motherships, and 100 mt by the tribal fishery) exceeding the 600 mt at-sea allowance. Bycatch of widow rockfish in the at-sea processing portion of the whiting fishery was 231 mt (70 mt by catcher-processors, 151 mt by non-tribal motherships, 10 mt by the tribal fishery). Yellowtail and widow rockfish bycatch levels from the shore-based sector were 19 mt and 8 mt, respectively.

Overall, the chinook salmon bycatch increased over levels seen in recent years. The chinook bycatch rate of 0.027 chinook per metric ton of whiting in the catcher-processor fleet was down from the 1999 rate of 0.040 chinook per metric ton of whiting, and below the guideline of 0.05 chinook per mt of whiting. Chinook bycatch in the non-tribal mothership fishery was 0.094 chinook per metric ton of whiting. This was considerably greater than the 1999 rate of 0.036 chinook per mt of whiting, and the 0.05 chinook per mt of whiting guideline. Chinook bycatch in the tribal whiting fishery was 0.311 chinook per metric ton of whiting and was up from the 1999 rate of 0.172 chinook per metric ton of whiting. The at-sea fishery as a whole incidentally caught 8,207 chinook salmon (1,839 by catcher-processors, 4,421 by non-tribal motherships, and 1,947 by the tribal mothership). The bycatch rate of chinook salmon taken by the shore-based sector was 0.039 chinook per mt of whiting, this was up from 0.020 per metric ton of whiting in 1999. The number of chinook taken by the shore-based fleet was 3,321.

To provide additional data for monitoring the fishery, all but one at-sea processor voluntarily carried two NMFS-trained observers while participating in the fishery. In addition, most processing vessels used motion compensating scales to weigh unsorted catch at sea. Weighing catch is expected to enhance the accuracy of the data used to estimate the total catch of whiting and incidental species.

2001 Fishery

Pacific Whiting The U.S.-Canada ABC of 266,000 mt, based on an assessment update using limited new data and an F_{MSY} proxy of $F_{40\%}$, was reduced to 238,000 mt following the application of the 40-10 default harvest policy (because whiting is at 37% of its unfished biomass). The U.S. ABC was 80% of the U.S.-Canada ABC, resulting in a U.S. ABC of 190,400 mt. The U.S. total catch OY was then set equal to the U.S. ABC. A set aside of 27,500 mt was made for the treaty Indian tribes on the coast of Washington State. This set aside, which was based on a "sliding scale" framework adopted in 1999, was 5,000 mt less than the tribal set aside of 32,500 mt in 2000. The commercial OY of 162,900 mt (the OY minus the tribal allocation) was divided with 34% (55,386 mt) going to the catcher-processor sector, 24% (39,096 mt) going to the mothership sector, and 42% (68,418 mt) going to the shore-based sector.

Season start dates have remained the same since 1997. The primary seasons for the mothership and catcher-processor sectors began May 15. The catcher-processor sector continued to operate as a voluntary quota sharing program where each of the catcher-processor companies agreed to harvest a specific share of the allocation, while the mothership and shore-based sectors operated under more competitive conditions (first come first served) for their sector's allocation. The shore-based season in most of the Eureka area (between 42°00'- 40°30' N latitude) began on April 1, and the fishery south of 40°30' N latitude opened April 15. The shore-based fishery north of 42°00' N latitude began on June 15.

As in previous years, the states of California, Oregon and Washington applied for and were issued EFPs for vessels landing more than 10,000 mt of whiting per trip during the primary season. EFPs allow vessels delivering to shore-based harvesters to delay sorting until offload. Delaying sorting until offload allows state biologists to collect information on prohibited and incidentally caught species at the processing facilities. To provide total catch data for monitoring the at-sea processing sectors of the fishery, all at-sea processing vessels voluntarily carried two NMFS-trained observers while participating in the fishery.

To increase the utilization of bycatch that is otherwise discarded as a result of trip limits, Amendment 13 to the Groundfish Fishery Management Plan implemented an increased utilization program for the at-sea whiting processors. This program became effective on June 1, 2001. Under this program, participating catcher-processors and motherships may exceed groundfish trip limits without penalty, providing specific conditions are met. The specified conditions include carrying more than one NMFS-trained observer on 90% or more of the vessels fishing days.

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

**FINAL GROUND FISH MANAGEMENT TEAM ACCEPTABLE
BIOLOGICAL CATCH AND HARVEST GUIDELINE
RECOMMENDATIONS FOR 2002**

No statement from the Groundfish Management Team was provided for 2002.

TABLE 1. Estimated domestic commercial groundfish landings (mt) for all management areas, 1984-2000.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	4,051	3,877	1,894	2,584	2,650	3,579	2,932	3,167	1,883	2,200	1,904	1,467	1,557	1,568	350	358	144
Pacific Cod	585	411	331	2,281	3,345	2,188	1,064	1,796	1,778	1,369	866	504	445	595	413	280	279
Pacific Whiting	2,721	3,894	3,463	4,795	6,867	7,414	12,828	204,323	198,856	137,916	248,734	174,628	191,333	230,413	231,099	223,385	206,439
Sablefish	14,074	14,315	13,288	12,786	10,876	10,439	9,179	9,508	9,365	8,145	7,579	7,905	8,318	7,942	4,395	6,646	6,255
Total Roundfish	21,466	22,545	19,021	22,484	23,778	23,663	26,025	218,823	211,918	149,657	259,129	184,598	201,769	240,667	236,455	230,831	213,286
Rockfish																	
Canary	2,199	2,484	2,023	2,844	2,743	3,092	2,680	3,015	2,713	2,064	1,120	907	1,228	1,107	1,177	667	57
Pacific Ocean Perch	1,644	1,495	1,387	1,078	1,382	1,448	1,036	1,392	1,095	1,259	979	811	778	627	619	480	138
Shortbelly	3	39	22	0	0	3	9	4	53	8	43	31	36	77	21	9	20
Widow	9,669	9,093	9,418	12,732	10,484	12,473	10,031	6,482	6,036	8,209	6,420	6,742	6,057	6,463	3,954	3,985	3,866
Thornyheads	2,379	2,997	2,975	3,748	5,662	8,083	10,085	6,512	8,874	9,228	8,049	7,554	6,532	5,502	3,516	2,645	2,367
Other Rockfish																	
Bocaccio	4,429	2,584	2,383	2,659	2,285	3,007	2,733	1,903	1,905	1,715	1,184	880	601	445	287	154	29
Chilipepper	2,212	2,511	1,954	1,760	2,185	2,879	2,873	3,185	2,502	2,348	1,864	1,983	1,818	2,057	1,436	931	445
Yellowtail	5,175	3,456	4,448	4,465	5,805	5,269	4,824	3,949	6,002	5,457	5,474	4,954	5,230	2,182	2,878	2,747	3,173
Remaining Rockfish ^{a/}	8,623	10,271	8,993	8,401	8,467	7,461	7,283	7,333	6,647	6,274	5,819	4,968	5,022	4,627	5,299	1,912	1,433
Unspecified Rockfish ^{b/}	3,681	2,419	3,430	2,618	1,970	1,620	1,728	1,833	1,292	1,689	716	843	933	729	827	448	49
Total Rockfish	40,014	37,348	37,035	40,304	40,983	45,335	43,283	35,608	37,118	38,252	31,669	29,673	28,235	23,816	20,013	13,978	11,578
Flatfish																	
Arrowtooth Flounder	2,379	2,679	2,230	2,830	1,946	3,552	5,824	4,945	3,576	2,713	3,249	2,322	2,192	2,343	3,169	5,286	3,279
Dover Sole	19,205	20,537	17,355	18,440	18,116	18,815	15,697	18,223	16,035	14,339	9,358	10,565	12,186	10,124	8,010	9,137	8,739
English Sole	1,721	1,930	2,037	2,482	2,102	2,412	1,912	2,185	1,626	1,602	1,124	1,134	1,154	1,505	1,140	913	762
Petrale Sole	1,739	1,839	1,748	2,205	2,149	2,153	1,765	1,927	1,554	1,503	1,375	1,659	1,829	1,945	1,463	1,498	1,883
Other Flatfish	2,655	3,455	2,758	2,913	2,729	2,966	2,504	3,236	2,015	1,937	2,437	2,558	1,999	2,309	1,712	2,015	1,601
Total Flatfish	27,700	30,440	26,128	28,869	27,042	29,898	27,701	30,516	24,805	22,094	17,544	18,239	19,359	18,227	15,494	18,849	16,265
Other Fish																	
	618	778	440	485	513	589	827	1,347	1,539	2,180	2,491	1,740	3,318	3,895	2,651	2,665	2,631
Grand Total	89,798	91,111	82,624	92,143	92,317	99,484	97,897	286,294	275,381	212,183	310,832	234,251	252,681	286,604	274,613	266,923	243,760

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.^{b/} Unspecified rockfish are those rockfish specifically categorized as "UROK" in the PacFIN landings.

TABLE 2. Estimated domestic commercial groundfish landings (in thousands of dollars) for all management areas, 1984-2000. Values are actual values for the year specified, and not adjusted for inflation.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	\$2,183	\$2,237	\$1,322	\$2,151	\$2,138	\$2,768	\$2,291	\$2,457	\$1,617	\$1,846	\$1,738	\$1,487	\$1,605	\$1,660	\$571	\$628	\$343
Pacific Cod	\$300	\$222	\$200	\$1,653	\$1,951	\$1,250	\$634	\$1,189	\$1,276	\$974	\$636	\$432	\$388	\$511	\$398	\$264	\$290
Pacific Whiting	\$406	\$583	\$448	\$663	\$1,136	\$1,071	\$1,824	\$23,705	\$23,253	\$10,205	\$18,928	\$18,053	\$16,712	\$27,385	\$18,428	\$18,642	\$18,736
Sablefish	\$6,806	\$10,522	\$10,965	\$13,425	\$12,499	\$10,797	\$9,661	\$14,342	\$13,638	\$10,009	\$13,767	\$23,449	\$25,821	\$27,845	\$11,333	\$17,059	\$20,188
Total Roundfish	\$9,711	\$13,592	\$12,953	\$17,910	\$17,745	\$15,910	\$14,428	\$41,733	\$39,853	\$23,178	\$35,357	\$44,082	\$45,351	\$58,332	\$32,045	\$37,798	\$41,054
Rockfish																	
Canary	\$1,128	\$1,428	\$1,283	\$2,130	\$1,729	\$2,024	\$1,825	\$2,139	\$2,029	\$1,577	\$1,037	\$1,018	\$1,271	\$1,250	\$1,387	\$775	\$75
Pacific Ocean Perch	\$818	\$830	\$854	\$779	\$876	\$871	\$616	\$919	\$730	\$833	\$719	\$635	\$574	\$452	\$524	\$404	\$132
Shortbelly	\$1	\$8	\$15	\$0	\$0	\$2	\$5	\$3	\$41	\$4	\$19	\$14	\$11	\$36	\$10	\$2	\$7
Widow	\$4,822	\$5,034	\$5,785	\$9,064	\$6,683	\$7,228	\$6,003	\$4,055	\$3,858	\$5,217	\$4,469	\$4,992	\$4,155	\$4,543	\$3,242	\$3,425	\$3,794
Thornyheads	\$1,267	\$1,657	\$1,826	\$2,675	\$4,389	\$6,591	\$8,550	\$6,506	\$8,977	\$9,545	\$12,869	\$16,783	\$12,579	\$9,542	\$5,583	\$5,076	\$5,259
Other Rockfish																	
Bocaccio	\$2,549	\$1,677	\$1,785	\$2,206	\$1,897	\$2,299	\$2,130	\$1,460	\$1,688	\$1,592	\$1,096	\$820	\$548	\$406	\$286	\$195	\$45
Chillipepper	\$1,228	\$1,706	\$1,407	\$1,376	\$1,655	\$2,209	\$2,154	\$2,551	\$2,108	\$2,329	\$1,703	\$1,861	\$1,614	\$1,808	\$1,327	\$965	\$596
Yellowtail	\$2,596	\$1,954	\$2,832	\$3,300	\$3,685	\$3,377	\$3,184	\$2,776	\$4,329	\$3,930	\$4,157	\$4,067	\$3,973	\$1,862	\$2,462	\$2,343	\$3,141
Remaining Rockfish ^{a/}	\$5,577	\$7,163	\$7,314	\$7,435	\$7,010	\$6,227	\$6,450	\$7,011	\$6,930	\$6,009	\$6,553	\$6,399	\$6,256	\$5,647	\$6,292	\$3,749	\$3,535
Unspecified Rockfish ^{b/}	\$2,152	\$1,755	\$2,600	\$2,156	\$1,400	\$1,316	\$1,589	\$1,714	\$1,012	\$1,448	\$686	\$870	\$1,140	\$845	\$975	\$569	\$101
Total Rockfish	\$22,138	\$23,212	\$25,700	\$31,122	\$29,324	\$32,143	\$32,507	\$29,134	\$31,701	\$32,485	\$33,310	\$37,460	\$32,121	\$26,393	\$22,088	\$17,503	\$16,686
Flatfish																	
Arrowtooth Flounder	\$503	\$578	\$500	\$913	\$507	\$775	\$1,343	\$1,250	\$836	\$584	\$699	\$569	\$492	\$506	\$715	\$1,149	\$839
Dover Sole	\$9,771	\$10,861	\$9,829	\$12,383	\$12,138	\$11,394	\$9,242	\$12,085	\$9,957	\$8,615	\$6,081	\$7,588	\$8,288	\$6,552	\$6,013	\$6,624	\$6,828
English Sole	\$1,217	\$1,407	\$1,604	\$2,195	\$1,818	\$1,941	\$1,380	\$1,656	\$1,182	\$1,122	\$844	\$922	\$912	\$1,080	\$879	\$675	\$598
Petrale Sole	\$2,714	\$2,977	\$2,985	\$3,960	\$3,862	\$3,874	\$3,209	\$3,508	\$2,760	\$2,600	\$2,535	\$3,478	\$3,692	\$3,864	\$3,046	\$3,139	\$4,214
Other Flatfish	\$2,159	\$2,829	\$2,510	\$2,828	\$2,470	\$2,550	\$2,077	\$2,748	\$1,723	\$1,746	\$2,064	\$2,088	\$1,683	\$1,797	\$1,341	\$1,569	\$1,447
Total Flatfish	\$16,365	\$18,653	\$17,428	\$22,280	\$20,795	\$20,535	\$17,252	\$21,248	\$16,458	\$14,667	\$12,223	\$14,645	\$15,067	\$13,799	\$11,995	\$13,155	\$13,925
Other Fish																	
	\$382	\$411	\$335	\$361	\$336	\$362	\$376	\$573	\$546	\$688	\$819	\$659	\$1,204	\$1,444	\$1,013	\$900	\$1,033
Grand Total	\$48,596	\$55,868	\$56,416	\$71,672	\$68,200	\$68,949	\$64,562	\$92,688	\$88,557	\$71,018	\$81,709	\$96,847	\$93,744	\$99,967	\$67,141	\$69,356	\$72,699

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 3. Estimated commercial groundfish landings (mt) for the U.S. portion of the Vancouver management area, 1984-2000.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	1,746	1,852	569	728	621	1,000	987	1,452	556	651	529	290	360	301	50	47	22
Pacific Cod	493	376	291	1,386	1,983	1,270	825	1,367	1,470	958	727	442	375	548	362	256	270
Pacific Whiting	2		1				12	5,823	33,308	10,349	44,046	9,646	47,533	60,716	64,617	102,616	73,979
Sablefish	3,723	3,066	1,718	1,772	1,862	1,836	1,519	1,705	1,546	1,481	1,227	1,758	1,609	1,391	837	1,371	1,147
Total Roundfish	5,979	5,297	2,601	3,910	4,488	4,128	3,347	10,353	36,890	13,439	46,530	12,137	49,877	62,956	65,866	104,290	75,420
Rockfish																	
Canary	590	944	857	980	852	1,292	1,142	916	838	340	173	159	194	280	334	178	10
Pacific Ocean Perch	607	567	644	375	585	486	429	656	659	599	433	381	342	260	280	234	41
Shortbelly								0		0		0		0			
Widow	461	462	584	578	341	694	1,375	872	869	1,736	959	917	717	862	579	643	462
Thornyheads	175	27	10	77	107	239	230	251	597	1,008	1,154	1,020	604	591	326	190	126
Other Rockfish																	
Bocaccio	147	129	82	116	99	284	305	394	216	140	53	51	36	57	48	11	2
Chillipepper						0		8	0					0	0	0	0
Yellowtail	1,013	943	1,544	1,193	1,709	1,522	1,462	959	1,247	1,658	1,618	1,473	1,371	513	786	1,057	1,138
Remaining Rockfish ^{a/}	844	664	711	546	479	723	684	810	603	525	299	332	286	225	291	139	163
Unspecified Rockfish ^{b/}	470	673	536	425	471	234	166	730	575	674	493	360	353	292	440	263	26
Total Rockfish	4,307	4,409	4,367	4,289	4,642	5,475	5,793	5,596	5,604	6,680	5,181	4,694	3,901	3,079	3,084	2,715	1,968
Flatfish																	
Arrowtooth Flounder	1,828	1,696	1,436	2,004	1,298	2,429	4,182	3,288	2,782	1,965	2,700	1,616	1,547	1,671	2,556	4,175	2,325
Dover Sole	3,184	2,683	1,540	1,339	2,272	2,551	2,264	2,396	1,771	1,691	1,155	1,179	1,459	995	897	1,107	1,217
English Sole	314	311	284	409	428	647	512	497	318	398	336	327	182	301	264	173	200
Petrale Sole	373	278	239	351	357	393	285	291	247	357	222	265	309	299	320	290	419
Other Flatfish	188	408	133	109	285	469	148	396	139	87	109	85	81	94	137	44	70
Total Flatfish	5,886	5,375	3,633	4,213	4,640	6,488	7,390	6,868	5,257	4,497	4,522	3,473	3,578	3,360	4,174	5,789	4,232
Other Fish																	
	274	303	116	159	212	291	491	916	1,069	1,277	1,354	412	324	633	526	568	766
Grand Total	16,446	15,384	11,318	12,572	13,982	16,383	17,021	23,734	48,820	25,893	57,587	20,716	57,681	70,029	73,649	113,362	82,386

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.^{b/} Unspecified rockfish are those rockfish specifically categorized as "UPOCK" in the PacFIN landings.

TABLE 4. Estimated commercial groundfish landings (in thousands of dollars) for the U.S. portion of the Vancouver management area, 1984-2000. Values are actual values for the year specified, and not adjusted for inflation.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	\$904	\$1,032	\$380	\$594	\$474	\$713	\$703	\$1,060	\$456	\$498	\$436	\$274	\$346	\$278	\$62	\$60	\$30
Pacific Cod	\$253	\$202	\$176	\$1,006	\$1,143	\$735	\$499	\$905	\$1,049	\$679	\$532	\$379	\$326	\$471	\$344	\$240	\$278
Pacific Whiting	\$0	\$0	\$0	\$0	\$0	\$0	\$2	\$761	\$5,411	\$780	\$4,036	\$1,000	\$6,050	\$8,586	\$6,777	\$8,802	\$6,621
Sablefish	\$1,966	\$3,506	\$1,834	\$2,397	\$2,883	\$2,543	\$2,219	\$3,802	\$3,039	\$2,480	\$2,562	\$6,250	\$5,678	\$5,269	\$2,370	\$3,930	\$4,182
Total Roundfish	\$3,127	\$4,742	\$2,397	\$4,008	\$4,508	\$3,998	\$3,425	\$6,531	\$9,959	\$4,437	\$7,565	\$7,904	\$12,401	\$14,604	\$9,553	\$13,031	\$11,110
Rockfish																	
Canary	\$282	\$519	\$528	\$711	\$541	\$772	\$684	\$599	\$575	\$231	\$129	\$145	\$146	\$222	\$313	\$157	\$10
Pacific Ocean Perch	\$301	\$315	\$396	\$268	\$371	\$295	\$255	\$432	\$441	\$402	\$320	\$302	\$257	\$191	\$238	\$202	\$40
Shortbelly								\$0		\$0		\$0		\$0			
Widow	\$219	\$252	\$359	\$411	\$228	\$407	\$812	\$559	\$584	\$1,083	\$646	\$665	\$497	\$609	\$454	\$533	\$449
Thornyheads	\$82	\$15	\$6	\$55	\$80	\$183	\$192	\$250	\$534	\$941	\$1,737	\$2,138	\$1,103	\$961	\$470	\$313	\$238
Other Rockfish																	
Bocaccio	\$69	\$71	\$51	\$85	\$65	\$170	\$181	\$258	\$147	\$93	\$39	\$40	\$25	\$45	\$40	\$9	\$2
Chilipepper						\$0		\$5	\$0					\$0	\$0	\$0	\$0
Yellowtail	\$491	\$519	\$960	\$857	\$1,086	\$908	\$871	\$633	\$854	\$1,121	\$1,181	\$1,179	\$1,032	\$396	\$592	\$859	\$1,125
Remaining Rockfish ^{a/}	\$404	\$367	\$437	\$390	\$315	\$438	\$427	\$541	\$420	\$381	\$249	\$251	\$199	\$167	\$233	\$119	\$166
Unspecified Rockfish ^{b/}	\$226	\$437	\$374	\$343	\$324	\$204	\$161	\$511	\$401	\$492	\$447	\$335	\$320	\$269	\$422	\$299	\$35
Total Rockfish	\$2,073	\$2,496	\$3,112	\$3,120	\$3,008	\$3,376	\$3,583	\$3,789	\$3,956	\$4,743	\$4,748	\$5,054	\$3,580	\$2,860	\$2,762	\$2,490	\$2,064
Flatfish																	
Arrowtooth Flounder	\$381	\$363	\$322	\$644	\$321	\$533	\$966	\$837	\$654	\$425	\$572	\$394	\$348	\$359	\$576	\$912	\$590
Dover Sole	\$1,600	\$1,439	\$880	\$882	\$1,555	\$1,563	\$1,347	\$1,573	\$1,140	\$1,085	\$754	\$883	\$1,054	\$665	\$678	\$799	\$950
English Sole	\$209	\$204	\$207	\$332	\$348	\$497	\$351	\$352	\$221	\$272	\$239	\$256	\$140	\$207	\$200	\$135	\$149
Petrale Sole	\$587	\$448	\$399	\$639	\$668	\$725	\$529	\$544	\$452	\$614	\$411	\$577	\$594	\$576	\$660	\$627	\$947
Other Flatfish	\$137	\$276	\$116	\$92	\$208	\$332	\$107	\$280	\$111	\$67	\$95	\$79	\$61	\$63	\$106	\$34	\$55
Total Flatfish	\$2,915	\$2,731	\$1,925	\$2,589	\$3,099	\$3,649	\$3,301	\$3,585	\$2,579	\$2,463	\$2,070	\$2,189	\$2,198	\$1,871	\$2,220	\$2,506	\$2,692
Other Fish																	
	\$52	\$58	\$24	\$36	\$57	\$87	\$145	\$281	\$332	\$364	\$420	\$127	\$93	\$195	\$150	\$178	\$277
Grand Total	\$8,167	\$10,026	\$7,457	\$9,753	\$10,673	\$11,111	\$10,453	\$14,185	\$16,827	\$12,007	\$14,804	\$15,274	\$18,271	\$19,531	\$14,685	\$18,205	\$16,143

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.

^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 5. Estimated commercial groundfish landings (mt) for the Columbia management area, 1984-2000.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	1,259	1,273	733	885	1,027	1,228	758	867	650	777	684	568	638	631	102	120	48
Pacific Cod	90	34	40	803	1,345	917	239	429	307	405	136	61	70	46	51	24	9
Pacific Whiting	383	882	480	240	249	88	6,941	69,338	143,304	124,462	200,423	159,750	130,863	157,737	160,610	119,283	126,773
Sablefish	4,663	5,169	4,777	5,918	4,797	4,019	3,340	3,691	3,453	3,568	3,361	2,802	2,930	2,897	1,808	2,852	2,842
Total Roundfish	6,396	7,357	6,030	7,853	7,429	6,258	11,282	74,333	147,720	129,212	204,605	163,181	134,502	161,315	162,574	122,282	129,677
Rockfish																	
Canary	1,128	1,069	892	1,598	1,661	1,393	931	1,774	1,450	1,429	657	456	673	517	471	308	29
Pacific Ocean Perch	971	814	703	615	733	915	590	719	400	636	530	415	411	347	307	240	78
Shortbelly	1	11	2	0	0	2	0	2	52	6	38	21	4	14	1	0	4
Widow	5,887	5,128	6,122	9,295	7,895	9,490	6,243	4,191	3,819	5,106	4,177	3,790	3,756	3,953	2,122	2,380	2,135
Thornyheads	77	30	16	579	706	1,778	3,490	2,956	3,322	3,582	2,883	2,143	2,050	1,589	1,025	754	750
Other Rockfish																	
Bocaccio	249	477	272	240	189	217	144	185	143	145	105	96	84	67	90	26	0
Chilipepper	2	2	1			3	2	6	13	6	14	9	9	7	6	2	0
Yellowtail	3,432	1,910	2,340	2,566	3,734	2,636	2,201	2,206	3,949	3,140	3,419	3,085	3,519	1,147	1,453	1,489	1,879
Remaining Rockfish ^{a/}	2,410	3,875	2,819	2,358	2,938	2,939	2,155	2,510	1,966	2,745	2,139	1,450	1,471	1,287	1,051	600	399
Unspecified Rockfish ^{b/}	715	816	1,199	1,332	889	805	669	442	433	836	117	382	332	231	219	157	8
Total Rockfish	14,872	14,133	14,366	18,582	18,745	20,179	16,427	14,991	15,546	17,630	14,078	11,845	12,308	9,160	6,744	5,956	5,284
Flatfish																	
Arrowtooth Flounder	502	932	770	773	602	1,091	1,568	1,467	660	665	450	563	570	591	555	1,046	717
Dover Sole	5,279	4,837	4,028	5,518	6,809	7,648	6,154	7,153	4,847	5,029	2,981	2,625	3,515	3,145	2,973	3,609	3,436
English Sole	360	518	648	700	559	690	488	860	702	680	300	280	353	454	329	295	211
Petrale Sole	702	633	720	900	885	828	690	777	671	568	435	693	581	654	593	533	683
Other Flatfish	1,146	1,203	899	1,055	723	781	933	1,467	937	860	878	941	444	626	453	610	397
Total Flatfish	7,989	8,123	7,065	8,945	9,579	11,038	9,833	11,724	7,817	7,803	5,044	5,102	5,464	5,470	4,903	6,093	5,443
Other Fish																	
	33	22	37	36	15	36	70	205	165	359	381	530	887	1,058	417	682	868
Grand Total	29,290	29,636	27,497	35,416	35,768	37,510	37,611	101,254	171,247	155,005	224,109	180,659	153,161	177,003	174,638	135,012	141,271

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 6. Estimated commercial groundfish landings (in thousands of dollars) for the Columbia management area, 1984-2000. Values are actual values for the year specified, and not adjusted for inflation.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	\$672	\$713	\$470	\$704	\$779	\$881	\$549	\$633	\$518	\$617	\$598	\$527	\$596	\$610	\$142	\$170	\$99
Pacific Cod	\$46	\$19	\$24	\$580	\$797	\$514	\$135	\$284	\$225	\$290	\$102	\$52	\$61	\$40	\$54	\$23	\$11
Pacific Whiting	\$64	\$183	\$64	\$46	\$47	\$15	\$975	\$7,080	\$15,338	\$9,082	\$14,488	\$16,481	\$9,558	\$17,774	\$11,250	\$9,709	\$11,273
Sablefish	\$2,244	\$3,505	\$3,990	\$6,293	\$5,743	\$4,130	\$3,350	\$5,577	\$5,295	\$4,504	\$6,426	\$8,431	\$9,650	\$11,105	\$4,833	\$7,693	\$9,663
Total Roundfish	\$3,026	\$4,420	\$4,548	\$7,627	\$7,373	\$5,544	\$5,013	\$13,583	\$21,383	\$14,495	\$21,615	\$25,493	\$19,866	\$29,535	\$16,283	\$17,605	\$21,063
Rockfish																	
Canary	\$577	\$597	\$557	\$1,202	\$1,003	\$827	\$572	\$1,186	\$1,020	\$996	\$514	\$423	\$612	\$547	\$532	\$351	\$32
Pacific Ocean Perch	\$484	\$453	\$432	\$448	\$463	\$545	\$349	\$475	\$264	\$415	\$388	\$321	\$298	\$246	\$259	\$198	\$75
Shortbelly	\$0	\$5	\$1	\$0	\$0	\$1	\$0	\$1	\$41	\$3	\$18	\$9	\$2	\$7	\$0	\$0	\$2
Widow	\$2,967	\$2,814	\$3,713	\$6,573	\$4,967	\$5,392	\$3,583	\$2,547	\$2,367	\$3,191	\$2,867	\$2,717	\$2,492	\$2,732	\$1,667	\$2,005	\$2,054
Thornyheads	\$34	\$16	\$10	\$417	\$540	\$1,431	\$2,950	\$2,922	\$3,168	\$3,521	\$4,461	\$4,689	\$3,872	\$2,619	\$1,468	\$1,279	\$1,484
Other Rockfish																	
Bocaccio	\$126	\$267	\$168	\$176	\$118	\$128	\$88	\$122	\$96	\$99	\$87	\$79	\$64	\$56	\$78	\$25	\$0
Chilipepper	\$1	\$1	\$1	\$1	\$2	\$2	\$1	\$4	\$8	\$4	\$10	\$6	\$6	\$5	\$3	\$1	\$0
Yellowtail	\$1,700	\$1,062	\$1,452	\$1,826	\$2,287	\$1,537	\$1,316	\$1,460	\$2,698	\$2,132	\$2,550	\$2,486	\$2,630	\$900	\$1,174	\$1,248	\$1,837
Remaining Rockfish ^{a/}	\$1,216	\$2,120	\$1,763	\$1,737	\$1,846	\$1,693	\$1,251	\$1,685	\$1,375	\$1,742	\$1,447	\$1,135	\$1,059	\$903	\$857	\$552	\$407
Unspecified Rockfish ^{b/}	\$361	\$497	\$788	\$1,015	\$587	\$573	\$526	\$377	\$321	\$671	\$115	\$383	\$353	\$269	\$223	\$202	\$9
Total Rockfish	\$7,486	\$7,831	\$8,884	\$13,396	\$11,812	\$12,129	\$10,637	\$10,779	\$11,357	\$12,774	\$12,455	\$12,249	\$11,386	\$8,285	\$6,262	\$5,860	\$5,900
Flatfish																	
Arrowtooth Flounder	\$111	\$202	\$172	\$251	\$171	\$232	\$359	\$363	\$150	\$141	\$99	\$136	\$127	\$129	\$123	\$221	\$187
Dover Sole	\$2,695	\$2,656	\$2,351	\$3,820	\$4,574	\$4,675	\$3,696	\$4,815	\$2,944	\$2,975	\$1,940	\$1,935	\$2,455	\$2,090	\$2,242	\$2,596	\$2,774
English Sole	\$253	\$375	\$508	\$617	\$479	\$542	\$333	\$628	\$476	\$446	\$208	\$219	\$264	\$310	\$242	\$205	\$166
Petrale Sole	\$1,113	\$1,022	\$1,209	\$1,635	\$1,638	\$1,529	\$1,267	\$1,418	\$1,188	\$973	\$809	\$1,498	\$1,246	\$1,348	\$1,237	\$1,124	\$1,514
Other Flatfish	\$959	\$1,001	\$876	\$1,146	\$727	\$777	\$833	\$1,301	\$799	\$751	\$737	\$682	\$374	\$477	\$331	\$460	\$351
Total Flatfish	\$5,132	\$5,256	\$5,116	\$7,469	\$7,589	\$7,756	\$6,489	\$8,524	\$5,557	\$5,285	\$3,792	\$4,470	\$4,466	\$4,354	\$4,176	\$4,606	\$4,991
Other Fish																	
	\$16	\$14	\$19	\$19	\$6	\$15	\$20	\$110	\$39	\$85	\$99	\$179	\$292	\$349	\$121	\$173	\$295
Grand Total	\$15,640	\$17,521	\$18,568	\$28,510	\$26,780	\$25,444	\$22,159	\$32,996	\$38,337	\$32,640	\$37,961	\$42,391	\$36,010	\$42,523	\$26,843	\$28,244	\$32,249

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.

^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 7. Estimated commercial groundfish landings (mt) for the Eureka management area, 1984-2000.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	288	238	207	322	312	389	422	213	170	197	228	232	203	264	99	105	42
Pacific Cod	0		0	79	14	0	0	0	0	1	1	0	0	0	0	0	0
Pacific Whiting	2,312	3,009	2,978	4,508	6,527	7,292	5,852	70,839	22,229	3,099	3,655	5,226	12,860	11,956	5,842	1,429	5,460
Sablefish	2,358	2,552	2,557	1,931	1,554	1,659	1,966	1,858	2,229	1,630	1,730	1,482	1,596	1,782	881	1,228	1,021
Total Roundfish	4,969	5,832	5,756	6,842	8,408	9,340	8,241	72,910	24,633	4,929	5,620	6,947	14,665	14,026	6,854	2,796	6,560
Rockfish																	
Canary	243	171	175	152	100	180	239	140	311	175	157	175	175	169	262	132	14
Pacific Ocean Perch	59	100	37	87	62	45	13	12	31	21	10	11	22	15	27	5	5
Shortbelly	0	0	0				2	1		2	1	2	1	1	11	9	15
Widow	2,243	2,325	1,689	1,556	1,464	1,120	1,157	599	751	999	905	928	788	778	729	501	801
Thornyheads	945	1,307	1,559	1,672	3,841	4,301	4,142	2,120	2,786	2,753	2,264	2,184	1,958	1,694	1,146	835	710
Other Rockfish																	
Bocaccio	239	261	125	132	120	135	172	58	63	121	56	61	39	11	16	31	3
Chilipepper	84	106	116	101	158	117	226	175	26	347	95	104	111	70	62	32	42
Yellowtail	416	167	122	275	101	284	495	486	316	226	170	187	218	163	305	145	34
Remaining Rockfish ^{a/}	919	1,457	621	2,044	1,401	939	944	934	1,013	804	991	874	863	769	918	451	301
Unspecified Rockfish ^{b/}	284	167	237	185	147	112	256	233	29	13	37	29	36	101	27	13	1
Total Rockfish	5,433	6,061	4,680	6,206	7,394	7,232	7,648	4,757	5,327	5,460	4,686	4,555	4,210	3,771	3,503	2,154	1,925
Flatfish																	
Arrowtooth Flounder	47	47	23	52	43	32	71	191	127	82	93	138	73	79	57	64	42
Dover Sole	5,109	5,924	5,144	5,095	4,762	4,131	3,887	3,914	3,978	3,505	2,127	2,403	2,648	2,117	2,287	2,224	1,920
English Sole	518	407	341	612	409	307	199	135	115	127	115	107	183	282	317	216	157
Petrale Sole	317	386	243	396	383	369	283	343	260	264	403	330	487	505	279	409	496
Other Flatfish	579	743	572	754	567	504	368	287	190	275	415	426	448	527	247	357	180
Total Flatfish	6,570	7,507	6,324	6,908	6,164	5,343	4,807	4,871	4,669	4,254	3,154	3,404	3,839	3,511	3,187	3,270	2,794
Other Fish																	
	54	223	103	88	146	95	107	86	169	319	382	326	803	1,274	1,011	865	567
Grand Total	17,026	19,623	16,862	20,044	22,112	22,010	20,803	82,623	34,798	14,962	13,842	15,232	23,517	22,582	14,555	9,085	11,847

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 8. Estimated commercial groundfish landings (in thousands of dollars) for the Eureka management area, 1984-2000. Values are actual values for the year specified, and not adjusted for inflation.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	\$167	\$153	\$169	\$304	\$292	\$336	\$370	\$188	\$156	\$176	\$217	\$250	\$224	\$324	\$175	\$207	\$131
Pacific Cod	\$0	\$0	\$0	\$57	\$9	\$0	\$0	\$0	\$0	\$1	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Pacific Whiting	\$337	\$397	\$381	\$609	\$1,074	\$1,045	\$837	\$8,943	\$2,500	\$342	\$354	\$569	\$1,098	\$1,023	\$397	\$126	\$819
Sablefish	\$964	\$1,483	\$1,864	\$1,711	\$1,342	\$1,478	\$1,831	\$2,138	\$2,751	\$1,630	\$2,904	\$4,052	\$4,513	\$5,624	\$2,135	\$2,773	\$2,787
Total Roundfish	\$1,474	\$2,053	\$2,421	\$2,683	\$2,717	\$2,859	\$3,038	\$11,269	\$5,410	\$2,149	\$3,479	\$4,876	\$5,843	\$7,022	\$2,804	\$3,254	\$3,986
Rockfish																	
Canary	\$126	\$95	\$114	\$112	\$69	\$116	\$188	\$112	\$262	\$194	\$175	\$245	\$220	\$248	\$373	\$183	\$21
Pacific Ocean Perch	\$29	\$55	\$23	\$62	\$41	\$29	\$9	\$8	\$20	\$13	\$7	\$9	\$17	\$11	\$23	\$4	\$4
Shortbelly	\$0	\$0	\$0	\$0	\$0	\$0	\$1	\$1	\$1	\$1	\$1	\$1	\$0	\$0	\$5	\$1	\$5
Widow	\$1,054	\$1,274	\$1,026	\$1,108	\$912	\$643	\$656	\$362	\$480	\$649	\$640	\$690	\$549	\$552	\$637	\$430	\$776
Thornyheads	\$519	\$729	\$969	\$1,226	\$3,019	\$3,543	\$3,526	\$2,159	\$2,966	\$3,036	\$3,822	\$4,849	\$3,708	\$2,883	\$1,768	\$1,533	\$1,553
Other Rockfish																	
Bocaccio	\$122	\$146	\$82	\$99	\$83	\$88	\$117	\$39	\$44	\$90	\$47	\$54	\$40	\$11	\$14	\$36	\$2
Chilipepper	\$43	\$59	\$74	\$74	\$105	\$75	\$152	\$116	\$18	\$246	\$70	\$82	\$75	\$55	\$42	\$25	\$37
Yellowtail	\$217	\$93	\$77	\$196	\$68	\$176	\$347	\$363	\$236	\$177	\$138	\$161	\$185	\$156	\$300	\$143	\$38
Remaining Rockfish ^{a/}	\$467	\$834	\$405	\$1,539	\$992	\$714	\$741	\$756	\$827	\$668	\$806	\$897	\$830	\$815	\$945	\$783	\$678
Unspecified Rockfish ^{b/}	\$160	\$112	\$179	\$174	\$104	\$123	\$248	\$236	\$20	\$15	\$39	\$40	\$46	\$124	\$49	\$28	\$2
Total Rockfish	\$2,737	\$3,397	\$2,949	\$4,590	\$5,393	\$5,507	\$5,985	\$4,151	\$4,874	\$5,090	\$5,746	\$7,028	\$5,670	\$4,855	\$4,156	\$3,167	\$3,117
Flatfish																	
Arrowtooth Flounder	\$11	\$10	\$5	\$17	\$13	\$9	\$17	\$50	\$31	\$18	\$24	\$36	\$16	\$17	\$14	\$14	\$11
Dover Sole	\$2,685	\$3,234	\$2,973	\$3,543	\$3,205	\$2,509	\$2,290	\$2,653	\$2,569	\$2,158	\$1,423	\$1,737	\$1,780	\$1,393	\$1,747	\$1,662	\$1,501
English Sole	\$376	\$308	\$282	\$570	\$369	\$255	\$147	\$112	\$91	\$92	\$93	\$90	\$145	\$204	\$249	\$159	\$125
Petrale Sole	\$483	\$609	\$395	\$685	\$640	\$614	\$476	\$583	\$435	\$431	\$672	\$630	\$901	\$914	\$533	\$801	\$1,044
Other Flatfish	\$457	\$610	\$479	\$679	\$500	\$421	\$300	\$241	\$163	\$231	\$351	\$343	\$372	\$399	\$206	\$279	\$165
Total Flatfish	\$4,012	\$4,771	\$4,134	\$5,493	\$4,727	\$3,808	\$3,230	\$3,639	\$3,288	\$2,930	\$2,563	\$2,836	\$3,214	\$2,927	\$2,750	\$2,915	\$2,846
Other Fish																	
	\$16	\$40	\$42	\$49	\$61	\$43	\$38	\$31	\$36	\$87	\$119	\$112	\$295	\$485	\$415	\$266	\$236
Grand Total	\$8,240	\$10,262	\$9,546	\$12,814	\$12,899	\$12,217	\$12,291	\$19,089	\$13,608	\$10,255	\$11,907	\$14,852	\$15,021	\$15,289	\$10,124	\$9,602	\$10,185

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 9. Estimated commercial groundfish landings (mt) for the Monterey management area, 1984-2000.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	736	489	360	600	628	894	705	559	441	495	396	318	314	341	80	70	25
Pacific Cod	2	1		10	0	0		0	1	0			0	0	0	0	0
Pacific Whiting	23	3	3	9	5	0	0	58,034	6	0	2	0	70	0	1	0	1
Sablefish	2,224	3,039	3,511	2,544	2,164	2,352	1,697	1,663	1,538	1,027	934	1,486	1,819	1,560	630	971	968
Total Roundfish	2,985	3,531	3,874	3,163	2,797	3,246	2,402	60,256	1,989	1,523	1,335	1,811	2,218	1,934	780	1,105	1,055
Rockfish																	
Canary	222	268	91	100	117	179	357	178	97	107	110	86	170	135	106	45	4
Pacific Ocean Perch	7	4	3	1	0	1	3	3	3	1	2	1	0	5	0	1	0
Shortbelly	0	28	19			1	7	1	0	0	3	9	31	62	9	0	0
Widow	991	1,130	970	1,260	630	1,084	1,156	680	547	339	314	954	692	830	479	379	267
Thornyheads	867	1,013	1,073	753	552	752	658	664	1,076	1,035	1,274	1,540	1,366	1,210	669	640	562
Other Rockfish																	
Bocaccio	3,144	1,275	1,268	1,497	1,449	1,782	1,441	879	754	666	444	425	280	250	94	74	20
Chilipepper	1,826	1,945	1,573	1,370	1,566	2,113	2,296	2,437	2,132	1,562	1,449	1,635	1,545	1,796	1,173	855	394
Yellowtail	276	419	390	420	215	763	619	274	427	372	228	162	113	327	310	50	30
Remaining Rockfish ^{a/}	2,922	2,548	2,198	1,599	1,862	1,432	2,181	1,825	1,550	1,282	1,276	1,239	1,501	1,654	2,171	446	367
Unspecified Rockfish ^{b/}	2,056	603	1,187	408	249	254	489	192	143	26	32	9	47	68	117	3	3
Total Rockfish	12,310	9,233	8,771	7,409	6,640	8,360	9,209	7,134	6,730	5,392	5,133	6,060	5,747	6,336	5,128	2,495	1,646
Flatfish																	
Arrowtooth Flounder	2	3	1	0	2	1	0	0	0	0	6	1	1	1	1	2	0
Dover Sole	4,347	4,261	5,398	3,994	2,609	2,869	2,011	3,285	3,599	2,894	2,126	3,226	3,242	2,744	1,275	1,748	1,646
English Sole	497	639	711	674	621	703	667	653	467	378	359	399	423	453	224	219	168
Petrale Sole	298	403	326	432	449	465	424	451	337	280	259	311	393	435	241	247	227
Other Flatfish	670	855	989	778	857	915	684	867	610	545	720	946	855	944	783	943	852
Total Flatfish	5,814	6,161	7,425	5,877	4,537	4,954	3,786	5,256	5,013	4,098	3,470	4,883	4,914	4,577	2,525	3,158	2,894
Other Fish																	
	127	106	80	68	50	73	77	77	77	169	312	419	1,223	825	590	416	308
Grand Total	21,236	19,032	20,149	16,516	14,024	16,633	15,474	72,723	13,810	11,183	10,251	13,172	14,102	13,672	9,022	7,173	5,903

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 10. Estimated commercial groundfish landings (in thousands of dollars) for the Monterey management area, 1984-2000. Values are actual values for the year specified, and not adjusted for inflation.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	\$425	\$312	\$276	\$499	\$529	\$770	\$603	\$497	\$415	\$469	\$402	\$357	\$369	\$395	\$150	\$145	\$61
Pacific Cod	\$1	\$1		\$7	\$0	\$0		\$0	\$1	\$0			\$0	\$0	\$0	\$0	\$0
Pacific Whiting	\$4	\$2	\$1	\$1	\$1	\$0	\$0	\$6,882	\$1	\$0	\$1	\$0	\$4	\$0	\$0	\$0	\$0
Sablefish	\$840	\$1,789	\$2,600	\$2,286	\$2,009	\$2,135	\$1,673	\$1,869	\$1,802	\$931	\$1,364	\$3,907	\$5,146	\$4,886	\$1,394	\$2,027	\$2,667
Total Roundfish	\$1,270	\$2,105	\$2,877	\$2,793	\$2,539	\$2,904	\$2,276	\$9,247	\$2,224	\$1,400	\$1,785	\$4,292	\$5,599	\$5,463	\$2,000	\$2,655	\$3,261
Rockfish																	
Canary	\$120	\$177	\$67	\$76	\$86	\$206	\$352	\$222	\$129	\$124	\$164	\$141	\$251	\$217	\$154	\$75	\$10
Pacific Ocean Perch	\$4	\$2	\$2	\$1	\$0	\$1	\$2	\$2	\$3	\$1	\$2	\$1	\$0	\$4	\$0	\$1	\$0
Shortbelly	\$0	\$3	\$13			\$0	\$4	\$1	\$0	\$0	\$1	\$4	\$9	\$29	\$5	\$0	\$0
Widow	\$525	\$653	\$639	\$931	\$459	\$723	\$862	\$457	\$391	\$254	\$261	\$795	\$536	\$613	\$438	\$386	\$309
Thornyheads	\$468	\$560	\$652	\$527	\$413	\$608	\$551	\$657	\$1,125	\$1,182	\$2,065	\$3,591	\$2,745	\$2,228	\$1,149	\$1,359	\$1,227
Other Rockfish																	
Bocaccio	\$1,699	\$776	\$893	\$1,192	\$1,143	\$1,346	\$1,137	\$674	\$602	\$551	\$405	\$405	\$249	\$218	\$98	\$91	\$31
Chilipepper	\$982	\$1,208	\$1,094	\$1,020	\$1,138	\$1,448	\$1,695	\$1,836	\$1,699	\$1,408	\$1,303	\$1,527	\$1,375	\$1,531	\$1,071	\$864	\$545
Yellowtail	\$156	\$265	\$294	\$410	\$195	\$706	\$578	\$291	\$451	\$378	\$235	\$184	\$115	\$344	\$362	\$83	\$49
Remaining Rockfish ^{a/}	\$1,701	\$1,626	\$1,622	\$1,413	\$1,746	\$1,373	\$1,967	\$1,903	\$1,692	\$1,385	\$1,616	\$1,512	\$1,818	\$1,945	\$2,263	\$1,041	\$1,144
Unspecified Rockfish ^{b/}	\$1,229	\$483	\$931	\$334	\$220	\$234	\$419	\$158	\$126	\$28	\$30	\$11	\$92	\$116	\$221	\$5	\$10
Total Rockfish	\$6,884	\$5,752	\$6,207	\$5,902	\$5,399	\$6,644	\$7,567	\$6,203	\$6,219	\$5,311	\$6,083	\$8,170	\$7,190	\$7,244	\$5,760	\$3,904	\$3,325
Flatfish																	
Arrowtooth Flounder	\$1	\$2	\$0	\$0	\$2	\$1	\$0	\$0	\$0	\$0	\$3	\$1	\$1	\$1	\$1	\$1	\$0
Dover Sole	\$2,194	\$2,203	\$2,972	\$2,581	\$1,724	\$1,717	\$1,134	\$2,186	\$2,285	\$1,696	\$1,335	\$2,241	\$2,075	\$1,647	\$887	\$1,228	\$1,193
English Sole	\$355	\$476	\$562	\$596	\$544	\$590	\$507	\$528	\$373	\$296	\$293	\$340	\$352	\$348	\$182	\$168	\$137
Petrale Sole	\$448	\$635	\$536	\$736	\$756	\$798	\$762	\$827	\$601	\$506	\$511	\$634	\$819	\$909	\$549	\$542	\$570
Other Flatfish	\$537	\$720	\$885	\$719	\$759	\$747	\$542	\$714	\$514	\$527	\$602	\$819	\$702	\$722	\$593	\$715	\$736
Total Flatfish	\$3,534	\$4,036	\$4,956	\$4,632	\$3,785	\$3,853	\$2,946	\$4,255	\$3,773	\$3,025	\$2,745	\$4,035	\$3,950	\$3,626	\$2,212	\$2,654	\$2,636
Other Fish																	
	\$80	\$85	\$62	\$63	\$44	\$62	\$60	\$53	\$53	\$77	\$118	\$183	\$443	\$323	\$239	\$163	\$140
Grand Total	\$11,768	\$11,978	\$14,102	\$13,390	\$11,767	\$13,463	\$12,849	\$19,758	\$12,269	\$9,812	\$10,730	\$16,680	\$17,182	\$16,655	\$10,211	\$9,377	\$9,362

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 11. Estimated commercial groundfish landings (mt) for the Conception management area, 1984-2000.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	21	25	23	43	57	65	58	72	64	79	66	58	41	31	19	15	4
Pacific Cod				0	0		0	0	0	0							
Pacific Whiting	0	0	1	1	0	6	3	3	1	1	2	1	0	1	1	0	0
Sablefish	1,070	473	558	390	346	502	621	412	585	403	290	332	341	262	211	181	122
Total Roundfish	1,091	498	582	433	403	572	682	487	660	500	392	468	472	371	317	259	191
Rockfish																	
Canary	16	30	8	13	14	45	10	7	16	13	23	27	16	4	5	3	0
Pacific Ocean Perch	0	0	0	0	0			0	1	0	0	0					0
Shortbelly	2									0		0	0				
Widow	86	48	54	39	81	50	73	108	10	29	41	63	33	38	44	26	21
Thornyheads	314	620	317	665	456	1,012	1,557	519	1,092	848	472	658	553	416	349	226	176
Other Rockfish																	
Bocaccio	648	442	635	665	426	587	671	386	723	643	526	247	162	60	39	13	5
Chilipepper	299	457	264	290	460	644	348	555	331	433	306	228	152	184	194	41	9
Yellowtail	39	16	53	8	17	44	35	20	46	59	31	36	8	30	16	2	2
Remaining Rockfish ^{a/}	1,504	1,698	2,602	1,812	1,770	1,415	1,306	1,247	1,486	910	1,103	1,070	900	691	867	270	193
Unspecified Rockfish ^{b/}	150	147	234	162	103	98	138	214	76	110	28	21	132	22	24	11	9
Total Rockfish	3,057	3,458	4,168	3,654	3,326	3,895	4,137	3,056	3,781	3,045	2,531	2,349	1,956	1,445	1,538	593	415
Flatfish																	
Arrowtooth Flounder		0	0						0	0	0	0			0		0
Dover Sole	1,286	2,832	1,241	2,468	1,656	1,612	1,375	1,474	1,834	1,218	968	1,101	1,322	1,107	571	443	231
English Sole	32	55	52	73	83	65	45	39	21	17	12	11	11	12	5	9	9
Petrale Sole	50	139	220	123	74	98	83	64	38	34	54	52	58	51	27	18	18
Other Flatfish	72	247	164	210	290	284	351	209	83	156	263	153	164	110	85	54	44
Total Flatfish	1,440	3,272	1,678	2,873	2,104	2,059	1,854	1,786	1,976	1,425	1,297	1,317	1,555	1,280	689	523	301
Other Fish																	
	129	123	105	121	87	92	76	63	58	54	59	51	77	105	108	129	70
Grand Total	5,717	7,351	6,532	7,082	5,920	6,618	6,750	5,393	6,474	5,023	4,278	4,186	4,061	3,201	2,651	1,504	977

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 12. Estimated commercial groundfish landings (in thousands of dollars) for the Conception management area, 1984-2000. Values are actual values for the year specified, and not adjusted for inflation.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	\$15	\$26	\$24	\$43	\$61	\$66	\$64	\$76	\$71	\$86	\$84	\$79	\$69	\$54	\$40	\$44	\$15
Pacific Cod				\$0	\$0		\$0	\$0	\$0	\$0							
Pacific Whiting	\$0	\$0	\$1	\$0	\$1	\$6	\$6	\$5	\$2	\$1	\$3	\$3	\$1	\$2	\$2	\$0	\$0
Sablefish	\$767	\$218	\$474	\$270	\$241	\$415	\$537	\$470	\$724	\$391	\$427	\$650	\$746	\$751	\$526	\$495	\$392
Total Roundfish	\$782	\$244	\$499	\$314	\$302	\$488	\$606	\$552	\$843	\$603	\$772	\$1,351	\$1,539	\$1,439	\$1,277	\$1,104	\$1,107
Rockfish																	
Canary	\$23	\$39	\$17	\$28	\$30	\$101	\$29	\$20	\$43	\$33	\$54	\$62	\$42	\$13	\$14	\$9	\$2
Pacific Ocean Perch	\$0	\$0	\$0	\$0	\$0			\$0	\$1	\$0	\$0	\$0					\$0
Shortbelly	\$0									\$0		\$0					
Widow	\$56	\$40	\$48	\$38	\$74	\$42	\$74	\$110	\$12	\$40	\$39	\$60	\$33	\$35	\$46	\$25	\$29
Thornyheads	\$165	\$337	\$189	\$451	\$337	\$825	\$1,324	\$516	\$1,183	\$864	\$781	\$1,494	\$1,150	\$848	\$727	\$591	\$670
Other Rockfish																	
Bocaccio	\$531	\$416	\$589	\$646	\$485	\$562	\$606	\$364	\$785	\$759	\$518	\$243	\$172	\$77	\$56	\$33	\$10
Chilipepper	\$202	\$438	\$238	\$282	\$411	\$676	\$305	\$586	\$381	\$671	\$320	\$240	\$157	\$217	\$210	\$74	\$14
Yellowtail	\$31	\$15	\$50	\$8	\$31	\$36	\$65	\$26	\$78	\$121	\$46	\$47	\$9	\$63	\$27	\$7	\$3
Remaining Rockfish ^{a/}	\$1,758	\$2,177	\$3,032	\$2,303	\$2,087	\$1,975	\$2,042	\$2,113	\$2,554	\$1,827	\$2,423	\$2,602	\$2,350	\$1,818	\$1,995	\$1,254	\$1,130
Unspecified Rockfish ^{b/}	\$170	\$215	\$303	\$211	\$111	\$122	\$229	\$399	\$118	\$201	\$44	\$47	\$288	\$48	\$58	\$34	\$44
Total Rockfish	\$2,936	\$3,678	\$4,466	\$3,968	\$3,567	\$4,339	\$4,673	\$4,134	\$5,155	\$4,515	\$4,225	\$4,794	\$4,200	\$3,118	\$3,133	\$2,028	\$1,902
Flatfish																	
Arrowtooth Flounder		\$0	\$0						\$0	\$0	\$0	\$0			\$0		\$0
Dover Sole	\$597	\$1,329	\$652	\$1,540	\$1,077	\$929	\$772	\$859	\$1,016	\$701	\$629	\$773	\$923	\$746	\$454	\$335	\$175
English Sole	\$24	\$44	\$45	\$68	\$77	\$57	\$41	\$37	\$19	\$14	\$10	\$10	\$9	\$11	\$5	\$7	\$8
Petrale Sole	\$83	\$264	\$447	\$258	\$158	\$209	\$176	\$137	\$81	\$76	\$129	\$121	\$131	\$115	\$63	\$43	\$45
Other Flatfish	\$65	\$222	\$152	\$187	\$270	\$256	\$276	\$202	\$100	\$161	\$240	\$158	\$169	\$127	\$97	\$76	\$82
Total Flatfish	\$769	\$1,858	\$1,296	\$2,053	\$1,581	\$1,452	\$1,264	\$1,235	\$1,216	\$952	\$1,008	\$1,063	\$1,233	\$999	\$619	\$462	\$311
Other Fish																	
	\$218	\$214	\$188	\$185	\$166	\$154	\$112	\$98	\$85	\$74	\$63	\$56	\$78	\$91	\$88	\$120	\$64
Grand Total	\$4,705	\$5,994	\$6,449	\$6,520	\$5,616	\$6,433	\$6,655	\$6,018	\$7,299	\$6,144	\$6,068	\$7,264	\$7,050	\$5,647	\$5,117	\$3,715	\$3,384

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.

^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 13. Estimated commercial groundfish landings (mt) for Washington, 1984-2000.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	2,043	2,130	714	1,023	757	1,137	993	893	561	676	477	278	360	290	38	42	26
Pacific Cod	503	372	300	1,549	2,306	1,408	833	1,281	1,361	878	696	424	361	542	335	242	268
Pacific Whiting	47	14	61	95	88	27	302	504	2,237	3,188	4,884	4,037	11,653	7,241	10,513	9,099	12,141
Sablefish	4,413	3,869	2,415	3,144	2,938	2,416	1,724	2,236	1,790	1,713	1,388	1,951	1,946	2,050	1,180	1,700	1,577
Total Roundfish	7,021	6,387	3,513	5,838	6,110	5,011	3,855	4,921	5,959	6,455	7,445	6,691	14,320	10,123	12,066	11,083	14,012
Rockfish																	
Canary	605	1,025	888	1,004	967	1,194	1,086	960	815	286	148	138	162	176	176	123	10
Pacific Ocean Perch	840	624	684	448	584	483	435	543	432	461	349	287	232	184	171	151	33
Shortbelly								0				0	0				
Widow	1,446	1,532	2,550	3,712	3,075	3,375	2,232	1,149	936	1,669	1,062	1,080	953	1,000	532	514	374
Thornyheads	253	56	25	63	69	131	156	134	214	604	685	580	431	366	162	88	63
Other Rockfish																	
Bocaccio	152	123	80	110	96	247	267	363	206	132	50	47	43	54	37	10	2
Chilipepper						0								0	0	0	0
Yellowtail	2,312	1,347	1,983	1,877	2,943	1,689	1,640	1,141	1,327	2,014	1,901	1,483	1,451	476	614	563	854
Remaining Rockfish ^{a/}	863	709	728	685	645	657	664	855	699	450	302	310	256	224	246	115	123
Unspecified Rockfish ^{b/}	842	982	1,215	1,125	961	777	477	342	438	596	357	590	484	342	349	253	35
Total Rockfish	7,313	6,399	8,153	9,023	9,342	8,552	6,956	5,487	5,066	6,212	4,854	4,515	4,013	2,822	2,287	1,818	1,495
Flatfish																	
Arrowtooth Flounder	1,930	1,943	1,709	2,044	1,268	2,387	3,955	2,700	1,413	997	1,457	790	1,023	1,134	1,541	2,964	2,079
Dover Sole	3,316	2,804	1,480	1,622	2,243	2,184	1,869	1,689	1,317	1,302	1,000	931	1,094	851	639	806	758
English Sole	318	399	403	565	455	666	511	527	423	411	303	321	182	303	238	178	217
Petrale Sole	460	405	313	526	452	450	342	261	251	265	210	270	290	308	308	257	395
Other Flatfish	260	474	273	358	287	503	368	530	264	145	90	71	62	77	93	33	70
Total Flatfish	6,284	6,026	4,177	5,117	4,704	6,190	7,045	5,707	3,668	3,119	3,060	2,383	2,651	2,674	2,818	4,239	3,519
Other Fish																	
	277	312	135	190	223	305	506	888	1,071	1,287	1,373	372	297	635	370	527	833
Grand Total	20,895	19,124	15,979	20,167	20,380	20,058	18,362	17,003	15,765	17,073	16,732	13,961	21,280	16,254	17,541	17,666	19,858

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 14. Estimated commercial groundfish landings (in thousands of dollars) for Washington, 1984-2000. Values are actual values for the year specified, and not adjusted for inflation.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	\$1,047	\$1,176	\$466	\$919	\$555	\$787	\$709	\$666	\$457	\$518	\$397	\$264	\$346	\$268	\$46	\$53	\$38
Pacific Cod	\$253	\$199	\$182	\$1,124	\$1,322	\$801	\$503	\$847	\$968	\$619	\$508	\$363	\$314	\$466	\$316	\$227	\$275
Pacific Whiting	\$6	\$2	\$8	\$18	\$19	\$5	\$46	\$80	\$209	\$210	\$253	\$364	\$721	\$756	\$618	\$802	\$1,120
Sablefish	\$2,428	\$4,229	\$2,703	\$4,532	\$4,616	\$3,327	\$2,622	\$5,551	\$3,815	\$3,053	\$3,043	\$7,036	\$7,090	\$9,579	\$3,337	\$5,060	\$5,865
Total Roundfish	\$3,738	\$5,607	\$3,365	\$6,504	\$6,520	\$4,928	\$3,881	\$7,148	\$5,453	\$4,400	\$4,200	\$8,028	\$8,470	\$10,069	\$4,317	\$6,142	\$7,298
Rockfish																	
Canary	\$286	\$564	\$548	\$727	\$610	\$712	\$648	\$627	\$559	\$193	\$110	\$128	\$123	\$141	\$157	\$105	\$10
Pacific Ocean Perch	\$411	\$346	\$422	\$322	\$365	\$288	\$258	\$357	\$288	\$298	\$257	\$227	\$172	\$137	\$144	\$129	\$33
Shortbelly								\$0				\$0	\$0				
Widow	\$670	\$835	\$1,550	\$2,629	\$1,978	\$1,930	\$1,323	\$746	\$646	\$1,033	\$718	\$782	\$631	\$697	\$402	\$429	\$362
Thornyheads	\$116	\$31	\$16	\$44	\$50	\$96	\$114	\$126	\$189	\$558	\$988	\$1,208	\$781	\$595	\$235	\$149	\$114
Other Rockfish																	
Bocaccio	\$70	\$68	\$50	\$80	\$63	\$148	\$158	\$238	\$140	\$87	\$37	\$36	\$29	\$42	\$31	\$9	\$2
Chilipepper						\$0								\$0	\$0	\$0	\$0
Yellowtail	\$1,085	\$738	\$1,232	\$1,347	\$1,840	\$997	\$970	\$749	\$908	\$1,348	\$1,392	\$1,190	\$1,068	\$362	\$456	\$447	\$831
Remaining Rockfish ^{a/}	\$406	\$391	\$448	\$490	\$415	\$403	\$418	\$573	\$492	\$351	\$277	\$236	\$182	\$169	\$205	\$98	\$139
Unspecified Rockfish ^{b/}	\$398	\$610	\$788	\$877	\$553	\$481	\$337	\$255	\$308	\$417	\$364	\$591	\$475	\$359	\$371	\$319	\$45
Total Rockfish	\$3,442	\$3,582	\$5,054	\$6,517	\$5,873	\$5,055	\$4,227	\$3,671	\$3,531	\$4,287	\$4,144	\$4,397	\$3,462	\$2,503	\$2,000	\$1,685	\$1,536
Flatfish																	
Arrowtooth Flounder	\$404	\$414	\$383	\$658	\$310	\$524	\$918	\$681	\$331	\$214	\$310	\$189	\$231	\$244	\$348	\$655	\$524
Dover Sole	\$1,613	\$1,488	\$834	\$1,089	\$1,483	\$1,310	\$1,079	\$1,058	\$808	\$818	\$642	\$693	\$777	\$561	\$476	\$578	\$582
English Sole	\$211	\$265	\$295	\$460	\$368	\$494	\$349	\$372	\$289	\$280	\$215	\$252	\$141	\$208	\$182	\$140	\$161
Petrale Sole	\$726	\$650	\$521	\$959	\$846	\$825	\$631	\$488	\$461	\$459	\$387	\$584	\$539	\$586	\$630	\$553	\$982
Other Flatfish	\$194	\$356	\$252	\$394	\$238	\$376	\$271	\$395	\$219	\$107	\$73	\$72	\$49	\$52	\$71	\$26	\$53
Total Flatfish	\$3,147	\$3,173	\$2,283	\$3,560	\$3,245	\$3,529	\$3,248	\$2,994	\$2,108	\$1,879	\$1,627	\$1,790	\$1,736	\$1,651	\$1,707	\$1,952	\$2,202
Other Fish																	
	\$53	\$60	\$27	\$46	\$60	\$91	\$148	\$271	\$333	\$362	\$422	\$110	\$77	\$187	\$112	\$165	\$265
Grand Total	\$10,380	\$12,423	\$10,730	\$16,627	\$15,698	\$13,603	\$11,503	\$14,083	\$11,424	\$10,928	\$10,394	\$14,325	\$13,745	\$14,409	\$8,136	\$9,945	\$11,302

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.

^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 15. Estimated commercial groundfish landings (mt) for Oregon, 1984-2000.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	1,057	1,052	656	717	1,004	1,175	874	1,487	708	833	859	650	717	767	161	174	64
Pacific Cod	80	39	31	666	1,034	780	231	514	416	491	170	80	84	52	78	38	11
Pacific Whiting	338	885	420	183	246	89	2,294	13,204	48,961	35,820	65,114	66,839	70,574	73,837	71,620	72,954	68,702
Sablefish	4,835	5,275	4,653	5,238	4,082	3,948	3,705	3,906	3,856	3,835	4,005	3,135	3,175	2,924	1,750	2,971	2,808
Total Roundfish	6,322	7,283	5,774	6,811	6,378	5,999	7,110	19,119	53,948	40,982	70,155	70,710	74,555	77,601	73,637	76,164	71,617
Rockfish																	
Canary	1,174	1,017	906	1,634	1,556	1,553	1,035	1,783	1,536	1,610	740	560	780	705	806	424	33
Pacific Ocean Perch	752	797	669	549	743	925	566	838	616	788	620	512	526	427	425	324	99
Shortbelly	1	11	3	0	0	2	0	2	3	6	38	21	4	14	2	0	15
Widow	5,368	4,353	4,329	6,314	5,461	6,937	5,653	3,870	3,951	5,306	4,390	3,872	3,752	4,106	2,450	2,770	2,710
Thornyheads				727	1,043	2,553	4,529	3,506	4,281	4,460	4,047	3,337	2,786	2,326	1,459	1,062	1,050
Other Rockfish																	
Bocaccio	325	495	282	260	207	278	194	224	168	165	127	102	80	71	100	30	0
Chilipepper	3	3	2		8	4	2	5	13	9	19	9	9	11	19	2	0
Yellowtail	2,197	1,570	1,918	1,935	2,606	2,574	2,108	2,051	3,943	2,901	3,189	3,069	3,495	1,260	1,726	1,613	2,003
Remaining Rockfish ^{a/}	2,764	4,231	3,012	2,362	2,990	3,144	2,289	2,644	2,232	3,134	2,461	1,647	1,712	1,552	1,357	828	525
Unspecified Rockfish ^{b/}	438	620	648	855	535	428	597	1,043	608	937	283	205	255	278	335	177	
Total Rockfish	13,022	13,097	11,768	14,637	15,148	18,399	16,974	15,967	17,350	19,317	15,914	13,333	13,398	10,749	8,679	7,231	6,435
Flatfish																	
Arrowtooth Flounder	417	698	503	740	641	1,137	1,815	2,089	2,063	1,659	1,719	1,413	1,118	1,162	1,591	2,278	1,170
Dover Sole	6,108	5,713	4,822	6,057	7,676	8,908	7,508	8,813	6,075	6,483	3,871	3,535	4,688	3,965	3,800	4,513	4,714
English Sole	451	468	552	594	581	693	509	846	628	718	358	313	390	551	475	349	246
Petrale Sole	689	577	709	855	902	862	744	932	771	775	616	797	720	806	682	674	860
Other Flatfish	1,166	1,171	782	828	763	782	750	1,363	881	850	997	1,017	517	712	538	667	491
Total Flatfish	8,830	8,628	7,368	9,074	10,564	12,381	11,326	14,042	10,418	10,485	7,560	7,074	7,434	7,195	7,085	8,481	7,482
Other Fish																	
	34	15	21	18	25	57	97	186	200	409	476	646	1,005	1,187	674	804	939
Grand Total	28,209	29,023	24,931	30,540	32,116	36,836	35,506	49,314	81,916	71,193	94,105	91,764	96,393	96,733	90,075	92,680	86,473

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 16. Estimated commercial groundfish landings (in thousands of dollars) for Oregon, 1984-2000. Values are actual values for the year specified, and not adjusted for inflation.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	\$584	\$604	\$443	\$599	\$798	\$871	\$653	\$1,083	\$575	\$669	\$755	\$612	\$689	\$786	\$251	\$290	\$689
Pacific Cod	\$45	\$22	\$18	\$482	\$625	\$448	\$131	\$342	\$306	\$354	\$129	\$69	\$74	\$45	\$83	\$37	\$74
Pacific Whiting	\$59	\$185	\$56	\$34	\$41	\$15	\$219	\$1,373	\$5,078	\$2,289	\$4,297	\$7,000	\$4,147	\$6,823	\$3,756	\$5,913	\$4,147
Sablefish	\$2,170	\$3,408	\$3,611	\$5,080	\$4,459	\$3,847	\$3,493	\$5,081	\$5,405	\$4,479	\$7,369	\$9,137	\$10,041	\$10,206	\$4,602	\$7,695	\$10,041
Total Roundfish	\$2,865	\$4,239	\$4,136	\$6,197	\$5,931	\$5,186	\$4,501	\$7,888	\$11,373	\$7,793	\$12,555	\$16,823	\$14,956	\$17,897	\$8,758	\$14,033	\$14,956
Rockfish																	
Canary	\$605	\$568	\$566	\$1,229	\$940	\$923	\$637	\$1,202	\$1,097	\$1,167	\$600	\$559	\$747	\$772	\$968	\$518	\$747
Pacific Ocean Perch	\$381	\$443	\$410	\$400	\$474	\$555	\$335	\$555	\$410	\$528	\$455	\$398	\$387	\$303	\$363	\$272	\$387
Shorthelly	\$0	\$5	\$2	\$0	\$0	\$1	\$0	\$1	\$1	\$3	\$18	\$9	\$2	\$8	\$1	\$0	\$2
Widow	\$2,740	\$2,394	\$2,628	\$4,465	\$3,397	\$3,942	\$3,224	\$2,333	\$2,430	\$3,330	\$3,020	\$2,788	\$2,518	\$2,843	\$1,900	\$2,328	\$2,518
Thornyheads				\$524	\$806	\$2,068	\$3,856	\$3,484	\$4,092	\$4,379	\$6,326	\$7,276	\$5,264	\$3,828	\$2,076	\$1,794	\$5,264
Other Rockfish																	
Bocaccio	\$167	\$277	\$174	\$191	\$129	\$165	\$118	\$148	\$112	\$114	\$104	\$84	\$61	\$59	\$16	\$27	\$61
Chilipepper	\$2	\$2	\$1		\$4	\$2	\$1	\$3	\$8	\$6	\$13	\$6	\$6	\$7	\$13	\$2	\$6
Yellowtail	\$1,139	\$878	\$1,190	\$1,375	\$1,598	\$1,510	\$1,268	\$1,372	\$2,704	\$1,996	\$2,384	\$2,476	\$2,644	\$1,008	\$1,426	\$1,378	\$2,643
Remaining Rockfish ^{a/}	\$1,403	\$2,319	\$1,883	\$1,739	\$1,893	\$1,817	\$1,328	\$1,798	\$1,606	\$2,047	\$1,697	\$1,348	\$1,310	\$1,228	\$957	\$932	\$1,315
Unspecified Rockfish ^{b/}	\$239	\$397	\$472	\$678	\$433	\$395	\$583	\$855	\$440	\$767	\$236	\$206	\$268	\$295	\$663	\$320	\$268
Total Rockfish	\$6,677	\$7,283	\$7,326	\$10,601	\$9,674	\$11,378	\$11,350	\$11,752	\$12,899	\$14,336	\$14,852	\$15,150	\$13,208	\$10,351	\$8,384	\$7,571	\$13,212
Flatfish																	
Arrowtooth Flounder	\$92	\$154	\$113	\$240	\$185	\$242	\$412	\$528	\$481	\$357	\$367	\$347	\$249	\$251	\$357	\$483	\$249
Dover Sole	\$3,196	\$3,161	\$2,829	\$4,184	\$5,216	\$5,472	\$4,534	\$5,975	\$3,738	\$3,879	\$2,535	\$2,599	\$3,273	\$2,642	\$2,883	\$3,258	\$3,273
English Sole	\$320	\$343	\$438	\$533	\$501	\$563	\$350	\$621	\$429	\$473	\$250	\$244	\$292	\$380	\$353	\$241	\$292
Petrale Sole	\$1,093	\$936	\$1,194	\$1,552	\$1,662	\$1,590	\$1,357	\$1,689	\$1,358	\$1,307	\$1,108	\$1,701	\$1,539	\$1,646	\$1,421	\$1,419	\$1,539
Other Flatfish	\$976	\$949	\$760	\$863	\$737	\$769	\$702	\$1,210	\$736	\$743	\$831	\$734	\$427	\$539	\$399	\$501	\$427
Total Flatfish	\$5,676	\$5,544	\$5,334	\$7,373	\$8,300	\$8,636	\$7,354	\$10,022	\$6,742	\$6,760	\$5,091	\$5,625	\$5,781	\$5,458	\$5,413	\$5,902	\$5,781
Other Fish																	
	\$19	\$13	\$19	\$19	\$12	\$24	\$29	\$46	\$32	\$102	\$130	\$222	\$336	\$402	\$208	\$190	\$336
Grand Total	\$15,237	\$17,079	\$16,814	\$24,190	\$23,918	\$25,224	\$23,234	\$29,708	\$31,046	\$28,991	\$32,628	\$37,820	\$34,281	\$34,108	\$22,763	\$27,696	\$34,285

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 17. Estimated commercial groundfish landings (mt) for California, 1984-2000.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	951	695	524	843	889	1,266	1,064	788	613	691	568	539	479	510	151	142	54
Pacific Cod	2	1		66	5	0	0	0	1	0	0	0	0	0	0	0	0
Pacific Whiting	2,335	2,996	2,982	4,518	6,533	7,298	5,519	6,893	4,930	3,100	3,613	4,091	2,901	6,332	5,723	1,308	4,986
Sablefish	4,826	5,171	6,220	4,404	3,856	4,075	3,750	3,353	3,714	2,597	2,186	2,819	3,196	2,968	1,448	1,974	1,859
Total Roundfish	8,123	8,875	9,734	9,836	11,290	12,653	10,347	11,048	9,278	6,412	6,406	7,536	6,686	9,939	7,492	3,560	7,035
Rockfish																	
Canary	420	441	229	206	220	344	559	271	362	168	232	209	286	226	195	115	13
Pacific Ocean Perch	52	74	34	81	55	41	15	7	14	11	7	10	19	15	20	2	3
Shortbelly	2	28	19			1	9	1	0	2	4	10	32	63	19	9	4
Widow	2,855	3,208	2,539	2,706	1,947	2,161	2,146	1,314	1,144	1,230	942	1,757	1,347	1,354	906	668	705
Thornyheads	2,126	2,940	2,950	2,958	4,551	5,399	5,399	2,872	4,379	4,164	3,317	3,637	3,315	2,811	1,893	1,495	1,240
Other Rockfish																	
Bocaccio	3,952	1,966	2,021	2,288	1,982	2,481	2,273	1,315	1,531	1,418	1,007	731	478	320	148	113	27
Chili pepper	2,208	2,508	1,953	1,760	2,177	2,875	2,871	3,117	2,489	2,339	1,845	1,974	1,809	2,046	1,417	929	444
Yellowtail	666	539	548	653	256	1,006	1,076	711	704	531	341	312	271	441	447	118	54
Remaining Rockfish ^{a/}	4,996	5,331	5,254	5,354	4,831	3,660	4,330	3,766	3,714	2,688	3,050	2,998	3,054	2,809	3,673	955	734
Unspecified Rockfish ^{b/}	2,401	817	1,568	638	474	415	654	447	245	155	76	48	195	109	144	18	14
Total Rockfish	19,679	17,852	17,114	16,644	16,493	18,384	19,333	13,820	14,584	12,705	10,820	11,686	10,807	10,194	8,862	4,423	3,238
Flatfish																	
Arrowtooth Flounder	32	38	19	45	36	28	54	157	99	57	73	118	50	48	37	43	26
Dover Sole	9,781	12,020	11,052	10,761	8,197	7,723	6,320	7,721	8,643	6,554	4,488	6,099	6,405	5,309	3,572	3,818	3,267
English Sole	952	1,062	1,082	1,322	1,067	1,053	892	812	575	474	463	500	581	650	427	385	299
Petrale Sole	591	857	726	824	795	841	678	734	532	464	550	593	818	831	473	567	628
Other Flatfish	1,230	1,810	1,704	1,727	1,679	1,681	1,384	1,343	870	942	1,350	1,470	1,419	1,521	1,069	1,314	1,039
Total Flatfish	12,586	15,786	14,583	14,679	11,774	11,326	9,328	10,766	10,719	8,490	6,924	8,780	9,274	8,358	5,578	6,128	5,259
Other Fish																	
	307	451	284	277	265	227	225	193	254	484	641	721	2,016	2,069	1,563	1,301	853
Grand Total	40,694	42,964	41,715	41,436	39,822	42,590	39,234	35,827	34,834	28,091	24,791	28,723	28,782	30,561	23,496	15,411	16,385

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 18. Estimated commercial groundfish landings (in thousands of dollars) for California, 1984-2000. Values are actual values for the year specified, and not adjusted for inflation.

Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	\$552	\$458	\$413	\$733	\$785	\$1,110	\$929	\$707	\$585	\$659	\$586	\$611	\$570	\$606	\$273	\$285	\$147
Pacific Cod	\$1	\$1		\$48	\$3	\$0	\$0	\$0	\$2	\$1	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Pacific Whiting	\$341	\$396	\$384	\$611	\$1,076	\$1,052	\$784	\$882	\$597	\$343	\$354	\$456	\$239	\$583	\$394	\$116	\$765
Sablefish	\$2,208	\$2,885	\$4,651	\$3,813	\$3,423	\$3,622	\$3,546	\$3,698	\$4,414	\$2,477	\$3,355	\$7,275	\$8,689	\$9,060	\$3,380	\$4,304	\$5,166
Total Roundfish	\$3,107	\$3,746	\$5,452	\$5,209	\$5,294	\$5,796	\$5,271	\$5,317	\$5,656	\$3,621	\$4,578	\$8,998	\$10,320	\$11,142	\$5,296	\$5,810	\$7,394
Rockfish																	
Canary	\$238	\$297	\$169	\$174	\$179	\$389	\$540	\$309	\$373	\$217	\$327	\$332	\$401	\$338	\$268	\$149	\$23
Pacific Ocean Perch	\$26	\$41	\$22	\$58	\$36	\$27	\$11	\$4	\$10	\$7	\$5	\$8	\$15	\$11	\$17	\$1	\$3
Shorthelly	\$1	\$3	\$13			\$0	\$5	\$1	\$0	\$1	\$2	\$5	\$9	\$29	\$9	\$2	\$2
Widow	\$1,412	\$1,805	\$1,608	\$1,970	\$1,308	\$1,356	\$1,455	\$884	\$778	\$851	\$713	\$1,400	\$1,002	\$1,000	\$823	\$637	\$750
Thornyheads	\$1,152	\$1,626	\$1,810	\$2,106	\$3,533	\$4,428	\$4,580	\$2,895	\$4,696	\$4,608	\$5,555	\$8,298	\$6,534	\$5,118	\$3,270	\$3,132	\$3,033
Other Rockfish																	
Bocaccio	\$2,311	\$1,332	\$1,561	\$1,934	\$1,705	\$1,986	\$1,854	\$1,073	\$1,436	\$1,391	\$955	\$700	\$458	\$305	\$167	\$148	\$43
Chilipepper	\$1,226	\$1,705	\$1,406	\$1,376	\$1,651	\$2,206	\$2,153	\$2,504	\$2,099	\$2,323	\$1,690	\$1,855	\$1,608	\$1,801	\$1,314	\$963	\$596
Yellowtail	\$372	\$338	\$410	\$578	\$248	\$870	\$946	\$625	\$701	\$578	\$348	\$331	\$251	\$488	\$503	\$153	\$76
Remaining Rockfish ^{a/}	\$3,768	\$4,453	\$4,983	\$5,206	\$4,702	\$4,007	\$4,704	\$4,595	\$4,831	\$3,610	\$4,575	\$4,805	\$4,760	\$4,234	\$4,815	\$2,603	\$2,574
Unspecified Rockfish ^{b/}	\$1,514	\$748	\$1,340	\$601	\$414	\$441	\$670	\$605	\$264	\$264	\$86	\$74	\$398	\$191	\$283	\$43	\$56
Total Rockfish	\$12,020	\$12,347	\$13,321	\$14,004	\$13,777	\$15,710	\$16,917	\$13,496	\$15,190	\$13,851	\$14,255	\$17,809	\$15,435	\$13,516	\$11,468	\$7,831	\$7,155
Flatfish																	
Arrowtooth Flounder	\$8	\$10	\$4	\$15	\$12	\$9	\$13	\$41	\$24	\$13	\$21	\$32	\$12	\$11	\$10	\$10	\$7
Dover Sole	\$4,963	\$6,212	\$6,166	\$7,111	\$5,439	\$4,612	\$3,630	\$5,052	\$5,411	\$3,917	\$2,904	\$4,296	\$4,238	\$3,349	\$2,660	\$2,788	\$2,449
English Sole	\$686	\$799	\$871	\$1,201	\$949	\$884	\$881	\$664	\$463	\$369	\$379	\$427	\$479	\$492	\$344	\$294	\$241
Petrale Sole	\$896	\$1,391	\$1,271	\$1,449	\$1,355	\$1,459	\$1,221	\$1,331	\$941	\$834	\$1,041	\$1,193	\$1,615	\$1,632	\$995	\$1,167	\$1,418
Other Flatfish	\$989	\$1,524	\$1,499	\$1,571	\$1,495	\$1,405	\$1,104	\$1,143	\$768	\$895	\$1,159	\$1,282	\$1,207	\$1,205	\$862	\$1,042	\$948
Total Flatfish	\$7,542	\$9,936	\$9,811	\$11,347	\$9,250	\$8,369	\$6,649	\$8,231	\$7,608	\$6,028	\$5,504	\$7,230	\$7,550	\$6,690	\$4,871	\$5,300	\$5,065
Other Fish																	
	\$310	\$338	\$289	\$296	\$264	\$247	\$199	\$168	\$165	\$224	\$268	\$328	\$791	\$855	\$689	\$519	\$405
Grand Total	\$22,979	\$26,366	\$28,872	\$30,856	\$28,584	\$30,122	\$29,036	\$27,213	\$28,618	\$23,724	\$24,605	\$34,364	\$34,096	\$32,203	\$22,325	\$19,461	\$20,019

^{a/} Remaining rockfish are species of rockfish not specifically listed on this page.

^{b/} Unspecified rockfish are those rockfish specifically categorized as "URCK" in the PacFIN landings.

TABLE 19. Total ocean recreational harvest in metric tons, 1981-2000 (all fishing modes). No data for 1990-1992, January-February 1995, for Oregon in July-August after 1992, for Oregon January-February and November-December in 1994. Data through 1998 was extracted from RecFIN September, 1999; data for 1999 and 2000 extracted from RecFIN October, 2001.

Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998 ^{a/}	1999 ^{b/}	2000 ^{b/}
ALL AREAS (Shaded Columns Indicate Incomplete Data)																	
Roundfish																	
Lingcod	1,479	1,508	658	615	1,211	1,125	1,256	1,299	1,172	765	515	448	536	494	471	532	364
Pacific Cod	0	-	0	0	2	0	13	1	-	-	0	-	-	-	-	-	-
Pacific Whiting	10	9	1	42	71	59	8	43	32	0	1	0	1	0	1	-	-
Sablefish	4	2	-	9	19	24	4	71	1	2	1	-	1	7	4	0	1
Total Roundfish	1,493	1,519	659	666	1,303	1,209	1,281	1,414	1,205	767	517	449	538	502	476	532	365
Rockfish																	
Pacific Ocean Perch	0	-	0	-	0	-	0	0	-	-	1	-	-	1	-	-	-
Shortbelly	-	-	-	-	-	2	-	0	-	-	-	-	0	-	-	-	-
Shortspine Thornyhead	-	1	0	23	19	2	0	3	1	-	0	-	-	-	-	1	-
Widow Rockfish	22	168	55	71	49	54	22	35	42	37	4	4	27	43	62	31	22
Total Rockfish	22	168	56	94	68	57	23	39	44	37	5	4	27	43	62	31	22
Other Rockfish																	
Black	2,741	1,847	601	1,019	1,297	689	802	797	634	939	827	717	720	707	921	865	1,073
Blue	1,435	1,134	801	600	468	305	460	449	413	581	229	176	310	462	454	311	270
Bocaccio	1,075	1,320	505	211	374	566	191	151	247	122	192	33	103	112	67	136	110
Canary	219	300	99	128	228	245	264	252	149	120	88	125	93	141	90	115	120
Chilipepper	272	316	154	140	350	385	203	413	308	17	23	11	37	74	12	7	38
Other	1,647	2,021	1,523	1,848	1,979	1,885	1,295	1,302	1,102	916	842	666	765	528	543	55	26
Rockfish Genus	214	314	57	54	92	77	77	0	20	114	207	263	278	42	43	1,009	611
Yellowtail	475	1,112	557	391	426	294	268	239	350	135	88	94	143	392	228	305	190
Total Other Rockfish	8,079	8,366	4,296	4,390	5,214	4,447	3,560	3,604	3,222	2,942	2,495	2,085	2,450	2,459	2,357	2,803	2,438
Flatfish																	
Arrowtooth Flounder	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dover Sole	0	-	0	-	-	0	-	0	-	0	-	-	-	-	-	-	-
English Sole	0	0	-	-	0	0	2	-	-	0	0	-	-	-	-	-	-
Other Flatfish	437	251	126	138	333	351	573	472	456	261	410	553	455	508	435	835	691
Petrale Sole	7	9	1	4	11	3	0	3	4	2	-	-	1	-	-	0	0
Total Flatfish	444	261	127	142	344	354	575	476	461	263	410	553	456	508	508	835	691
Other Fish																	
Cabezon	217	174	100	116	97	160	169	116	116	111	77	85	95	91	118	84	85
Greenling Genus	1	1	3	-	0	1	0	-	-	0	0	-	1	-	-	29	50
Jack Mackerel	1	2	4	14	20	7	8	353	3	17	1	6	1	7	10	10	10
Kelp Greenling	62	59	42	41	34	53	71	45	42	65	35	31	35	28	18	33	28
Leopard Shark	9	1	6	11	32	12	52	36	2	8	20	-	3	3	8	3	3
Rock Greenling	10	6	7	3	7	7	7	7	5	5	5	7	9	4	2	4	0
Soupin Shark	-	-	0	-	13	1	-	-	-	-	-	3	2	-	-	-	-
Spiny Dogfish Shark	34	44	17	17	52	63	6	49	23	10	10	20	19	4	-	13	9
Total Other Fish	333	288	179	202	255	305	313	606	191	216	149	152	164	137	155	163	171
Grand Total	10,371	10,601	5,317	5,493	7,184	6,372	5,751	6,138	5,122	4,226	3,576	3,243	3,634	3,648	3,486	4,365	3,687

a/ Preliminary

b/ Greenling Genus includes Kelp, Rock, and unspecified greenling; Jack Mackerel not estimated or included in Total Other Fish.

TABLE 20. Washington ocean recreational harvest in metric tons, 1981-2000 (all fishing modes). Data not available for 1990-1992. Data through 1998 was extracted from RecFIN September, 1999; data for 1999 and 2000 extracted from RecFIN October, 2001.

extracted from Rechin October, 2001.

Species	WASHINGTON																1999 ^{a/b/}	2000 ^{a/b/}
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998 ^{a/}			
Roundfish																		
Lingcod	137	199	43	30	66	33	142	114	38	77	110	61	54	48	24	43	29	
Pacific Cod	0	-	0	0	2	0	13	1	-	-	-	-	-	-	1	-	-	
Pacific Whiting	-	-	0	-	-	-	0	-	-	-	-	-	-	-	-	-	-	
Total Roundfish	137	199	43	30	68	33	155	115	38	77	110	61	54	48	25	43	29	
Rockfish																		
Widow Rockfish	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Rockfish	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Other Rockfish																		
Black	1,454	1,044	282	276	428	27	238	172	-	237	319	213	231	180	122	156	139	
Blue	5	-	0	1	12	1	-	1	-	3	1	1	1	1	-	2	1	
Canary Rockfish	14	1	-	5	1	0	3	-	-	10	4	4	3	4	10	5	3	
Other Rockfish	15	22	9	14	14	2	81	6	-	13	5	5	5	7	15	15	18	
Rockfish Genus	-	-	-	-	-	5	-	-	-	-	-	-	1	-	2	4	5	
Yellowtail	10	2	0	12	2	-	1	-	-	22	7	5	4	6	38	6	9	
Total Other Rockfish	1,497	1,070	292	308	456	34	323	178	-	285	336	227	245	199	186	189	165	
Flatfish																		
Dover Sole	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
English Sole	0	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	
Other Flatfish	1	0	0	4	17	1	55	2	-	-	83	54	141	147	58	263	137	
Petrale Sole	0	-	-	-	1	-	-	0	-	-	-	-	-	-	-	-	-	
Total Flatfish	2	0	0	4	17	1	56	2	-	-	83	54	141	147	58	263	137	
Other Fish																		
Cabezon	18	0	0	1	1	1	9	2	-	4	1	1	2	2	5	7	3	
Greenling Genus	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	1	
Kelp Greenling	4	1	3	2	0	6	12	2	-	2	1	-	1	1	2	-	-	
Rock Greenling	-	-	-	-	0	0	0	1	-	-	-	-	-	-	-	-	-	
Spiny Dogfish Shark	-	-	0	-	-	2	2	2	-	-	-	-	2	-	-	-	-	
Total Other Fish	22	1	4	3	1	10	24	5	-	5	2	2	5	2	7	10	4	
Grand Total	1,658	1,270	338	345	543	79	558	300	38	367	531	344	445	397	276	505	336	

a/ Preliminary

b/ Greenling Genus includes Kelp, Rock, and unspecified greenling; Jack Mackerel not estimated or included in Total Other Fish.

TABLE 21. Oregon ocean recreational harvest in metric tons, 1981-2000 (all fishing modes). Data not available for 1990-1992, January-February 1995, July-August after 1992, and for January-February and November-December 1994. Data through 1998 was extracted from RecFIN September, 1999; data for 1999 and 2000 extracted from RecFIN October, 2001.

December 1994 data through 1999 was collected from users in September 1994. Data is not available for 1994 and 1995.

Species	OREGON (Shaded Columns Indicate Incomplete Data)																	
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998 ^a	1999 ^b	2000 ^{a,b}	
Roundfish	Lingcod	210	483	133	110	183	194	182	162	195	250	158	107	124	192	175	116	130
	Pacific Whiting	-	-	0	-	-	-	0	-	-	-	0	-	-	-	1	-	-
	Sablefish	-	-	-	-	-	0	-	-	-	2	1	-	0	7	3	0	1
	Total Roundfish	210	483	133	110	183	194	182	162	195	252	159	107	124	199	179	179	179
Rockfish	Pacific Ocean Perch	-	-	-	-	-	-	-	0	-	-	0	-	-	-	-	-	-
	Shortspine Thornyhead	-	0	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-
	Widow Rockfish	-	4	0	3	1	1	0	1	1	34	2	1	4	4	9	2	15
	Total Rockfish	-	4	0	3	8	1	0	1	1	34	2	1	4	4	9	2	15
Other Rockfish	Black	814	337	105	331	379	253	338	336	421	422	294	338	337	438	685	544	799
	Blue	253	48	40	38	44	30	40	30	97	121	50	48	108	164	122	77	79
	Bocaccio	3	1	0	0	2	0	1	0	0	2	0	1	0	1	-	3	1
	Canary	47	41	4	20	60	21	30	56	25	46	33	50	26	43	49	43	32
	Other	145	76	4	38	48	16	32	26	52	62	33	35	19	44	51	26	11
	Rockfish Genus	-	-	0	-	-	-	-	-	-	-	-	-	1	-	-	40	42
	Yellowtail	35	14	21	32	45	12	13	8	31	42	41	63	41	26	41	37	47
	Total Other Rockfish	1,297	518	174	459	577	333	455	457	626	694	451	535	531	716	948	770	1,013
Flatfish	English Sole	-	0	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-
	Other Flatfish	1	12	0	0	3	0	14	23	58	2	52	40	25	126	117	112	68
	Petrale Sole	-	0	0	-	-	0	-	-	-	-	0	-	-	-	-	0	-
	Total Flatfish	1	12	1	0	3	0	14	23	58	2	52	40	25	126	117	113	68
Other Fish	Cabezon	89	65	10	12	24	19	49	28	26	30	22	13	12	29	39	34	43
	Jack Mackerel	-	0	-	0	-	-	-	-	-	1	-	-	-	-	-	-	-
	Kelp Greenling	36	11	11	9	10	13	12	11	5	35	11	8	6	12	7	20	31
	Leopard Shark	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	0	-
	Rock Greenling	5	1	0	0	1	1	1	2	1	2	0	1	0	1	-	-	-
	Spiny Dogfish Shark	1	-	-	1	-	-	-	-	-	0	-	-	-	-	-	1	-
Total Other Fish	131	78	22	21	35	33	63	41	32	69	33	21	18	42	45	54	74	
Grand Total	1,639	1,094	329	593	808	561	714	683	912	1,051	698	704	703	1,086	1,300	1,054	1,301	

a/ Preliminary

b/ Kelp Greenling includes Kelp, Rock, and unspecified greenling; Jack Mackerel not estimated or included in Total Other Fish.

TABLE 22. California ocean recreational harvests in metric tons, 1981-2000 (all fishing modes). Data not available for 1990-1992 and January-February 1995. Data through 1998 was extracted from RecFIN September, 1999; data for 1999 and 2000 extracted from RecFIN October, 2001.

data for 1999 and 2000 extracted from NEFRI October, 2001.

Species	CALIFORNIA (Shaded Column Indicates Incomplete Data)																	1998 ^{a/}	1999 ^{a/b/}	2000 ^{a/b/}
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997						
Roundfish																				
Lingcod	1,132	827	483	475	961	899	932	1,023	939	439	246	280	359	254	272	373	204			
Pacific Cod	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-			
Pacific Whiting	10	9	1	42	71	59	7	43	32	0	1	0	-	0	-	-	-			
Sablefish	4	2	-	9	19	24	4	71	1	-	-	-	0	-	-	0	0			
Total Roundfish	1,145	837	484	526	1,051	982	943	1,137	972	439	247	281	360	255	272	373	204			
Rockfish																				
Pacific Ocean Perch	0	-	0	-	0	-	0	-	-	-	0	-	-	1	-	-	-			
Shortbelly Rockfish	-	-	-	-	-	2	-	0	-	-	-	-	-	-	-	-	-			
Shortspine Thornyhead	-	1	0	23	12	2	0	3	1	-	0	-	-	-	-	1	-			
Widow Rockfish	22	164	55	67	48	53	22	34	42	3	2	3	22	39	53	29	7			
Total Rockfish	22	164	56	91	60	57	22	38	43	3	3	3	22	39	53	30	7			
Other Rockfish																				
Black	473	465	214	412	491	409	226	289	213	280	214	166	152	89	114	165	135			
Blue	1,177	1,086	761	562	412	274	419	418	316	457	178	127	200	297	332	233	189			
Bocaccio	1,072	1,319	505	211	372	566	190	151	247	119	192	32	103	112	67	133	108			
Canary	158	258	95	103	167	224	231	196	124	65	50	72	64	95	31	67	85			
Chilipepper	272	316	154	140	350	385	203	413	308	17	23	11	37	74	12	7	38			
Other Rockfish	1,488	1,923	1,509	1,795	1,917	1,866	1,182	1,270	1,049	842	804	626	742	476	476	13	7			
Rockfish Genus	214	314	57	54	92	73	77	0	20	114	207	263	276	42	41	965	563			
Yellowtail	430	1,096	536	347	379	282	254	231	319	71	40	27	99	360	149	261	134			
Total Other Rockfish	5,284	6,778	3,830	3,624	4,181	4,079	2,782	2,969	2,596	1,963	1,708	1,323	1,673	1,545	1,222	1,844	1,259			
Flatfish																				
Arrowtooth Flounder	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Dover Sole	-	-	0	-	-	0	-	0	-	0	-	-	-	-	-	-	-			
English Sole	-	0	-	-	0	0	0	-	-	0	0	-	-	-	-	-	-			
Other Flatfish	435	239	125	134	313	349	504	447	399	259	275	459	289	234	260	459	486			
Petrale Sole	7	9	1	4	10	3	0	3	4	2	0	0	1	-	-	0	0			
Total Flatfish	442	248	126	138	323	352	504	451	403	261	275	459	289	234	260	459	486			
Other Fish																				
Cabazon	110	109	89	103	72	140	111	86	91	77	54	71	80	60	74	43	39			
Greenling Genus	1	1	3	-	0	-	0	-	-	0	0	-	1	-	-	8	18			
Jack Mackerel	1	2	4	14	20	7	8	353	3	17	1	6	1	7	10	-	-			
Kelp Greenling	22	46	27	31	24	34	46	31	37	28	24	23	28	15	9	-	-			
Leopard Shark	9	1	6	11	32	12	52	36	2	8	20	-	3	3	8	33	28			
Rock Greenling	5	5	7	3	6	6	5	4	4	3	5	7	8	3	2	-	-			
Soupin Shark	-	-	0	-	13	1	-	-	-	-	-	3	2	-	-	4	0			
Spiny Dogfish Shark	33	44	17	16	52	61	4	49	23	9	10	20	18	4	-	12	9			
Total Other Fish	181	209	153	178	218	262	227	560	159	142	114	129	140	92	102	100	94			
Grand Total	7,075	8,237	4,650	4,555	5,834	5,732	4,479	5,155	4,172	2,808	2,348	2,195	2,486	2,165	1,910	2,805	2,050			

a/ Preliminary

b/ Greenling Genus includes Kelp, Rock, and unspecified greenling; Jack Mackerel not estimated or included in Total Other Fish.

TABLE 23. Washington ocean recreational harvest from private vessels in metric tons, 1981-2000. Data not available for 1989-1992. Data through 1998 was extracted from RecFIN September, 1999; data for 1999 and 2000 extracted from RecFIN October, 2001.

and 2000 extracted from RecFIN October, 2001.

Species	WASHINGTON - PRIVATE VESSELS																			1999 ^{a/b}	2000 ^{a/b}
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998 ^a			
Roundfish																					
Lingcod	8	54	32	17	31	20	94	1	18	23	19	21	22	22	16	22	22	11			
Pacific Cod	-	-	-	-	2	0	11	-	-	-	-	-	-	-	-	-	-	-			
Pacific Whiting	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-			
Total Roundfish	8	54	32	17	33	21	106	1	18	23	19	21	22	22	16	22	22	11			
Rockfish																					
Widow Rockfish	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Total Rockfish	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Other Rockfish																					
Black	7	4	21	28	42	17	15	2	22	24	26	31	26	38	27	24					
Blue	-	-	0	0	12	1	-	-	1	-	-	-	-	-	1	0					
Canary	-	0	-	1	1	0	2	-	1	1	1	1	1	1	1	1					
Other Rockfish	0	12	9	8	14	2	80	1	3	2	2	2	3	5	10	7					
Yellowtail	-	2	0	-	2	-	0	-	1	-	-	-	-	1	1	1					
Total Other Rockfish	8	18	31	37	70	20	96	3	29	28	29	34	30	45	41	34					
Flatfish																					
English Sole	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-			
Other Flatfish	-	0	0	4	17	1	52	-	-	22	23	70	80	36	131	63					
Petrale Sole	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-			
Total Flatfish	-	0	0	4	17	1	54	-	-	22	23	70	80	36	131	63					
Other Fish																					
Cabezon	4	0	0	1	0	0	9	-	3	1	1	2	1	5	7	2					
Kelp Greenling	-	0	3	2	0	3	10	-	1	-	-	1	-	2	2	1					
Rock Greenling	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-					
Spiny Dogfish Shark	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-					
Total Other Fish	4	0	3	3	1	3	21	-	4	1	1	2	2	7	10	3					
Grand Total	20	73	66	61	120	44	277	4	51	75	72	128	134	105	203	112					

a/ Preliminary

b/ Kelp Greenling includes Kelp, Rock, and unspecified greenling; Jack Mackerel not estimated or included in Total Other Fish.

TABLE 24. Washington ocean recreational harvest from charter vessels in metric tons, 1981-2000. Data not available 1990-1992. Data through 1998 was extracted from RecFIN September, 1999; data for 1999 and 2000 extracted from RecFIN October, 2001.

Species	WASHINGTON - CHARTER VESSELS																		
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998 ^{a/}	2000 ^{b/}
Roundfish																			
Lingcod	129	142	11	13	35	7	46	87	59	87	43	27	7	22	18				
Pacific Cod	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Total Roundfish	129	142	11	13	35	7	48	87	59	87	43	27	7	22	18				
Other Rockfish																			
Black	1,446	1,032	260	248	386	-	221	164	215	295	187	154	79	129	115				
Blue	5	-	-	1	-	-	-	-	2	1	-	1	-	1	1				
Canary	14	1	-	3	0	-	1	-	8	3	3	3	8	4	2				
Other Rockfish	14	9	0	6	0	-	1	4	9	3	3	4	10	9	5				
Yellowtail	10	-	-	12	-	-	1	-	21	7	4	6	36	5	7				
Total Other Rockfish	1,489	1,042	260	270	386	-	225	168	256	308	198	168	134	148	131				
Flatfish																			
Dover Sole	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Other Flatfish	0	-	-	-	-	-	2	2	-	60	31	68	22	132	74				
Petrale Sole	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Total Flatfish	1	-	-	-	-	-	2	2	-	60	31	68	22	132	74				
Other Fish																			
Cabezon	13	-	-	0	0	-	0	1	1	-	-	-	-	-	-				
Kelp Greenling	3	-	1	0	0	-	0	-	-	-	-	-	-	-	-				
Total Other Fish	17	-	1	0	1	-	0	1	2	-	-	-	1	1	0				
Total	1,635	1,183	272	284	422	7	275	258	316	456	272	263	163	302	224				

a/ Preliminary

b/ Kelp Greenling includes Kelp, Rock, and unspecified greenling; Jack Mackerel not estimated or included in Total Other Fish.

TABLE 25. Oregon ocean recreational harvest from private vessels in metric tons, 1981-1989 and 1993-2000. Data not available for 1990-1992, January -February 1995, July-August after 1992; and for January-February and November-December 1994. Data through 1998 was extracted from RecFIN September, 1999; data for 1999 and 2000 extracted from RecFIN October, 2001.

OREGON - PRIVATE VESSELS (Shaded Columns Indicate Incomplete Data)																				
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998 ^{a/}	1999 ^{a/b/}	2000 ^{a/b/}			
Roundfish	Lingcod	15	61	32	42	104	92	71	74	52	167	97	47	50	101	130	73	74		
	Pacific Whiting	-	-	-	-	-	-	0	-	-	-	0	-	-	-	1	-	-		
	Sablefish	-	-	-	-	-	-	-	-	-	1	0	-	-	-	0	0	-		
Total Roundfish	15	61	32	42	104	92	71	74	52	168	97	47	50	101	132	73	74			
Rockfish	Shortspine Thornyhead	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-		
	Widow Rockfish	-	-	-	-	-	0	0	0	2	-	0	0	0	0	0	1	-		
Total Rockfish	-	-	-	-	7	0	0	0	0	2	-	0	0	0	0	0	1	-		
Other Rockfish	Black	148	107	40	254	220	89	162	96	66	209	135	146	123	192	421	287	447		
	Blue	12	3	2	3	43	17	9	5	9	52	24	10	9	45	43	25	37		
	Bocaccio	1	-	0	-	1	-	-	-	-	0	-	-	-	-	0	3	-		
	Canary	8	11	0	9	38	5	8	19	7	22	10	17	7	11	18	20	9		
	Other Rockfish	5	7	0	14	30	4	8	10	5	24	11	15	5	18	34	13	1		
	Rockfish Genus	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	22	14		
	Yellowtail	3	3	6	1	9	3	3	1	1	6	3	3	1	3	9	7	2		
Total Other Rockfish	177	131	48	281	341	118	189	132	88	314	183	192	145	269	526	377	510			
Flatfish	English Sole	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-		
	Other Flatfish	-	2	0	-	2	0	0	0	27	0	26	12	3	8	61	79	25		
	Petrale Sole	-	-	0	-	-	-	-	-	-	-	0	-	-	-	-	0	-		
Total Flatfish	-	2	0	-	2	0	0	0	27	0	26	12	3	8	61	80	25			
Other Fish	Cabezon	3	12	4	4	12	4	21	12	4	19	10	8	6	15	33	23	23		
	Kelp Greenling	2	4	1	4	5	2	3	2	1	16	6	4	3	5	4	15	26		
	Rock Greenling	0	0	-	-	-	-	0	-	-	1	0	-	-	-	-	-	-		
	Spiny Dogfish Shark	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	1	-		
	Total Other Fish	5	17	5	8	17	6	23	14	5	36	16	12	8	20	37	39	48		
Grand Total	197	211	85	332	470	217	284	221	172	520	323	262	205	399	755	570	658			

a/ Preliminary
b/ Kelp Greenling includes Kelp, Rock, and unspecified greenling; Jack Mackerel not estimated or included in Total Other Fish.

TABLE 26. Oregon ocean recreational harvest from charter vessels in metric tons, 1981-1990 and 1993-2000. Data not available for 1990-1992, January-February 1995, July-August after 1992, and for January-February and November-December 1994. Data through 1998 was extracted from RecFIN September, 1999; data for 1999 and 2000 extracted from RecFIN October, 2001.

OREGON - CHARTER VESSELS (Shaded Columns Indicate Incomplete Data)																				
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998 ^{a/}	1999 ^{a/b/}	2000 ^{a/b/}			
Roundfish	Lingcod	194	419	92	67	77	98	100	27	143	75	59	58	73	88	44	43	56		
	Pacific Whiting	-	-	-	-	-	-	-	-	-	-	0	-	-	-	0	-	-		
	Sablefish	-	-	-	-	-	0	-	-	-	1	1	-	0	7	3	0	1		
	Total Roundfish	194	419	92	67	77	98	100	27	143	77	60	58	73	88	47	43	57		
Rockfish	Pacific Ocean Perch	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-		
	Widow Rockfish	-	4	0	3	1	1	0	1	1	32	2	1	4	4	9	1	15		
Total Rockfish	-	4	0	3	1	1	0	-	1	32	2	1	4	4	9	1	15			
Other Rockfish	Black	664	227	62	74	155	160	169	69	354	211	157	190	212	245	264	257	352		
	Blue	242	45	38	35	1	12	31	7	87	69	26	38	99	119	78	52	42		
	Bocaccio	1	1	0	0	1	0	1	0	0	2	0	1	0	1	0	1	1		
	Canary	38	30	3	11	22	16	21	17	18	24	22	33	18	31	31	23	23		
	Other Rockfish	140	69	4	24	18	12	22	8	47	37	22	20	13	26	17	14	10		
	Rockfish Genus	-	-	0	-	-	-	-	-	-	-	-	-	0	-	0	18	29		
	Yellowtail	33	11	15	31	36	9	10	2	30	35	39	60	40	24	32	30	46		
Total Other Rockfish	1,117	384	123	175	233	210	255	104	537	378	267	341	383	445	422	393	504			
Flatfish	English Sole	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Other Flatfish	1	9	0	0	2	0	14	-	31	0	26	28	22	117	57	33	42		
	Petrale Sole	-	0	0	-	-	0	-	-	-	-	0	-	-	-	0	0	-		
Total Flatfish	1	10	0	0	2	0	14	-	31	0	26	28	22	117	57	33	43			
Other Fish	Cabezon	84	52	6	7	11	12	26	7	20	8	11	4	6	13	6	11	20		
	Jack Mackerel	-	0	-	0	-	-	-	-	-	1	-	-	-	-	-	-	-		
	Kelp Greenling	18	3	1	1	1	3	2	1	3	4	3	1	2	4	2	4	5		
	Rock Greenling	-	-	-	-	-	-	0	-	-	0	0	-	-	-	-	-	-		
	Spiny Dogfish Shark	1	-	-	1	-	-	-	-	-	0	-	-	-	-	-	-	-		
Total Other Fish	103	55	6	9	12	14	28	9	23	13	14	5	8	18	8	15	25			
Grand Total	1,415	871	222	254	325	323	397	139	734	500	368	433	491	678	542	485	643			
/ Preliminary																				

a/ Preliminary
b/ Kelp Greenling includes Kelp, Rock, and unspecified greenling; Jack Mackerel not estimated or included in Total Other Fish.

TABLE 27. California ocean recreational harvest from private vessels in metric tons, 1981-1989 and 1993-2000. Data not available for 1990-1992 and January-February 1995. Data through 1998 was extracted from RecFIN September, 1999; data for 1999 and 2000 extracted from RecFIN October, 2001.

Species	CALIFORNIA - PRIVATE VESSELS (Shaded Column Indicates Incomplete Data)																1999 ^{a/b}	2000 ^{a/b}
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998 ^a			
Roundfish																		
Lingcod	520	513	287	355	778	647	719	395	663	420	233	265	240	111	195	232	134	
Pacific Cod	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	
Pacific Hake	0	4	1	3	3	10	7	2	1	0	1	0	1	-	-	-	-	
Sablefish	2	1	-	0	1	2	3	0	-	-	-	-	-	-	-	0	0	
Roundfish Total	523	518	287	359	783	658	729	397	664	420	234	265	241	111	195	233	134	
Rockfish																		
Pacific Ocean Perch	-	-	-	-	-	-	-	-	-	-	0	-	-	1	-	-	-	
Shortspine Thornyhead	-	-	0	23	12	-	0	-	-	-	0	-	-	-	-	1	-	
Widow Rockfish	2	8	6	1	5	1	9	-	3	3	1	3	0	1	3	1	-	
Total Rockfish	2	8	6	24	17	1	9	-	3	3	2	3	0	1	3	2	-	
Other Rockfish																		
Black	438	378	185	377	447	394	187	126	192	277	206	160	122	72	106	146	92	
Blue	477	494	344	287	221	194	318	141	184	448	169	112	72	78	139	97	53	
Bocaccio	80	133	15	30	74	44	79	42	32	86	66	10	42	15	22	27	15	
Canary	79	101	49	63	109	155	110	66	54	65	50	71	26	20	11	16	20	
Chilipepper	15	18	3	1	3	8	5	7	21	17	17	11	14	1	6	4	6	
Other Rockfish	741	862	613	946	1,091	952	808	522	514	751	594	537	354	166	236	5	5	
Rockfish Genus	39	76	34	0	92	-	19	-	5	103	186	258	97	39	21	394	265	
Yellowtail	34	70	57	62	61	66	92	68	71	71	40	27	11	33	42	42	13	
Total Other Rockfish	1,904	2,133	1,301	1,766	2,097	1,814	1,617	974	1,073	1,816	1,328	1,187	738	423	583	730	470	
Flatfish																		
Arrowtooth Flounder	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dover Sole	-	-	0	-	-	-	-	0	-	0	-	-	-	-	-	-	-	
English Sole	159	170	74	91	235	280	415	143	320	241	213	409	220	204	228	377	324	
Other Flatfish	4	3	0	3	5	2	-	3	1	2	0	0	0	-	-	0	0	
Petrale Sole	163	174	74	94	240	282	415	146	322	243	214	410	221	204	228	377	324	
Total Flatfish																		
Other Fish																		
Cabezon	83	74	39	74	50	85	86	31	53	48	39	45	43	14	26	42	32	
Greenling Genus	-	0	2	-	-	-	-	-	-	-	0	-	0	-	-	7	13	
Jack Mackerel	0	1	2	5	2	3	3	1	1	14	-	5	0	0	2	-	-	
Kelp Greenling	10	31	9	15	10	21	22	15	14	18	14	12	10	5	3	3	28	
Leopard Shark	8	1	1	-	32	-	42	-	-	7	18	-	2	3	7	28	28	
Rock Greenling	-	0	1	-	0	1	-	-	0	1	0	1	0	0	0	-	0	
Southern Shark	-	-	0	-	10	-	-	-	-	-	-	3	2	-	-	-	0	
Spiny Dogfish Shark	27	44	9	14	47	56	3	14	14	9	9	16	11	4	-	9	6	
Total Other Fish	128	151	63	108	152	166	156	62	83	97	81	82	69	27	37	86	79	
Grand Total	2,721	2,983	1,731	2,351	3,288	2,921	2,926	1,579	2,145	2,579	1,858	1,946	1,269	766	1,046	1,427	1,008	

a/ Preliminary

b/ Greenling Genus includes Kelp, Rock, and unspecified greenling; Jack Mackerel not estimated or included in Total Other Fish.

TABLE 28. California ocean recreational harvest from charter vessels in metric tons, 1981-1989 and 1993-2000. Data not available for 1990-1992 and January-February 1995. Data through 1998 was extracted from RecFIN September, 1999; data for 1999 and 2000 extracted from RecFIN October, 2001.

CALIFORNIA - CHARTER VESSELS (Shaded Column Indicates Incomplete Data)																				
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998 ^{a/}	1999 ^{a,b/}	2000 ^{a,b/}			
Roundfish																				
Lingcod	598	274	172	99	167	235	194	226	199	7	7	3	108	138	63	141	70			
Pacific Whiting	9	5	0	38	67	49	-	24	30	-	-	-	0	-	-	-	-			
Sablefish	2	0	-	9	18	22	1	60	1	-	-	-	0	-	-	-	0			
Total Roundfish	608	280	172	147	252	306	194	310	230	7	7	3	109	138	63	141	70			
Rockfish																				
Pacific Ocean Perch	0	-	0	-	0	-	-	-	-	-	-	-	-	-	-	-	-			
Shortbelly Rockfish	-	-	-	-	-	2	-	0	-	-	-	-	0	-	0	-	-			
Shortspine Thornyhead	-	-	-	0	-	0	-	3	1	-	-	-	-	-	-	0	-			
Widow Rockfish	20	156	50	66	43	52	13	11	38	-	1	-	22	38	50	28	7			
Total Rockfish	20	156	50	67	43	54	13	15	40	-	1	-	22	38	50	28	7			
Other Rockfish																				
Black	23	60	19	14	36	14	33	16	16	-	-	-	30	17	5	20	42			
Blue	694	588	405	269	186	72	97	128	121	-	3	3	127	217	192	136	136			
Bocaccio	987	1,185	489	181	296	520	109	24	212	33	123	22	60	97	45	106	94			
Canary	79	156	46	38	57	69	121	32	69	-	-	0	39	74	20	51	65			
Chilepepper	257	298	150	139	346	377	199	155	284	-	6	-	24	73	6	2	32			
Other Rockfish	739	1,057	881	838	804	899	354	341	525	80	201	76	379	300	231	8	2			
Rockfish Genus	175	238	23	53	-	73	57	-	15	3	14	1	164	3	20	571	298			
Yellowtail	395	1,026	479	285	318	216	162	77	247	-	0	-	87	327	107	220	120			
Total Other Rockfish	3,349	4,607	2,492	1,818	2,043	2,239	1,132	772	1,490	115	348	103	910	1,109	625	1,114	789			
Flatfish																				
Dover Sole	-	-	0	-	-	0	-	-	-	-	-	-	-	-	-	-	-			
English Sole	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Other Flatfish	75	55	32	33	58	51	70	36	67	15	49	30	52	27	24	83	162			
Petrale Sole	3	5	1	1	6	1	0	0	3	-	-	-	0	-	-	0	-			
Total Flatfish	78	60	33	34	63	52	70	36	70	15	49	30	52	27	24	83	162			
Other Fish																				
Cabezon	7	7	11	2	6	17	9	8	6	1	2	1	8	3	4	1	8			
Greenling Genus	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	1	4			
Jack Mackerel	0	1	1	5	16	3	4	347	1	1	1	0	1	7	2	1	-			
Kelp Greenling	1	1	1	4	1	2	1	0	3	-	-	-	1	2	0	-	-			
Leopard Shark	-	-	-	0	-	3	-	-	-	-	-	-	-	-	-	5	-			
Rock Greenling	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-			
Souptin Shark	-	-	-	-	3	1	-	-	-	-	-	-	-	-	-	4	0			
Spiny Dogfish Shark	4	-	7	2	5	5	1	14	8	-	1	2	6	-	-	3	2			
Total Other Fish	13	8	21	14	30	32	15	370	18	2	3	4	17	12	6	14	14			
Grand Total	4,068	5,112	2,769	2,080	2,431	2,683	1,426	1,503	1,848	138	409	139	1,109	1,324	768	1,379	1,042			

a/ Preliminary
b/ Greenling Genus includes Kelp, Rock, and unspecified greenling; Jack Mackerel not estimated or included in Total Other Fish.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 1 of 58)

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

Effective October 13, 1982

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

Effective November 30, 1982

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

Effective January 1, 1983

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

Effective June 28, 1983

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

Effective September 10, 1983

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

Effective November 10, 1983

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

Effective January 1, 1984

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

Effective February 12, 1984

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 2 of 58)

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

Effective August 1, 1984

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

Automatic Closure (effective August 16, 1984)

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

Automatic Action (effective September 9, 1984)

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

Effective January 10, 1985

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

Effective April 28, 1985

- Continued the coastwide widow rockfish trip limit of 30,000 pounds once per week, but rescinded the option to land 60,000 pounds once every two weeks.
- The coastwide widow rockfish trip limit will be reduced to 10% by weight of all fish on board not to exceed 3,000 pounds if 90% of the OY (about 8,400 mt) reached before the Council's July meeting (under this incidental limit, landings of widow rockfish less than 1,000 pounds will be unrestricted).
- For the *Sebastes* complex north of Cape Blanco (42°50' N latitude), reduced the trip limit to 15,000 pounds once per week of which no more than 5,000 pounds may be yellowtail rockfish (or 30,000 pounds once every two weeks of which no more than 10,000 pounds may be yellowtail rockfish). Added a third option to land 7,500 pounds twice each week of which no more than 3,000 pounds in each landing may be yellowtail rockfish; landings declaration applies.
- Reduced the Vancouver and Columbia areas Pacific ocean perch trip limit to 5,000 pounds or 20% by weight of all fish on board, whichever is less. Landings of Pacific ocean perch less than 1,000 pounds will be unrestricted. The fishery for this species will close when the OY in each area is reached.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 3 of 58)

Effective June 10, 1985

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

Effective July 21, 1985

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

Effective July 25, 1985

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

Effective September 1, 1985

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

Effective October 6, 1985

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

Effective November 25, 1985

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

Effective December 6, 1985

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

Effective January 1, 1986

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

Effective April 11, 1986

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

Automatic Action (see September 28, 1986 below)

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 4 of 58)

Effective August 22, 1986 (Emergency Regulation)

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

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

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

Effective August 31, 1986

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

Effective September 28, 1986

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

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

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

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

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

Effective December 1, 1986

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

Effective January 1, 1987

- Established a coastwide widow rockfish trip limit of 30,000 pounds per week with no biweekly option. Only 1 landing per week above 3,000 pounds (coastwide OY = 12,500 mt; ABC = 12,100 mt).
- Harvest guideline for *Sebastes* complex north of Coos Bay, Oregon (43°21'34" N latitude) set at 10,200 mt.
- For *Sebastes* complex north of Coos Bay, established 25,000-pound weekly trip limit of which no more than 10,000 pounds may be yellowtail rockfish (or 50,000 pounds biweekly of which no more than 20,000 pounds may be yellowtail rockfish, or 12,500 pounds twice per week of which no more than 5,000 pounds may be yellowtail rockfish; biweekly and twice weekly landings require appropriate declaration to state in which fish are landed); no restriction on landings less than 3,000 pounds.
- For *Sebastes* complex south of Coos Bay, established 40,000-pound trip limit; no trip frequency limit.
- Allocated the sablefish OY between trawl and fixed gear at 52% (6,200 mt) and 48% (5,800 mt), respectively; if the quota for either gear type is reached, sablefish becomes a prohibited species for that gear; coastwide OY and ABC = 12,000 mt.
- Established coastwide 5,000-pound trawl and 100-pound fixed gear trip limits (round weights) for sablefish smaller than 22-inches total length (16-inches dorsal total length).
- Established coastwide Pacific ocean perch limit at 20% of all legal fish on board or 5,000 pounds whichever is less (in round weight); landings of Pacific ocean perch unrestricted if less than 1,000 pounds regardless of percentage on board; Vancouver area OY = 500 mt; Columbia area OY = 800 mt.
- Established ABC and OY of 195,000 mt for Pacific whiting.
- Established ABC of 4,000 mt for yellowtail rockfish.

Effective April 5, 1987

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

Effective April 27, 1987

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 5 of 58)

Effective May 3, 1987

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

Effective July 22, 1987

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

Effective August 14, 1987

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

Effective October 2, 1987

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

Effective October 14, 1987

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

Effective October 22, 1987

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

Effective November 25, 1987

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

Effective January 1, 1988

- Established coastwide widow rockfish trip limit of 30,000 pounds per week. Only 1 landing per week above 3,000 pounds. No restriction on landings less than 3,000 pounds (coastwide OY/ABC = 12,100 mt).
- Harvest guideline for *Sebastes* complex north of Coos Bay, Oregon (43°21'34"N) fixed at 10,200 mt.
- For *Sebastes* complex north of Coos Bay, established a 25,000-pound weekly trip limit of which no more than 10,000 pounds may be yellowtail rockfish (or 50,000 pounds biweekly of which no more than 20,000 pounds may be yellowtail rockfish, or 12,500 pounds twice per week, of which no more than 5,000 pounds may be yellowtail rockfish; biweekly and twice weekly landings require appropriate declaration to state in which fish are landed). No restriction on landings less than 3,000 pounds.
- For *Sebastes* complex south of Coos Bay, established a 40,000-pound trip limit; no trip frequency restriction.
- Allocated the sablefish OY between trawl and nontrawl (fixed gear) at 5,200 and 4,800 mt, respectively; if the quota for nontrawl gear is reached, sablefish becomes a prohibited species for that gear; manage the trawl fishery to achieve the trawl allocation, provided that up to an additional 800 mt may be added to the trawl allocation for unavoidable incidental catch; coastwide OY = 9,200 to 10,800 mt; ABC = 10,000 mt.
- For trawl-caught sablefish, established a trip limit of 6,000 pounds or 20% of legal fish on board, whichever is greater, with only two landings above 1,000 pounds allowed per vessel per week; no restriction on landings less than 1,000 pounds.
- Continued the 22-inch total length size limit (15.5-inch dorsal length) on sablefish in all areas; 5,000-pound trawl and 1,500-pound nontrawl incidental landing limits for sablefish smaller than the minimum size limit.
- Established the coastwide Pacific ocean perch trip limit at 20% (by weight) of all fish on board or 5,000 pounds, whichever is less; landings of Pacific ocean perch unrestricted if less than 1,000 pounds regardless of percentage on board; Vancouver area OY = 500 mt; Columbia area OY = 800 mt.
- Established ABC and OY of 232,000 mt for Pacific whiting.
- Established ABC of 4,000 mt for yellowtail rockfish.

Effective August 3, 1988

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

Effective August 26, 1988

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 6 of 58)

Effective September 21, 1988

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

Effective October 5, 1988

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

Effective January 1, 1989

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

Effective April 26, 1989

- Established coastwide weekly trip limit on the deepwater complex (consisting of sablefish, Dover sole, arrowtooth flounder and thornyheads) of only 1 landing above 4,000 pounds per week, not to exceed 30,000 pounds. No limit on the number of landings of deepwater complex less than 4,000 pounds. For each landing of the deepwater complex, no more than 1,000 pounds or 25% of the deepwater complex, whichever is greater, may be sablefish. If fishing under the 25% limit, no more than 5,000 pounds may be sablefish under 22 inches (total length). If fishing under the 1,000-pound limit, all sablefish may be under 22 inches. Biweekly and twice weekly trip limit options for trawl-caught sablefish are available but require appropriate declaration to state in which fish are landed.
- Revised the gear quotas for the remainder of the year by reducing the nontrawl quota 400 mt (to 4,581 mt) and increasing the trawl quota by 1,000 mt (400 mt from nontrawl gear plus the 600 mt reserve) so it totals 6,397 mt. If either gear quota is reached, further landings by that gear will be prohibited for the remainder of the year.
- Reduced the coastwide weekly trip limit for widow rockfish to 10,000 pounds.

Effective July 17, 1989

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

Effective July 26, 1989

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 7 of 58)

Effective October 4, 1989

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

Effective October 11, 1989

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

Effective December 13, 1989

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

Effective January 1, 1990

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

Effective January 31, 1990

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

Effective March 21, 1990

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

Effective June 24, 1990

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

Effective July 25, 1990

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 8 of 58)

Effective October 3, 1990

- In order to reduce trawl sablefish landings so the trawl quota would not be exceeded, established a 15,000-pound trip limit on the deepwater complex (sablefish, Dover sole and thornyheads); allowed only one landing per week of the deepwater complex above 1,000 pounds; and maintained the current sablefish trip limit of 1,000 pounds or 25% of the deepwater complex, whichever is greater. Biweekly and twice weekly landing options are provided. The 5,000-pound trip limit for sablefish smaller than 22 inches remained in effect for landings made under the biweekly option.
- Relaxed the nontrawl sablefish trip limit to 2,000 pounds per trip to enable the entire nontrawl quota to be taken. Reinstated the limit on sablefish less than 22 inches of 1,500 pounds or 3% of all sablefish on board.

Effective December 12, 1990

- Closed widow rockfish fishery.

Effective January 1, 1991

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

Effective April 1, 1991

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

Effective April 24, 1991

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

Effective May 24, 1991

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

Effective July 1, 1991

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

Effective July 31, 1991

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 9 of 58)

Effective August 28, 1991

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

Effective September 6, 1991

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

Effective September 25, 1991

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

Effective September 30, 1991

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

Effective November 17, 1991

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

Effective January 1, 1992

- Established a coastwide widow rockfish cumulative landing limit of 30,000 pounds per specified four-week period. All landings apply toward the 30,000-pound limit. (coastwide ABC = 7,000 mt; harvest guideline = 7,000 mt).
- Harvest guideline for the *Sebastes* complex in the Vancouver and Columbia areas north of Cape Lookout, Oregon (42°20'15"N latitude) set at 8,000 mt; harvest guidelines for yellowtail rockfish north of Cape Lookout set at 4,000 mt and 1,400 mt for the Eureka and Columbia areas south of Cape Lookout (Vancouver, Columbia and Eureka ABC = 4,700 mt).
- For the *Sebastes* complex, established a cumulative landing limit per specified 2 week period of 50,000 pounds. Within this 50,000 pounds, no more than 8,000 pounds cumulative may be yellowtail rockfish landed north of Cape Lookout and no more than 10,000 pounds cumulative may be bocaccio landed south of Cape Mendocino, California (40°30'00"N latitude). All landings count toward the 50,000-pound limit.
- For Pacific ocean perch, established the coastwide trip limit at 20% (by weight) of all groundfish on board or 3,000 pounds whichever is less; landings of Pacific ocean perch be unrestricted if less than 1,000 pounds regardless of percentage on board (harvest guideline for combined Vancouver and Columbia areas = 1,550 mt).
- For the deepwater complex (sablefish, Dover sole, and thornyheads), established a cumulative landing limit per specified 2-week period of 55,000 pounds of which no more than 25,000 pounds may be thornyheads. In any landing, no more than 25% of the deepwater complex may be sablefish, unless less than 1,000 pounds of sablefish are landed, in which case the percentage does not apply. In any landing, no more than 5,000 pounds of sablefish may be smaller than 22 inches (total length).
- For the nontrawl sablefish fishery, established a daily-trip-limit of 500 pounds from January 1 through February 29.
- The harvest guideline for Pacific whiting set at 208,800 mt.

Effective January 17, 1992

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

Effective March 1, 1992

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

Effective March 21, 1992

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

Effective April 1, 1992

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

Effective April 15, 1992 through October 14, 1992

- Established (by emergency regulation) a Pacific whiting allocation system with an initial limit of 98,800 mt on at-sea processing, an initial allocation of 80,000 mt for vessels that deliver to shoreside processors, and the remaining 30,000 mt set aside as a reserve with priority for deliveries to shore-based processors. If less than 48,000 mt (60% of the initial shoreside allocation) is

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 10 of 58)

processed shoreside by September 1, the 30,000 mt reserve will be made available for at-sea processing on September 1 or as soon as practicable thereafter. Any amount of the harvest guideline the regional director determines will not be needed by shoreside processors may be available for at-sea processing on October 1.

Effective April 16, 1992 through October 19, 1992

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

Effective April 17, 1992

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

Effective May 9, 1992

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

Effective May 12, 1992

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

Effective May 27, 1992

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

Effective June 10, 1992

- For black rockfish, established a trip limit for commercial fishing vessels using hook-and-line gear between the U.S. border and Cape Alava (48°09'30"N latitude), and between Destruction Island (47°40'00"N latitude) and Leadbetter Point (46°38'10"N latitude), of 100 pounds or 30% by weight of all fish on board (including salmon), whichever is greater.
- Harvest guidelines for commercial harvests of rockfish by members of the Makah, Quileute, Hoh, and Quinault Indian tribes will be set annually and reviewed and adjusted as necessary. For 1992, established harvest guidelines of 51,000 pounds between the U.S.-Canada border and Cape Alava and 10,000 pounds between Destruction Island and Leadbetter Point.
- For the recreational fishery, reduced the bag limit of all species of rockfish from 15 to 12 between the U.S.-Canada border and Leadbetter Point.

Effective July 29, 1992

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

Effective August 12, 1992

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

Effective September 4, 1992

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

Effective October 1, 1992

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 11 of 58)

Effective October 7, 1992

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

Effective October 31, 1992

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

Effective December 2, 1992

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

Effective January 1, 1993

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 12 of 58)

- Starting in 1994, the whiting regular season will begin March 1 off northern California (42°00' to 40°30' N latitude) and remain April 15 elsewhere along the coast.

Announced April 19, 1993

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

Effective April 21, 1993

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

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

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

Effective June 2, 1993

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

Effective September 4, 1993

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

Effective September 8, 1993

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

Announced September 20, 1993

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

Effective October 6, 1993

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

Effective December 1, 1993

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

Effective January 1, 1994

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 13 of 58)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 14 of 58)

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

Effective April 1, 1994

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

Effective April 8, 1994

- Allocated the Pacific whiting harvest guideline between fishing vessels that either catch and process at sea or catch and deliver to at-sea processors, and fishing vessels that deliver to processors located on shore. In 1994, 1995 and 1996, after 60% of the annual harvest guideline is taken, the at-sea whiting fishery will be closed. The remaining 40% (104,000 mt in 1994) will be reserved initially for fishing vessels delivering to shore-based processors. On or about August 15, any amount of the HG 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. 10,000-pound trip limit for rockfish caught with setnets, which applied to each trip, was removed. 40,000-pound cumulative limit that applies per calendar month remains in effect.

Effective May 13, 1994

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

Effective May 15, 1994

- Opened regular season for the nontrawl sablefish fishery off Washington, Oregon, and California for limited entry permitted vessels with longline and/or pot endorsements. Current trip limits continued until 0001 hours (local time) May 12, 1994, which marked the beginning of a 72-hour closure of the fishery for vessels operating in the regular season. Effective May 15, 1994 at 0001 hours (local time), the only trip limit in effect for sablefish caught with nontrawl gear is 1,500 pounds or 3% of all legal sablefish on board, whichever is greater, for sablefish smaller than 22 inches. Sablefish trip limits for open access gears did not change.

Effective June 4, 1994

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

Effective July 1, 1994

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

Effective September 1, 1994

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

Effective October 1, 1994

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

Effective October 5, 1994

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

Effective December 1, 1994

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 15 of 58)

Effective January 1, 1995

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 16 of 58)

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

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

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

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

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

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

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

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

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

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

Effective March 13, 1995 (Regulatory Amendment)

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

Effective April 1, 1995

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

Effective May 1, 1995

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

Effective May 4, 1995

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

Effective July 14, 1995

- Increased the monthly cumulative trip limit for widow rockfish from 30,000 pounds to 45,000 pounds.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 17 of 58)

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

Effective July 14, 1995 (Regulatory Amendment)

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

Effective July 24, 1995

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

Effective August 1, 1995

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

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

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

Effective August 6, 1995

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

Effective August 13, 1995

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

Effective September 1, 1995

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

Effective September 8, 1995

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

Effective November 30, 1995

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 18 of 58)

Effective January 1, 1996

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

- For the limited entry fishery, established cumulative vessel limits for specified 2-month periods, rather than 1-month periods, with the target harvest level per month being 50% of the 2-month limit. However, vessels could land as much as 60% of the 2-month limit during either of the two months, so long as the total would not exceed the specified limit. The specified periods were January-February, March-April, May-June, July-August, September-October, and November-December. All weights are round weight or round weight equivalents, unless otherwise specified.
- Sebastes Complex (Including Yellowtail Rockfish and Bocaccio) cumulative limit of 70,000 pounds per specified 2-month period north of Cape Lookout, Oregon (45°20'15"N latitude), 100,000 pounds per 2-months between Cape Lookout and Cape Mendocino, California (40°30'00"N latitude), and 200,000 pounds per 2-months south of Cape Mendocino. Within the cumulative 2-month limits for the *Sebastes* complex, no more than 32,000 pounds may be yellowtail rockfish caught north of Cape Lookout, Oregon, no more than 70,000 pounds may be yellowtail rockfish caught between Cape Lookout and Cape Mendocino, and no limit south of Cape Mendocino (other than the limit on the *Sebastes* complex). For bocaccio, the cumulative limit is 60,000 pounds per 2-months south of Cape Mendocino, and no limit north of Cape Mendocino (other than the limit on the *Sebastes* complex). For canary rockfish, the limit is 18,000 pounds per 2-months coastwide.
- Widow Rockfish cumulative limit of 70,000 pounds per specified two-month period.
- Pacific Ocean Perch cumulative trip limit of 10,000 pounds per two-month period.
- Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex cumulative limit of 70,000 pounds per 2-month period north of Cape Mendocino, California and 100,000 pounds per 2-months south of Cape Mendocino; within the DTS complex limit, not more than 20,000 pounds may be thornyheads, of which not more than 4,000 pounds per 2-months may be shortspine thornyhead. For trawl-caught sablefish, the cumulative limit is 12,000 pounds per 2-months. In any landing, no more than 500 pounds of sablefish may be smaller than 22 inches.
- Lingcod the cumulative limit for lingcod should be 40,000 pounds per 2-month period. No lingcod may be smaller than 22 inches (56 cm) (total length) or 18 inches (46 cm) for lingcod that are "heads off." The 40,000 pounds cumulative limit corresponds to 26,666 pounds for headed and gutted lingcod, and 36,366 pounds for lingcod that are only gutted. Headed and gutted lingcod are measured from the front of the dorsal fin, where it meets the dorsal surface of the body closest to the head, to the tip of the upper lobe of the tail; the dorsal fin and tail must be intact. There is a 100-pound (45 kg) trip limit for lingcod smaller than 22 inches (56 cm) taken by trawl gear. This 100-pound trip limit corresponds to 91 pounds (41 kg) of lingcod smaller than 22 inches that are gutted (with head on) and 67 pounds (30 kg) of lingcod smaller than 22 inches that are headed and gutted.
- Pacific Whiting trip limit of 10,000 pounds taken before or after the regular season or inside the 100 fathom contour in the Eureka area.
- Nontrawl sablefish outside the regular derby and mop-up seasons, a daily-trip-limit of 300 pounds north of 36°00' N latitude and 350 pounds south of 36°00' N latitude. Only one landing of sablefish caught with nontrawl gear may be made per day, coastwide. During the derby and mop-up seasons, there is a per trip limit on the amount of sablefish that may be smaller than 22 inches total length (or 15.5 inches heads off); the amount of small sablefish may not exceed 1,500 pounds round weight or 3% of the sablefish larger than 22 inches, whichever is greater. The product recovery ratio (PRR) established by the state where the fish is or will be landed will be used to convert the processed weight to round weight for the purposes of applying the trip limit; the PRR currently is 1.6 in Washington, Oregon, and California.

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

- Rockfish the cumulative limit is 35,000 pounds per month north of Cape Lookout and 40,000 pounds per month south of Cape Lookout, including a coastwide trip limit for hook-and-line and pot gear of 10,000 pounds per of rockfish per trip.
- Thornyheads daily limit of 50 pounds coastwide. Limit of one landing of thornyheads per vessel per day, and daily-trip-limits may not be accumulated.

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

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

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 19 of 58)

- Spot and Ridgeback Prawns limit of 1,000 pounds of groundfish species per trip for any vessel engaged in fishing for spot and ridgeback prawns.
- California Halibut and Sea Cucumber limit of 500 pounds of groundfish species per trip for vessels engaged in fishing for California halibut or sea cucumbers south of Point Arena, California (38°57'30 N latitude). All fishing during the trip must occur south of Point Arena. Landings must contain California halibut of a size required at California Department of Fish and Game Code Section 8392(a), or sea cucumbers taken in accordance with California Department of Fish and Game Code Section 8396 which requires a state permit.

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

- Trip limits for a species or species complex may differ in different geographic areas along the coast. The following "crossover" provisions apply to all vessels (limited entry and open access) operating in different geographical areas with different cumulative or "per trip" limits for the same species, except for species with daily-trip-limits (nontrawl sablefish, open access thornyheads), black rockfish off Washington State, or those otherwise exempted by a State declaration procedure (yellowtail rockfish and the *Sebastes* complex off Washington and Oregon).
- If a vessel fishes (for any species) in an area where a more restrictive trip limit applies, then the vessel is subject to the more restrictive trip limit for the entire period to which that trip limit applies, no matter where the fish are taken and retained, possessed, or landed. Similarly, if a vessel takes and retains a species (or species complex) in an area where a higher trip limit (or no trip limit) applies, and possesses or lands that species (or species complex) in an area where a more restrictive trip limit applies, then that vessel is subject to the more restrictive trip limit for that trip limit period. In 1996, the trip limit period for most major groundfish species is two months.

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

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

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

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

Effective May 2, 1996

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

Effective April 15, 1996

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

Effective May 3, 1996

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

Effective May 15, 1996

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

Effective June 1, 1996

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

Effective May 31, 1996

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 20 of 58)

Effective July 1, 1996

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

Effective September 1, 1996

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

Effective September 6, 1996

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

Effective September 11, 1996

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

Effective November 1, 1996

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

Effective January 1, 1997

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

- For the limited entry fishery, cumulative vessel limits for specified two-month periods, with the target harvest level per month being 50% of the two-month limit. However, vessels could land as much as 60 % of the two-month limit during one of the two months, so long as the total would not exceed the specified limit. The specified periods were January-February, March-April, May-June, July-August, September-October, and November-December. All weights are round weight or round weight equivalents, unless otherwise specified.
- *Sebastes* Complex (Including Yellowtail Rockfish and Bocaccio) cumulative limit of 30,000 pounds per specified 2-month period north of Cape Mendocino, California (40°30'00" N latitude), and 150,000 pounds per two-months south of Cape Mendocino. Within the cumulative 2-month limits for the *Sebastes* complex, no more than 6,000 pounds may be yellowtail rockfish caught north of Cape Mendocino, and no limit south of Cape Mendocino (other than the limit on the *Sebastes* complex). For bocaccio, the cumulative limit is 12,000 pounds per 2-months south of Cape Mendocino, and no limit north of Cape Mendocino (other than the limit on the *Sebastes* complex). For canary rockfish, the limit is 14,000 pounds per two-months coastwide.
- Widow Rockfish cumulative limit of 70,000 pounds per specified two-month period.
- Pacific Ocean Perch cumulative trip limit of 8,000 pounds per two-month period.
- Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex cumulative limit of 70,000 pounds per two-month period north of Cape Mendocino, California and 100,000 pounds per two-months south of Cape Mendocino; within the DTS complex limit, not more than 20,000 pounds may be thornyheads, of which not more than 4,000 pounds per two-months may be shortspine thornyhead. For trawl-caught sablefish, the cumulative limit is 12,000 pounds per two-months. In any landing, no more than 500 pounds of sablefish may be smaller than 22 inches. For Dover sole north of Cape Mendocino, the cumulative limit will be 38,000 pounds per two months.
- Lingcod cumulative limit of 40,000 pounds per two-month period. No lingcod may be smaller than 22 inches (56 cm) (total length) or 18 inches (46 cm) for lingcod that are "heads off," except for lingcod caught with trawl gear. (There is a 100-pound (45 kg) trip limit for lingcod smaller than 22 inches (56 cm) taken by trawl gear. This 100-pound trip limit corresponds to 91 pounds (41 kg) of lingcod smaller than 22 inches that are gutted (with head on) and 67 pounds (30 kg) of lingcod smaller than 22 inches that are headed and gutted). The 40,000 pounds cumulative limit corresponds to 26,666 pounds for headed and gutted lingcod, and 36,364 pounds for lingcod that are only gutted. Headed and gutted lingcod are measured from the front of the dorsal fin, where it meets the dorsal surface of the body closest to the head, to the tip of the upper lobe of the tail; the dorsal fin and tail must be intact.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 21 of 58)

- Pacific Whiting trip limit of 10,000 pounds taken before or after the regular season or inside the 100 fathom contour in the Eureka area.
- Nontrawl sablefish in 1997 the derby north of 36°N latitude will be replaced by a 3-week cumulative limit that will open sometime between August 1 and September 30. A sablefish endorsement will be required for participation in the cumulative fishery, and vessels without endorsements may not fish for or land sablefish during the 3-week season or subsequent mop-up season, if any. There will be a 48-hour closure before and after the three-week season. Outside the 3-week cumulative season, the mop-up season and associated closures, there will be a daily-trip-limit of 300 pounds (round weight), and only one landing of sablefish caught with nontrawl gear may be made per day. South of 36° N latitude there will be no cumulative or mop-up seasons; there will be a daily-trip-limit of 350 pounds (round weight), and only one landing of sablefish caught with nontrawl gear may be made per day. During the 3-week cumulative and mop-up seasons north of 36° N latitude, there is a per trip limit on the amount of sablefish that may be smaller than 22 inches total length (or 15.5 inches heads off): the amount of small sablefish may not exceed 1,500 pounds round weight or 3% of the sablefish larger than 22 inches, whichever is greater. The product recovery ratio (PRR) established by the state where the fish is or will be landed will be used to convert the processed weight to round weight for the purposes of applying the trip limit; the PRR currently is 1.6 in Washington, Oregon, and California.

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

- Rockfish cumulative limit of 40,000 pounds per month coastwide, including a trip limit for hook-and-line and pot gear of 10,000 pounds per of rockfish per trip, which includes, south of Cape Mendocino, a trip limit of 300 pounds bocaccio not to exceed 2,000 pounds cumulative per month. Setnets, which are legal gear only south of 38°N latitude, will be subject to the 40,000-pound monthly cumulative limit but not the per trip limit, and will have a cumulative limit of 4,000 pounds of bocaccio per month.
- Thornyheads north of Point Conception, no retention of thornyheads. South of Point Conception, daily limit of 50 pounds. Limit of one landing of thornyheads per vessel per day, and daily-trip-limits may not be accumulated.
- Sablefish daily limit of 300 pounds north of 36°N latitude and 350 pounds south of 36° N latitude. Limit of one landing of sablefish per vessel per day, and daily-trip-limits may not be accumulated. North of 36° N latitude, there will also be a cumulative limit of 1,500 pounds per month.

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

- Pink Shrimp cumulative trip limit of 500 pounds (multiplied by the number of days of the trip) of groundfish species for any vessel engaged in fishing for pink shrimp. In addition, not more than 300 pounds per trip may be sablefish and not more than one landing per day may include sablefish. Vessels using shrimp gear may not exceed half the limited entry two-month cumulative limits in a month, and are limited to 3,000 pounds of yellowtail rockfish and 6,000 pounds of sablefish per month.
- Spot and Ridgeback Prawns limit of 500 pounds of groundfish per trip for vessels engaged in fishing for spot and ridgeback prawns, including not more than 300 pounds of sablefish per trip, and not more than one landing of sablefish per day.
- California Halibut and Sea Cucumber limit of 500 pounds of groundfish species per trip for vessels engaged in fishing for California halibut or sea cucumbers south of Point Arena, California (38°57'30" N latitude). All fishing during the trip must occur south of Point Arena. Landings must contain California halibut of a size required at California Department of Fish and Game Code Section 8392(a), or sea cucumbers taken in accordance with California Department of Fish and Game Code Section 8396 which requires a state permit. Not more than 300 pounds per trip per day may be sablefish.

Adopted the following management measures for the recreational fishery in 1997

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

Effective May 1, 1997

- Sebastes Complex (Including Yellowtail Rockfish and Bocaccio) reduced the two-month cumulative limit on bocaccio to 10,000 pounds south of Cape Mendocino.
- Widow Rockfish cumulative limit reduced to 60,000 pounds per specified two-month period.
- Non-trawl sablefish daily-trip-limit fishery limited to 5,100 pounds per month north of 36° N latitude.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 22 of 58)

- Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex cumulative two-month limit for Dover Sole north of Cape Mendocino reduced to 30,000 pounds. Reduction in overall limit for thornyheads to 15,000 pounds, reduction in two-month cumulative limit on shortspines to 3,000 pounds. The cumulative limits for the whole complex will also be reduced to 57,000 pounds per two months north of Cape Mendocino.
- Open Access south of Cape Mendocino, trip limit reduction for hook-and-line and trap gear for Bocaccio from 300 pounds to 250 pounds with no change to the monthly trip limit (2000 pounds).

Effective May 14, 1997

- Set allocation of the commercial whiting harvest guideline among the nontribal sectors at: 42% shoreside, 24% for mothership sector, and 34% for catcher/processor, Set framework for setting whiting primary season opening dates (For 1997: Catcher/processor, May 15, 1997; mothership, May 15, 1997; and shore-based, June 15, 1997), and allows for processing fish waster at sea by a "waste processing vessel."

Effective May 27, 1997

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

Effective June 1, 1997

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

Effective June 11, 1997

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

Effective July 1, 1997

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

Effective July 28, 1997

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

Effective August 21, 1997

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

Effective August 22, 1997

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

Effective September 1, 1997

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

Effective October 1, 1997

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 23 of 58)

- Sebastes Complex (Including Yellowtail Rockfish and Bocaccio) changed from two-month limits to one-month limits for *Sebastes*. Increase *Sebastes* one month limits to 20,000 pounds north of Cape Mendocino and 75,000 pounds south of Cape Mendocino, no more than 5,000 pounds of which may be yellowtail rockfish north of Cape Mendocino, no more than 5,000 pounds of which may be bocaccio south of Cape Mendocino, and no more than 10,000 pounds of which may be canary rockfish coastwide.
- Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex reduced monthly limit for the DTS complex to 11,000 pounds north of Cape Mendocino and 39,500 pounds south of Cape Mendocino. Within these limits, no more than 1,500 pounds may be dover sole north of Cape Mendocino, and 30,000 pounds south of Cape Mendocino; no more than 2,000 pounds coastwide may be may be trawl-caught sablefish; and no more than 7,500 pounds coastwide may be thornyheads. No more than 1,500 pounds of the thornyheads may be shortspines.
- Open-Access Sablefish increased the open-access monthly cumulative limit to 1,500 pounds.

Effective January 1, 1998

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

- For the limited entry fishery, cumulative vessel limits for specified two-month periods, with the target harvest level per month being 50% of the two-month limit. However, vessels may land as much as 60% of the two-month limit during one of the two months, so long as the total does not exceed the specified limit. The specified periods are January-February, March-April, May-June, July-August, September-October, and November-December. All weights are round weight or round weight equivalents, unless otherwise specified. The Council may revert to one-month limits later in the year.
- Sebastes Complex (Including yellowtail, canary and bocaccio rockfish): Cumulative limit of 40,000 pounds per specified two-month period north of Cape Mendocino, California (40° 30'00" N latitude), and 150,000 pounds per two-months south of Cape Mendocino. Within the cumulative two-month limits for the *Sebastes* complex, no more than 11,000 pounds may be yellowtail rockfish caught north of Cape Mendocino, and no limit south of Cape Mendocino (other than the limit on the *Sebastes* complex). For bocaccio, the cumulative limit is 2,000 pounds per two-months south of Cape Mendocino, and no limit north of Cape Mendocino (other than the limit on the *Sebastes* complex). For canary rockfish, the limit is 15,000 pounds per two-months coastwide.
- Widow Rockfish: Cumulative limit of 25,000 pounds per two-month period.
- Pacific Ocean Perch: Cumulative trip limit of 8,000 pounds per two-month period.
- Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex: Coastwide cumulative limit of 40,000 pounds of Dover sole in the January-February period and 18,000 pounds per two-month period thereafter; not more than 5,000 pounds of sablefish, not more than 10,000 pounds of longspine thornyheads, and not more than 4,000 pounds of shortspine thornyhead. (The shortspine limit is separate from the longspine limit). In any landing, no more than 500 pounds of sablefish may be smaller than 22 inches total length.
- Lingcod: Cumulative limit of 1,000 pounds per two-month period. No lingcod may be smaller than 24 inches (total length), except for lingcod caught with trawl gear. A length conversion for lingcod landed "heads off" will be established. Headed and gutted lingcod are measured from the front of the dorsal fin, where it meets the dorsal surface of the body closest to the head, to the tip of the upper lobe of the tail; the dorsal fin and tail must be intact. There is a 100-pound (45 kg) trip limit for lingcod smaller than 24 inches taken by trawl gear. Vessel operators landing gutted (with head off) or headed and gutted lingcod should contact state fishery officials in the state where the fish will be landed to determine that state's official weight conversion factors.
- Pacific Whiting: Trip limit of 10,000 pounds taken before or after the regular season or year-round inside the 100-fathom contour in the Eureka area .
- Nontrawl sablefish: North of 36° N latitude, a daily-trip-limit of 300 pounds (round weight) and a cumulative limit of 1,500 pounds per two-month period. Only one landing of sablefish caught with nontrawl gear may be made per day. South of 36° N latitude there will be no cumulative or mop-up seasons; there is a daily-trip-limit of 350 pounds (round weight), and only one landing of sablefish caught with nontrawl gear may be made per day.

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

- Open access landings may not exceed 50% of any two-month cumulative limit or any other limit for the limited entry fishery for any groundfish species or complex that applies to the same area, unless specifically authorized (as for bocaccio caught with setnets and lingcod).
- Rockfish: For rockfish, a cumulative limit of 40,000 pounds per month coastwide, including a trip limit for hook-and-line and pot gear of 10,000 pounds of rockfish per trip, which includes, south of Cape Mendocino, a trip limit of 250 pounds bocaccio not to exceed 1,000 pounds cumulative per month. Setnets, which are legal gear only south of 38° N latitude, are subject to the 40,000-pound monthly cumulative limit, but not the per-trip limit, and have a cumulative limit of 2,000 pounds of bocaccio per month.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 24 of 58)

- Thornyheads: North of Point Conception, no retention of thornyheads. South of Point Conception, daily limit of 50 pounds. Limit of one landing of thornyheads per vessel per day, and daily-trip-limits may not be accumulated.
- Sablefish: Daily limit of 300 pounds north of 36° 00' N latitude and 350 pounds south of 36° 00' N latitude. Limit of one landing of sablefish per vessel per day, and daily-trip-limits may not be accumulated. North of 36° N latitude, there is a cumulative limit of 600 pounds per two-month period.
- Lingcod: Coastwide, a cumulative limit of 1,000 pounds per two-month period, with no monthly sublimit. A minimum size limit of 24 inches (total length) applies coastwide.

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

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

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

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

Effective May 1, 1998

- Limited Entry:

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

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

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

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

- Open Access:

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

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 25 of 58)

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

Effective May 31, 1998

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

Effective July 1, 1998

- Limited Entry *Sebastes* Complex: south of Cape Mendocino, decreased the 2-month cumulative limit to 40,000 pounds.
- Open Access Widow Rockfish: decreased monthly cumulative trip limit to 3,000 pounds.
- Open Access Canary Rockfish: decreased monthly cumulative trip limit to 200 pounds.
- Open Access Rockfish: removed overall rockfish monthly limit and replaced it with limits for component rockfish species: for *Sebastes* complex, monthly cumulative limit is 33,000 pounds, for widow rockfish, monthly cumulative trip limit is 3,000 pounds, for Pacific Ocean Perch, monthly cumulative trip limit is 4,000 pounds.
- Open Access Lingcod: reduced the monthly cumulative limit to 250 pounds for the month of July. After August 1, no lingcod may be landed by any vessel participating in the open access fisheries.
- Open Access Fixed Gear Sablefish: increased the 2-month cumulative north of 36° N. lat. to 1,800 pounds.

Effective August 1, 1998

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

Effective August 7, 1998

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

Effective September 1, 1998

- All limited entry cumulative limits become monthly limits.

Effective October 1, 1998

- For Limited Entry:
 - Widow Rockfish: increased monthly limit to 19,000 pounds.
 - Sebastes* South(of Cape Mendocino): decreased monthly limit to 15,000 pounds.
 - Canary Rockfish: decreased monthly limit to 500 pounds.
 - Dover Sole: increased monthly limit to 18,000 pounds.
 - Longspine Thornyhead: increased monthly limit to 7,500 pounds.
 - Shortspine Thornyhead: decreased monthly limit to 1,500 pounds.
 - Trawl-caught Sablefish: increased monthly limit to 5,000 pounds.
 - Fixed-Gear Sablefish: increased the 2 month cumulative limit to 2,700 pounds; on November 1, instituted 1,500-pound monthly limit.
- For Open Access:
 - All rockfish north of Cape Blanco: prohibited all landings.
 - Canary Rockfish, Widow Rockfish (coastwide): prohibited all landings.
 - Thornyheads (between Pt. Conception and Cape Blanco): prohibited all landings except for 100-pound per trip limit for shrimp trawl.
 - Dover Sole: coastwide, increased monthly limit to 18,000 pounds.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 26 of 58)

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

Effective October 13, 1998

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

Effective November 1, 1998

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

Effective December 1, 1998

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

Effective January 1, 1999

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

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 27 of 58)

- Shortspine Thornyhead: Phase 1: 3,000 pounds per period; Phase 2: 2,000 pounds per period; Phase 3: 1,000 pounds per period.
- Trawl-caught Sablefish: Phase 1: 13,000 pounds per period; Phase 2: 10,000 pounds per period; Phase 3: 6,000 pounds per period. At any time of year unless otherwise announced, no more than 500 pounds per trip may be trawl-caught sablefish smaller than 22 inches total length. 22 inches total length is equivalent to 15.5 inches headed; processed weight will be converted to round weight using the States' conversion factor of 1.6.
- Lingcod: Phase 1: 1,500 pounds per period; Phase 2: 1,000 pounds per period; Phase 3: 500 pounds per period. No lingcod may be smaller than 24 inches total length, except for a 100-pounds "per trip" limit for trawl-caught lingcod smaller than 24 inches. 24 inches total length is equivalent to 19.5 inches headed; processed weight will be converted to round weight using 1.5 for headed-and-gutted lingcod, and 1.1 for gutted lingcod with the head on.
- Nontrawl Sablefish: north of 36° N latitude, a daily-trip-limit of 300 pounds and a cumulative trip limit of 2,400 pounds per 2-month period; south of 36° N latitude, the daily-trip-limit is either (1) 350 pounds with no cumulative limit on the amount of sablefish that may be retained in a month; or (2) one landing of sablefish per week above 350 pounds, but not to exceed 1,050 pounds. Only one landing of sablefish caught with nontrawl gear may be made per day coastwide, and daily-trip-limits may not be accumulated. A limited entry permit holder must have a permit with a sablefish endorsement to participate in either the regular or mop-up seasons.
- Pacific Whiting: Trip limit of 10,000 pounds taken before and after the regular season. This trip limit also applies inside the 100-fathom contour between 43° 00' - 40° 30' N latitude during the regular season. The 1999 primary season start dates for the whiting fishery are as follows: Catcher/processor and mothership sectors, May 15; shore-based sector, June 15 north of 42° N latitude, April 1 between 42° - 40° 30' N latitude (the Eureka area), and April 15 south of 40° 30' N latitude.
- Black Rockfish: The 1998 black rockfish trip limits for commercial fishing vessels using hook-and-line gear off Washington state remain in effect in 1999: 100 pounds or 30% by weight of all fish on board, whichever is greater, per vessel, per fishing trip. These limits apply north of Cape Alava (48° 09' 30" N latitude) and between Destruction Island (47° 40' 00" N latitude) and Leadbetter Point (46° 38' 10" N latitude).

Adopted the following management measures for open access gear:

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 28 of 58)

- Dover Sole: coastwide, 100 pounds per month.
- Pacific Whiting: coastwide, 100 pounds per month.

Adopted the following management measures for Exempted Trawl Gear:

- Vessels fishing for pink shrimp, spot and ridgeback prawns, California halibut, and sea cucumbers, trip limit of 300 pounds of groundfish per trip. All limits and closures adopted for open access gear (above) also apply and are counted toward the 300 pounds groundfish limit. The daily-trip-limits for sablefish and for Thornyheads south of Point Conception may not be multiplied by the number of days in the fishing trip. The groundfish "per trip" limit may not be multiplied by the number of days in the fishing trip, although this was allowed in 1998 for the pink shrimp fishery.

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

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

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

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

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

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 29 of 58)

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

Limited Entry:

- Dover Sole: 2-month cumulative trip limit for the period April 1 through May 31 increased from 20,000 pounds to 25,000 pounds. Beginning June 1, 2-month cumulative Dover sole trip limit will revert to 20,000 pounds.
- Trawl-caught Sablefish: 2-month cumulative trip limit for the period April 1 through May 31 increased from 10,000 pounds to 12,000 pounds. Beginning June 1, 2-month cumulative trawl-caught sablefish trip limit will revert to 10,000 pounds.
- Widow Rockfish: 2-month cumulative trip limit for the periods June 1 through July 31, and August 1 through September 30 decreased from 16,000 pounds to 11,000 pounds.
- Sebastes complex: north of Cape Mendocino, 2-month cumulative trip limit for the periods June 1 through July 31 and August 1 through September 30 increased from 25,000 pounds to 30,000 pounds, within which: (1) yellowtail rockfish north of Cape Mendocino, 2-month cumulative trip limit increased from 13,000 pounds to 16,000 pounds, and (2) canary rockfish north of Cape Mendocino, 2-month cumulative trip limit increased from 9,000 pounds to 14,000 pounds.
- Sebastes complex: south of Cape Mendocino, limited entry 2-month cumulative trip limit for the periods June 1 through July 31 and August 1 through September 30 decreased from 6,500 pounds to 3,500 pounds, within which: (1) Bocaccio monthly trip limit of 750 pounds decreased and changed to a 2-month cumulative trip limit of 1,000 pounds with a 500 pounds per trip limit, and (2) canary rockfish 2-month cumulative trip limit decreased to 3,500 pounds.

Open Access:

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

Effective May 19, 1999

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

Effective June 2, 1999

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

Effective July 2, 1999

Limited Entry:

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

Open Access:

- Sablefish: daily-trip-limit continues to be 300 pounds, but the 2-month cumulative trip limit for the period July 1 through August 31 increased from 1,800 pounds to 3,000 pounds. Beginning September 1, the 2-month cumulative trip limit will be converted to a 1-month cumulative trip limit of 1,500 pounds.
- Widow Rockfish: increased monthly cumulative trip limit from 2,000 pounds to 8,000 pounds.

Effective July 21, 1999

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

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

Limited Entry:

- Sebastes complex: north of Cape Mendocino, 2-month cumulative trip limit for the period August 1 through September 30 (August 16 through October 15 for "B" platoon) increased from 30,000 pounds to 35,000 pounds, within which: (1) yellowtail rockfish, north

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 30 of 58)

of Cape Mendocino, 2-month cumulative trip limit increased from 16,000 pounds to 20,000 pounds; (2) canary rockfish, north of Cape Mendocino, 2-month cumulative trip limit remains at 14,000 pounds; and (3) added 2-month cumulative trip limit of 10,000 pounds for rockfish other than yellowtail rockfish and canary rockfish north of Cape Mendocino.

Effective August 14, 1999

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

Effective August 16, 1999

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

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

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

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

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

Effective September 13, 1999

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

Effective September 20, 1999

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

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 31 of 58)

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

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

- Limited Entry *Sebastes* Complex: decreased 1-month cumulative trip limits from 10,000 pounds (north of Cape Mendocino) and 5,000 pounds (south of Cape Mendocino) to a coastwide limit of 500 pounds per month.
 - Yellowtail Rockfish: north of Cape Mendocino, 1-month cumulative trip limit of 300 pounds.
 - The 1-month cumulative trip limits for canary rockfish, coastwide; Bocaccio, south of Cape Mendocino; and other species in the *Sebastes* complex, which count together towards the overall *Sebastes* complex limit, may not exceed the 500-pound cumulative monthly limit.
- Limited Entry Chilepepper Rockfish: S. of Cape Mendocino, 1-mo. cumulative TL decreased from 18,000 to 5,000 pounds.
- Limited Entry Splitnose Rockfish: S. of Cape Mendocino, 1-mo. cumulative TL decreased from 10,000 to 5,000 pounds.
- Limited Entry Widow Rockfish: The states of Washington and Oregon will adopt regulations that require limited entry vessels landing the 30,000-pound 1-month cumulative trip limit of widow rockfish, to have midwater gear onboard. If a vessel does not have midwater gear on board, a state-imposed cumulative trip limit per month will be applied.

Effective January 1, 2000

Adopted the following management measures for the groundfish fishery in 2000:

New Cumulative Trip Limit Periods for 2000. A cumulative trip limit is the maximum amount that may be taken and retained, possessed, or landed per vessel in a specified period of time without a limit on the number of landings or trips, unless otherwise specified. The cumulative trip limit periods for limited entry and open access fisheries, which start at 0001 hours and end at 2400 hours (local time), are as follows, unless otherwise specified:

- (i) The 2-month periods are: January 1-February 29, March 1-April 30, May 1-June 30, July 1-August 31, September 1-October 31, and, November 1-December 31.
- (ii) One-month means the first day through the last day of the calendar month.
- (iii) One week means 7 consecutive days, Sunday through Saturday.

Sablefish size and weight limit conversions. The following conversions apply to both the limited entry and open access fisheries when size and trip limits are effective for those fisheries. For headed and gutted (eviscerated) sablefish:

- (i) The minimum size limit for headed sablefish, which corresponds to 22 in. (56 cm) TL for whole fish, is 15.5 in. (39 cm).
- (ii) The conversion factor established by the state where the fish is or will be landed will be used to convert the processed weight to round weight for purposes of applying the trip limit. (The conversion factor currently is 1.6 in Washington, Oregon, and California. However, the state conversion factors may differ; fishermen should contact fishery enforcement officials in the state where the fish will be landed to determine that state's official conversion factor.)

Lingcod size and weight conversions. The following conversions apply in both limited entry and open access fisheries.

- (i) Size conversion. For lingcod with the head removed, the minimum size limit is 19.5 in. (49.5 cm), which corresponds to 24 in. (61 cm) TL for whole fish.
- (ii) Weight conversion. The conversion factor established by the state where the fish is or will be landed will be used to convert the processed weight to round weight for purposes of applying the trip limit. (The states' conversion factors may differ, and fishers should contact fishery enforcement officials in the state where the fish will be landed to determine that state's official conversion factor.) If a state does not have a conversion factor for headed and gutted lingcod, or lingcod that is only gutted; the following conversion factors will be used. To determine the round weight, multiply the processed weight times the conversion factor.
 - (a) Headed and gutted. The conversion factor for headed and gutted lingcod is 1.5. (The State of Washington currently uses a conversion factor of 1.5.)
 - (b) Gutted, with the head on. The conversion factor for lingcod that has only been gutted is 1.1.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 32 of 58)

Operating in both limited entry and open access fisheries. The open access trip limit applies to any fishing conducted with open access gear, even if the vessel has a valid limited entry permit with an endorsement for another type of gear. A vessel that operates in both the open access and limited entry fisheries is not entitled to two separate trip limits for the same species. If a vessel has a limited entry permit and uses open access gear, and the open access limit is smaller than the limited entry limit, then the open access limit cannot be exceeded and counts toward the limited entry limit. If a vessel has a limited entry limit and uses open access gear, and the open access limit is larger than the limited entry limit, the smaller limited entry limit applies, even if taken entirely with open access gear. In short, a vessel with a limited entry permit that uses both limited entry and open access gear is constrained by the smaller of the two limits during the entire cumulative trip limit period.

Operating in areas with different trip limits. Trip limits for a species or species group may differ in different geographic areas along the coast. The following "crossover" provisions apply to vessels operating in different geographical areas that have different cumulative or "per trip" trip limits for the same species or species group. Such crossover provisions do not apply to species that are subject only to daily-trip-limits, or to the trip limits for black rockfish off Washington.

(i) Going from a more restrictive to a more liberal area. If a vessel takes and retains any groundfish species or species group of groundfish in an area where a more restrictive trip limit applies, before fishing in an area where a more liberal trip limit (or no trip limit) applies, then that vessel is subject to the more restrictive trip limit for the entire period to which that trip limit applies, no matter where the fish are taken and retained, possessed, or landed.

(ii) Going from a more liberal to a more restrictive area. If a vessel takes and retains a groundfish species or species group in an area where a higher trip limit or no trip limit applies, and takes and retains, possesses or lands the same species or species group 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.

Sorting. It is unlawful for any person to "fail to sort, prior to the first weighing after offloading, those groundfish species or species groups for which there is a trip limit, size limit, quota, or harvest guideline, if the vessel fished or landed in an area during a time when such trip limit, size limit, harvest guideline, or quota applied." This provision applies to both the limited entry and open access fisheries. The following species must be sorted in 2000:

(i) For vessels with a limited entry permit:

- (a) Coastwide—widow, canary, minor nearshore, minor shelf rock, minor slope rockfishes; shortspine and longspine thornyheads; Dover sole; arrowtooth flounder; lingcod; sablefish; and Pacific whiting;
- (b) N. of 40° 10' N. lat.—Pacific ocean perch, yellowtail rockfish, and, for fixed gear, black and blue rockfishes;
- (c) S. of 40° 10' N. lat.—chilipepper rockfish, bocaccio rockfish, splitnose rockfish, cowcod.

(ii) For open access vessels (vessels without a limited entry permit):

- (a) Coastwide—widow rockfish, canary rockfish, minor nearshore rockfish, minor shelf rockfish, minor slope rockfish, arrowtooth flounder, other flatfish, lingcod, sablefish, and Pacific whiting;
- (b) North of 40° 10' N. lat.—Black rockfish, blue rockfish, Pacific ocean perch, yellowtail rockfish;
- (c) South of 40° 10' N. lat.—chilipepper rockfish, bocaccio rockfish, splitnose rockfish, cowcod;
- (d) South of Point Conception—thornyheads.

New Limited Entry Trawl Gear Restrictions in 2000. Limited entry trip limits may vary depending on the type of trawl gear that is onboard a vessel during a fishing trip: large footrope, small footrope, or midwater trawl gear.

(i) Types of trawl gear.

- (a) Large footrope trawl gear is bottom trawl gear, as specified at 50 CFR 660.302 and 660.322(b), with a footrope diameter larger than 8 in. (20 cm) (including rollers, bobbins or other material encircling or tied along the length of the footrope).
- (b) Small footrope trawl gear is bottom trawl gear, as specified at 50 CFR 660.302 and 660.322(b), with a footrope diameter 8 in. (20 cm) or smaller (including rollers, bobbins or other material encircling or tied along the length of the footrope), except chafing gear may be used only on the last 50 meshes of a small footrope trawl, running the length of the net from the terminal (closed) end of the codend.
- (c) Midwater trawl gear is pelagic trawl gear, as specified at 50 CFR 660.302 and 660.322(b)(2). The footrope of midwater trawl gear may not be enlarged by encircling it with chains or by any other means.

(ii) Cumulative trip limits and prohibitions.

- (a) Large footrope trawl. It is unlawful to take and retain, possess or land the following species from a fishing trip if large footrope gear is onboard and the trip is conducted at least in part during the following periods: any species of shelf or nearshore rockfish, January 1-December 31; any species of flatfish, January 1-December 31, with the following exceptions—large footrope trawl gear may be used to take and retain Dover sole and rex sole year-round, petrale sole from January 1-February 29 and November 1-December 31, and arrowtooth flounder from January 1-April 30 and November 1-December 31, but these

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 33 of 58)

exceptions apply only on a trip that is conducted entirely during the periods in which use of large footrope gear is authorized. The presence of rollers or bobbins larger than 8 in. (20 cm) in diameter on board the vessel, even if not attached to a trawl, will be considered to mean a large footrope trawl is on board. Dates will be adjusted for the "B" platoon.

(b) Small footrope or midwater trawl gear. Cumulative trip limits for canary rockfish, widow rockfish, yellowtail rockfish, bocaccio, chilipepper, minor shelf rockfish, minor nearshore rockfish, and lingcod, and the "per trip" limit for cowcod are allowed only if small footrope gear or midwater trawl gear is used, and if that gear meets the specifications.

(c) Midwater trawl gear. Higher cumulative trip limits are available for limited entry vessels using midwater trawl gear to harvest widow, yellowtail, or chilipepper rockfish. Each landing that contains widow, yellowtail, or chilipepper rockfish is attributed to the gear on board with the most restrictive trip limit for those species. Landings attributed to small footrope trawl must not exceed the small footrope limit, and landings attributed to midwater trawl must not exceed the midwater trawl limit. If a vessel has landings attributed to both types of trawls during a cumulative trip limit period, landings attributed to small footrope gear are counted toward the cumulative limit for midwater trawl gear. [Example: The cumulative trip limit for widow rockfish is 30,000 lb (13,608 kg) per 2 month period, of which no more than 1,000 lb (454 kg) per month may be attributed to landings by small footrope trawl gear.]

(d) More than one type of trawl gear on board. The cumulative trip limits must not be exceeded. It is legal to have more than one type of limited entry trawl gear on board, but the most restrictive trip limit associated with the gear on board will apply for that trip, and will count toward the cumulative trip limit for that gear. [Example: If a vessel has large footrope gear on board, it cannot land chilipepper, even if the chilipepper is caught with a small footrope trawl. If a vessel has both small footrope trawl and midwater trawl gear onboard, the landing is attributed to the more restrictive small footrope trawl limit, even if midwater trawl gear was used.]

(iii) Measurement. The footrope will be measured in a straight line from the outside edge to the opposite outside edge at the widest part on any individual part, including any individual disk, roller, bobbin, or any other device.

(iv) State landing receipts. Washington, Oregon, and California have indicated that they will require the type of trawl gear on board with the most restrictive limit to be recorded on the State landing receipt(s) for each trip, or an attachment to the State landing receipt.

(v) Gear inspection. All trawl gear and trawl gear components, including unattached rollers or bobbins, must be readily accessible and made available for inspection at the request of an authorized officer. All footropes shall be uncovered and clearly visible except when in use for fishing.

Permit transfers. Limited entry permit transfers are to take effect only on the first day of a major cumulative limit period (50 CFR 660.333(c)(1)), those days in 2000 are January 1, March 1, May 1, July 1, September 1, and November 1, and are delayed by 15 days (starting on the 16th of a month) for the "B" platoon.

Platooning—limited entry trawl vessels. Limited entry trawl vessels are automatically in the "A" platoon, unless the "B" platoon is indicated on the limited entry permit. If a vessel is in the "A" platoon, its cumulative trip limit periods begin and end on the beginning and end of a calendar month as in the past. If a limited entry trawl permit is authorized for the "B" platoon, then cumulative trip limit periods will begin on the 16th of the month (generally 2 weeks later than for the "A" platoon), unless otherwise specified.

(i) For a vessel in the "B" platoon, cumulative trip limit periods begin on the 16th of the month at 0001 hours, local time, and end on the 15th of the month. Therefore, the management measures announced herein that are effective on January 1, 2000, for the "A" platoon will be effective on January 16, 2000, for the "B" platoon. The effective date of any inseason changes to the cumulative trip limits also will be delayed for 2 weeks for the "B" platoon, unless otherwise specified.

(ii) A vessel authorized to operate in the "B" platoon may take and retain, but may not land, groundfish from January 1, 2000, through January 15, 2000.

(iii) Special provisions will be made for "B" platoon vessels later in the year so that the amount of fish made available in 1999 to both "A" and "B" vessels is the same. (For example, a vessel in the "B" platoon could have the same cumulative trip limit for the final period as a vessel in the "A" platoon, but the final period may be 2 weeks shorter, so that both fishing periods end on December 31, 2000. Alternatively, the "B" platoon may have 6 weeks to take the cumulative limits from the final 2 cumulative limit periods.)

Commonly used geographic coordinates.

Cape Falcon, OR	—	45° 46' N. lat.
Cape Lookout, OR	—	45° 20'15" N. lat.
Cape Blanco, OR	—	42° 50' N. lat.
Cape Mendocino, CA	—	40° 30' N. lat.
North/South management line	—	40° 10' N. lat.
Point Arena, CA	—	38° 57'30" N. lat.
Point Conception, CA	—	34° 27' N. lat.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 34 of 58)

International North Pacific Fisheries Commission (INPFC) subareas (for more precise coordinates for the Canadian and Mexican boundaries, see 50 CFR 660.304):

(i) Vancouver	—	U.S.-Canada border to 47° 30' N. lat.
(ii) Columbia	—	47° 30' to 43° 00' N. lat.
(iii) Eureka	—	43° 00' to 40° 30' N. lat.
(iv) Monterey	—	40° 30' to 36° 00' N. lat.
(v) Conception	—	36° 00' N. lat. to the U.S.-Mexico border.

New rockfish categories in 2000. Rockfish (except thornyheads) are divided into new categories north and south of 40° 10' N. lat., depending on the depth where they most often are caught: nearshore, shelf, or slope. New trip limits have been established for "minor rockfish" species according to these categories.

- (i) Nearshore: minor rockfish species listed in Table 29. a.
- (ii) Shelf: shortbelly, widow, yellowtail, bocaccio, chilipepper, cowcod rockfishes, and shelf species in Table 29. a.
- (iii) Slope: Pacific ocean perch, splitnose rockfish, and minor slope rockfish species in Table 29. a.

Table 29. a. – Minor Rockfish Species (excludes thornyheads)

North of 40°10' N. lat.	South of 40°10' N. lat.
NEARSHORE	
black, <i>Sebastes melanops</i>	black, <i>Sebastes melanops</i>
black and yellow, <i>S. chrysomelas</i>	black and yellow, <i>S. chrysomelas</i>
blue, <i>S. mystinus</i>	blue, <i>S. mystinus</i>
brown, <i>S. auriculatus</i>	brown, <i>S. auriculatus</i>
calico, <i>S. dalli</i>	calico, <i>S. dalli</i>
China, <i>S. nebulosus</i>	California Scorpionfish, <i>Scorpaena guttata</i>
copper, <i>S. caurinus</i>	China, <i>S. nebulosus</i>
gopher, <i>S. carnatus</i>	copper, <i>S. caurinus</i>
grass, <i>S. rastrelliger</i>	gopher, <i>S. carnatus</i>
kelp, <i>S. atrovirens</i>	grass, <i>S. rastrelliger</i>
olive, <i>S. serranoides</i>	kelp, <i>S. atrovirens</i>
quillback, <i>S. maliger</i>	olive, <i>S. serranoides</i>
treefish, <i>S. serriceps</i>	quillback, <i>S. maliger</i>
	treefish, <i>S. serriceps</i>
SHELF	
bronzespotted, <i>S. gilli</i>	bronzespotted, <i>S. gilli</i>
bocaccio, <i>S. paucispinis</i>	chameleon, <i>S. phillipsi</i>
chameleon, <i>S. phillipsi</i>	dwarf-red, <i>S. rufinatus</i>
chilipepper, <i>S. goodei</i>	flag, <i>S. rubrivinctus</i>
cowcod, <i>S. levis</i>	freckled, <i>S. lentiginosus</i>
dwarf-red, <i>S. rufinatus</i>	greenblotched, <i>S. rosenblatti</i>
freckled, <i>S. lentiginosus</i>	greenspotted, <i>S. chlorostictus</i>
greenblotched, <i>S. rosenblatti</i>	greenstriped, <i>S. elongatus</i>
greenspotted, <i>S. chlorostictus</i>	halfbanded, <i>S. semicinctus</i>
greenstriped, <i>S. elongatus</i>	honeycomb, <i>S. umbrosus</i>
halfbanded, <i>S. semicinctus</i>	Mexican, <i>S. macdonaldi</i>
honeycomb, <i>S. umbrosus</i>	pink, <i>S. eos</i>
Mexican, <i>S. macdonaldi</i>	pinkrose, <i>S. simulator</i>
pink, <i>S. eos</i>	pygmy, <i>S. wilsoni</i>
pinkrose, <i>S. simulator</i>	redstriped, <i>S. proriger</i>
pygmy, <i>S. wilsoni</i>	rosethorn, <i>S. helvomaculatus</i>
redstriped, <i>S. proriger</i>	rosy, <i>S. rosaceus</i>
rosethorn, <i>S. helvomaculatus</i>	silvergrey, <i>S. brevispinis</i>
rosy, <i>S. rosaceus</i>	speckled, <i>S. ovalis</i>
silvergrey, <i>S. brevispinis</i>	squarespot, <i>S. hopkinsi</i>
speckled, <i>S. ovalis</i>	starry, <i>S. constellatus</i>
squarespot, <i>S. hopkinsi</i>	stripetail, <i>S. saxicola</i>
starry, <i>S. constellatus</i>	swordspine, <i>S. ensifer</i>
stripetail, <i>S. saxicola</i>	tiger, <i>S. nigrocinctus</i>
swordspine, <i>S. ensifer</i>	vermillion, <i>S. miniatus</i>
tiger, <i>S. nigrocinctus</i>	yelloweye, <i>S. ruberrimus</i>
vermillion, <i>S. miniatus</i>	yellowtail, <i>S. flavidus</i>
yelloweye, <i>S. ruberrimus</i>	
SLOPE	
aurora, <i>S. aurora</i>	aurora, <i>S. aurora</i>
bank, <i>S. rufus</i>	bank, <i>S. rufus</i>

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 35 of 58)

blackgill, <i>S. melanostomus</i>	blackgill, <i>S. melanostomus</i>
darkblotched, <i>S. crameri</i>	darkblotched, <i>S. crameri</i>
redbanded, <i>S. babcocki</i>	Pacific ocean perch, <i>S. alutus</i>
rougheye, <i>S. aleutianus</i>	redbanded, <i>S. babcocki</i>
sharpchin, <i>S. zacentrus</i>	rougheye, <i>S. aleutianus</i>
shortraker, <i>S. borealis</i>	sharpchin, <i>S. zacentrus</i>
splitnose, <i>S. diploproa</i>	shortraker, <i>S. borealis</i>
yellowmouth, <i>S. reedi</i>	yellowmouth, <i>S. reedi</i>

Limited Entry Fishery

Sablefish. The limited entry sablefish allocation is further allocated 58% to trawl gear and 42% to nontrawl gear.

(i) Trawl trip and size limits. Management measures for the limited entry trawl fishery for sablefish are listed in Table 29.b.

(ii) Nontrawl trip and size limits. To take, retain, possess, or land sablefish during the regular, or mop-up season for the nontrawl limited entry sablefish fishery, the owner of a vessel must hold a limited entry permit for that vessel, affixed with both a gear endorsement for longline or trap (or pot) gear, and a sablefish endorsement. See 50 CFR 663.23(a)(2)(i). A sablefish endorsement is not required to participate in the limited entry daily-trip-limit fishery.

(a) Regular and mop-up seasons. Starting and ending dates for the regular and mop-up seasons, and the size of the cumulative trip limits for the regular and mop-up seasons (see 50 CFR 660.323(a)(2)) will be announced later in the year.

(b) Daily-trip-limit—listed in Table 29. c., applies to sablefish of any size, is in effect north of 36° N. lat. until the closed periods before or after the regular season as specified at 50 CFR 660.323(a)(2), between the end of the regular season and the beginning of the mop-up season, and after the mop-up season. The daily-trip-limit for sablefish taken and retained with nontrawl gear south of 36° N. lat. also is listed in Table 29. c., and continues throughout the year unless otherwise announced in the *Federal Register* because the regular and mop-up seasons do not apply south of 36° N. lat.

(c) Limit on small fish. During the "regular" and "mop-up" seasons, there is a trip limit in effect for sablefish smaller than 22 in. (56 cm) total length, which may comprise no more than 1,500 lb (680 kg) or 3% of all legal sablefish 22 in. (56 cm) (total length) or larger, whichever is greater. This trip limit counts toward any other cumulative trip limit that may be in effect. The size limit does not apply during the daily-trip-limit fishery outside the regular and mop-up seasons north of 36° N. lat., nor does it apply at any time south of 36° N. lat.

Whiting. Additional regulations that apply to the whiting fishery are found at 50 CFR 660.306 and 50 CFR 660.323(a)(3) and (a)(4).

(i) Allocations. The nontribal allocations are HGs, based on percentages that are applied to the commercial OY of 199,500 mt in 2000 (see 50 CFR 660.323(a)(4)), as follows:

- (a) Catcher/processor sector—67,830 mt (34%);
- (b) Mothership sector—47,880 mt (24%);
- (c) Shore-based sector—83,790 mt (42%). No more than 5% (4,190 mt) of the shore-based whiting allocation may be taken before the shore-based fishery begins north of 42° N. lat.
- (d) Tribal allocation—See below.

(ii) Seasons. The 2000 primary seasons for the whiting fishery start on the same dates as in 1999, as follows (see 50 CFR 660.323(a)(3)):

- (a) Catcher/processor sector—May 15;
- (b) Mothership sector—May 15;
- (c) Shore-based sector—June 15 north of 42° N. lat.; April 1 between 42° -40° 30' N. lat.; April 15 south of 40° 30' N. lat.

(iii) Trip limits.

(a) Before and after the regular season. The "per trip" limit for whiting before and after the regular season for the shore-based sector is announced in Table 29. b., as authorized at 50 CFR 660.323(a)(3) and (a)(4). This trip limit includes any whiting caught shoreward of 100 fathoms (183 m) in the Eureka area.

(b) Inside the Eureka 100-fm contour. No more than 10,000 lb (4,536 kg) of whiting may be taken and retained, possessed, or landed by a vessel that, at any time during a fishing trip, fished in the fishery management area shoreward of the 100-fathom (183-m) contour (as shown on NOAA Charts 18580, 18600, and 18620) in the Eureka area.

Black rockfish. The regulations at 50 CFR 660.323(a)(1) state: "The trip limit for black rockfish (*Sebastes melanops*) for commercial fishing vessels using hook-and-line gear between the U.S.-Canada border and Cape Alava (48° 09'30" N. lat.) and between Destruction

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 36 of 58)

Island (47° 40'00" N. lat.) and Leadbetter Point (46° 38'10" N. lat.), is 100 lb (45 kg) or 30%, by weight of all fish on board, whichever is greater, per vessel per fishing trip." These "per trip" limits apply to limited entry and open access fisheries, in conjunction with the cumulative trip limits and other management measures listed in Tables 29. c. and 29. d. The crossover provisions do not apply to the per trip limits.

Table 29. b. – 2000 Trip Limits 1/ and Gear Requirements 2/ for Limited Entry Trawl Gear

Species/groups	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
Minor slope rockfish						
North	3,000 lb / 2 months		5,000 lb / 2 months		1,500 lb / month	
South	3,000 lb / 2 months		5,000 lb / 2 months		1,500 lb / month	
Splitnose-South	8,500 lb / 2 months		14,000 lb / 2 months		4,000 lb / month	
Pacific ocean perch	500 / month		2,500 lb / month		500 lb / month	
Sablefish	7,000 lb / 2 months; 22-inch size limit 3/		10,000 lb / 2 months; 22-inch size limit 3/		3,500 lb / month; 22-inch size limit 3/	
Longspine thornyhead	12,000 lb / 2 months		4,000 lb / 2 months		6,000 lb / month	
Shortspine thornyhead	3,000 lb / 2 months		1,000 lb / 2 months		1,500 lb / month	
Dover sole	55,000 lb / 2 months		20,000 lb / 2 months		20,000 / month	
Arrowtooth flounder	10,000 lb / trip		No pound limit, but small footrope required 2/		10,000 lb / trip	
Petrale sole	No restriction	No pound limit, but small footrope required 2/			No restriction	
Rex sole	No limit					
All other flatfish 4/	No pound limit, but small footrope required 2/					
Whiting shoreside 5/	20,000 lb / trip – before primary season		Primary season			20,000 lb / trip – after primary season
Use of small footrope bottom trawl or midwater trawl required for landing all the following species 6/:						
Minor Shelf rockfish						
North	300 lb / month		1,000 lb / month		300 lb / month	
South	500 lb / month		1,000 lb / month		500 lb / month	
Canary rockfish	100 lb / month		300 lb / month		100 lb / month	
Widow rockfish						
mid-water trawl	30,000 lb / 2 months		30,000 lb / 2 months		30,000 lb / 2 months	
small footrope trawl	1,000 lb / month		1,000 lb / month		1,000 lb / month	
Yellowtail-North 7/						
mid-water trawl	10,000 lb / 2 months		30,000 lb / 2 months		10,000 lb / 2 months	
small footrope trawl	1,500 lb / month		1,500 lb / month		1,500 lb / month	
Bocaccio-South 7/	300 lb / month		500 lb / month		300 lb / month	
Chilipepper-South 7/						
mid-water trawl	25,000 lb / 2 months		25,000 lb / 2 months		25,000 lb / 2 months	
small footrope trawl	7,500 lb / 2 months		7,500 lb / 2 months		7,500 lb / 2 months	
Cowcod - South 7/	1 fish per landing		1 fish per landing		1 fish per landing	
Minor Nearshore rockfish						
North	200 lb / month		200 lb / month		200 lb / month	
South	200 lb / month		200 lb / month		200 lb / month	
Lingcod	CLOSED		400 lb / month; 24-inch size limit 8/		CLOSED	

1/ These trip limits apply coastwide unless otherwise specified. North means 40° 10' N. lat. to the US-Canada border. "South" means 40° 10' N. lat. to the US-Mexico border. 40° 10' N. lat. is about 20 nautical miles south of Cape Mendocino CA.

2/ Gear requirements and prohibitions are explained above.

3/ No more than 500 lbs (227 kg) per trip may be sablefish smaller than 22 in. (56 cm) total length, which counts toward the cumulative limit.

4/ Other flatfish means all flatfish listed at 50 CFR 660.302 except those in this Table with a trip limit.

5/ The whiting "per trip" limit in the Eureka area inside 100 fm is 10,000 lb / trip throughout the year.

6/ Small footrope trawl is a bottom trawl net with a footrope no larger than 8 in. (20 cm) in diameter. Midwater gear also may be used; the footrope must be bare.

7/ Yellowtail rockfish (south) and bocaccio, chilipepper, and cowcod rockfishes (north) are included in trip limits for minor shelf rockfish in the appropriate area.

8/ Lingcod must be greater than or equal to 24 in. (61 cm) total length.

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 37 of 58)

Table 29. c. – 2000 Trip Limits 1/ for Limited Entry Fixed Gear

Species/groups	JAN-FEB	MAR-APR	MAY-JUN	JULY-AUG	SEP-OCT	NOV-DEC
Minor slope rockfish						
North	3,000 lb / 2 months		5,000 lb / 2 months		1,500 lb / month	
South	3,000 lb / 2 months		5,000 lb / 2 months		1,500 lb / month	
Splitnose-South	8,500 lb/2 mo.		14,000 lb / 2 months		4,000 lb / month	
Pacific ocean perch	500 lb / month		2,500 lb / month		500 lb / month	
Sablefish (daily-trip-limit fishery) 2/						
North of 36 ° N. lat.	300 lb / day, 2,100 lb / 2 months or 1 landing above 300 lb but less than 600 lb/week, less than 1,800 lb / 2 mo.		300 lb / day, 2,100 lb / 2 months (option to make one landing per week above 300 lb removed May 1; may be reinstated in July)		300 lb / day, 2,100 lb / 2 months	
South of 36 ° N. lat.	350 lb / day or 1 landing above 350 lb per week, up to 1,050 lb					
Longspine thornyhead	12,000 lb / 2 months		4,000 lb / 2 months		6,000 lb / month	
Shortspine thornyhead	1,000 lb / month		1,000 lb / month		1,000 lb / month	
Dover sole	55,000 lb / 2 months		20,000 lb / 2 months		20,000 / month	
Arrowtooth flounder	10,000 lb / trip		No restriction		10,000 lb / trip	
Petrale sole	No restriction					
Rex sole	No restriction					
Other flatfish 3/	No restriction					
Shoreside whiting 4/	20,000 lb / trip		Open		20,000 lb / trip	
Minor Shelf rockfish						
North	300 lb / month		1,000 lb / month		300 lb / month	
South						
40°10-36°00' N. lat.	500 lb / month	CLOSED 5/	1,000 lb / month		500 lb / month	
South of 36°00' N. lat.	CLOSED	500 lb / month	1,000 lb / month		500 lb / month	
Canary-Coastwide						
North	100 lb / month		300 lb / month		100 lb / month	
South						
40°10-36°00' N. lat.	100 lb / month	CLOSED	300 lb / month		100 lb / month	
South of 36°00' N. lat.	CLOSED	100 lb / month	300 lb / month		100 lb / month	
Widow rockfish Coastwide:						
North	3,000 lb / month		3,000 lb / month		3,000 lb / month	
South						
40°10-36°00' N. lat.	3,000 lb/month	CLOSED	3,000 lb / month		3,000 lb / month	
South of 36°00' N. lat.	CLOSED	3,000 lb/month	3,000 lb / month		3,000 lb / month	
Yellowtail-North 6/	1,500 lb / month		1,500 lb / month		1,500 lb / month	
Bocaccio-South 6/						
40°10-36°00' N. lat.	300 lb / month	CLOSED	500 lb / month		300 lb / month	
South of 36°00' N. lat.	CLOSED	300 lb / month	500 lb / month		300 lb / month	
Chilipepper-South 6/						
40°10-36°00' N. lat.	2,000 lb /month	CLOSED	2,000 lb / month		2,000 lb / month	
South of 36°00' N. lat.	CLOSED	2,000 lb/month	2,000 lb / month		2,000 lb / month	
Cowcod - South 6/						
40°10-36°00' N. lat.	1 fish per landing	CLOSED	1 fish per landing		1 fish per landing	
South of 36°00' N. lat.	CLOSED	1 fish per landing	1 fish per landing		1 fish per landing	
Minor Nearshore rockfish						
North	2,400 lb/2 months, of which no more than 1,200 lb may be species other than black or blue rockfish 7/					
South						
40°10-36°00' N. lat.	1,000 lb / 2 months	CLOSED	1,000 lb / 2 months		1,000 lb / 2 months	
South of 36°00' N. lat.	CLOSED	1,000 lb / 2 months	1,000 lb / 2 months		1,000 lb / 2 months	
Lingcod 8/	CLOSED		400 lb / month; size limit 24 in. N., 26 in. S.		CLOSED	

1/ Trip limits apply coastwide unless otherwise specified. North is 40° 10' N. lat. to the US-Canada border. South is 40° 10' N. lat. to the US-Mexico border.

2/ The sablefish size limit does not apply during the daily-trip-limit fishery, but does apply during the "regular" and mop-up* seasons north of 36° N. lat.

3/ Other flatfish means all flatfish listed at 50 CFR 660.302 except those in this Table with a trip limit.

4/ The whiting "per trip" limit in the Eureka area for catch inside 100 fathoms is 10,000 lb / trip throughout the year.

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

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 38 of 58)

- 6/ Yellowtail rockfish (south) and bocaccio, chilipepper, and cowcod rockfishes (north) are included in trip limits for minor shelf rockfish in the appropriate area.
 7/ The "per trip" limit for black rockfish off Washington also applies.
 8/ The size limit for lingcod is 24 in. (61 cm) in the north and 26 in. (66 cm) in the south, total length.
 To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

Trip Limits in the Open Access Fishery

Open access gear is gear used to take and retain groundfish from a vessel that does not have a valid permit for the Pacific coast groundfish fishery with an endorsement for the gear used to harvest the groundfish. This includes longline, trap, pot, hook-and-line (fixed or mobile), set net (south of 38° N. lat. only), and exempted trawl gear (trawls used to target non-groundfish species: pink shrimp or prawns, and, south of Pt. Arena, CA (38° 57'30" N. lat.), California halibut or sea cucumbers). Unless otherwise specified, a vessel operating in the open access fishery is subject to, and must not exceed any trip limit, frequency limit, and/or size limit for the open access fishery. The application of trip limits for vessels operating in both limited entry and open access fisheries has been clarified. The crossover provisions that apply to the limited entry fishery apply to the open access fishery as well. The cumulative limit periods initially are the same as for the limited entry fishery, but may be changed during the year.

Table 29. d. – 2000 Trip Limits for All Open Access Gear except Exempted Trawl Gear

Species/groups	JAN-FEB	MAR-APR	MAY-JUN	JULY-AUG	SEP-OCT	NOV	DEC
Minor slope rockfish							
North	500 lb / 2 months		500 lb / 2 months			500 lb / 2 months	
South	500 lb / 2 months		500 lb / 2 months			500 lb / 2 months	
Splitnose-South	200 lb / month		200 lb / month			200 lb / month	
POP	100 lb / month		100 lb / month			100 lb / month	
Sablefish 2/							
North of 36 °	300 lb / day, but no more than 2,100 lb / 2 months						
South of 36 °	350 lb / day		350 lb / day			350 lb / day	
Thornyheads (longspine and shortspine combined)							
North of Pt. Conception	CLOSED 3/		CLOSED			CLOSED	
South of Pt. Conception	50 lb / day		50 lb / day			50 lb / day	
Arrowtooth	200 lb / month		200 lb / month			200 lb / month	
Dover sole	(included in "other" flatfish limit)						
Petrale sole	(included in "other" flatfish limit)						
Near-shore flatfish	(included in "other" flatfish limit)						
"Other" flatfish 4/	300 lb / month		300 lb / month			300 lb / month	
Shoreside whiting	300 lb / month		300 lb / month			300 lb / month	
Minor Shelf Rockfish							
North	100 lb / month		100 lb / month			100 lb / month	
South							
40°10'-36°00' N. lat.	200 lb / month	CLOSED	200 lb / month			200 lb / month	
South of 36°00' N. lat.	CLOSED	200 lb / month	200 lb / month			200 lb / month	
Canary							
North	50 lb / month		50 lb / month			50 lb / month	
South							
40°10'-36°00' N. lat.	50 lb / month	CLOSED	50 lb / month			50 lb / month	
South of 36°00' N. lat.	CLOSED	50 lb / month	50 lb / month			50 lb / month	
Widow							
North	3,000 lb / month		3,000 lb / month			3,000 lb / month	
South							
40°10'-36°00' N. lat.	3,000 lb / month	CLOSED	3,000 lb / month			3,000 lb / month	
South of 36°00' N. lat.	CLOSED	3,000 lb / month	3,000 lb / month			3,000 lb / month	
Yellowtail-North 5/	100 lb / month		100 lb / month			100 lb / month	
Bocaccio - South 5/							
40°10'-36°00' N. lat.	200 lb / month	CLOSED	200 lb / month			200 lb / month	
South of 36°00' N. lat.	CLOSED	200 lb / month	200 lb / month			200 lb / month	
Chilipepper-South 5/							
40°10'-36°00' N. lat.	2,000 lb / month	CLOSED	2,000 lb / month			2,000 lb / month	
South of 36°00' N. lat.	CLOSED	2,000 lb / month	2,000 lb / month			2,000 lb / month	

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 39 of 58)

Cowcod - South 5/				
40°10'-36°00' N. lat.	1 fish per landing	CLOSED	1 fish per landing	1 fish per landing
South of 36°00' N. lat.	CLOSED	1 fish per landing	1 fish per landing	1 fish per landing
Minor Nearshore Rockfish				
North	1,000 lb / 2 months, of which no more than 500 lb may be species other than black or blue rockfish 6/			
South				
40°10'-36°00' N. lat.	550 lb / 2 months	CLOSED	550 lb / 2 months	550 lb / 2 months
South of 36°00' N. lat.	CLOSED	550 lb / 2 months	550 lb / 2 months	550 lb / 2 months
Lingcod 7/	CLOSED		400 lb / month; size limit 24 in. north, 26 in. south	CLOSED

- 1/ Trip limits apply coastwide unless otherwise specified. North is 40° 10' N. lat. to the US-Canada border. South is 40° 10' N. lat. to the US-Mexico border.
2/ No size limit for sablefish taken and retained with nontrawl gear in the open access fishery. Management of the nontrawl sablefish fishery is described above.
3/ Closed means it is prohibited to take and retain, possess, or land the designated species in the time or area indicated.
4/ Other flatfish means all flatfish listed at 50 CFR 660.302 except those in this Table with a trip limit.
5/ Yellowtail rockfish (south) and bocaccio, chilipepper, and cowcod rockfishes (north) are included in trip limits for minor shelf rockfish in the appropriate area.
6/ The "per trip" limit for black rockfish off Washington also applies.
7/ The size limit for lingcod is 24 in. (61 cm) in the north and 26 in. (66 cm) in the south, total length.
To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

All open access gear except exempt trawl gear. The trip limits, size limits, seasons, and other management measures for open access groundfish gear, except exempted trawl gear, are listed in Table 29. d. The trip limit at 50 CFR 660.323(a)(i) for black rockfish caught with hook-and-line gear also applies.

Groundfish taken by exempted trawl gear (e.g., by vessels engaged in fishing for spot and ridgeback prawns, California halibut, and sea cucumbers.

(i) Trip limits. No more than 300 lb (136 kg) of groundfish may be taken per vessel per fishing trip. Limits and closures in Table 29. d. also apply and are counted toward the 300 lb (136 kg) groundfish limit. In any landing by a vessel engaged in fishing for spot and ridgeback prawns, California halibut, or sea cucumbers with exempted trawl gear, the amount of groundfish landed may not exceed the amount of the target species landed, except that the amount of spiny dogfish (*Squalus acanthias*) landed may exceed the amount of target species landed. Spiny dogfish are limited by the 300 lb (136 kg) per trip overall groundfish limit. The daily-trip-limits for sablefish and thornyheads south of Pt. Conception, and the overall groundfish "per trip" limit may not be multiplied by the number of days of the fishing trip.

(ii) State law. These trip limits are not intended to supersede any more restrictive state law relating to the retention of groundfish taken in shrimp or prawn pots or traps.

(iii) Participation in the California halibut fishery. A trawl vessel will be considered participating in this fishery if:

(a) It is not fishing under a valid limited entry permit issued under 50 CFR part 660.333 for trawl gear;

(b) All fishing on the trip takes place south of Pt. Arena; and

(c) The landing includes California halibut of a size required by California Fish and Game Code section 8392(a), which states: "No California halibut may be taken, possessed or sold which measures less than 22 in. (56 cm) in total length, unless it weighs 4 pounds or more in the round, 3 and one-half pounds or more dressed with the head on, or 3 pounds or more dressed with the head off. Total length means the shortest distance between the tip of the jaw or snout, whichever extends farthest while the mouth is closed, and the tip of the longest lobe of the tail, measured while the halibut is lying flat in natural repose, without resort to any force other than the swinging or fanning of the tail."

(iv) Participation in the sea cucumber fishery. A trawl vessel is considered to be participating in the sea cucumber fishery if:

(a) It is not fishing under a valid limited entry permit issued under 50 CFR part 660.333 for trawl gear;

(b) All fishing on the trip takes place south of Pt. Arena; and

(c) The landing includes sea cucumbers taken in accordance with California Fish and Game Code section 8396, which requires a permit issued by the State of California.

Groundfish taken with exempted trawl gear by vessels engaged in fishing for pink shrimp. The trip limit for a vessel engaged in fishing for pink shrimp is 500 lb (227 kg) of groundfish per day, multiplied by the number of days of the fishing trip, but not to exceed 2,000 lb (907 kg) of groundfish per trip. In any landing by vessels engaged in fishing for pink shrimp, the amount of groundfish landed may not exceed the amount of pink shrimp landed. Retention of thornyheads and lingcod is prohibited in months when the open access fishery for these species is closed. [This limit may be revised before the pink shrimp fishery starts its next season in April 2000.]

Recreational Fishery

California. For each person engaged in recreational fishing seaward of California, the following seasons and bag limits apply:

(i) Rockfish.

(a) Seasons. South of Cape Mendocino and north of 36° N. lat., recreational fishing for rockfish is closed from March 1 through April 30. South of 36° N. lat., recreational fishing for rockfish is closed from January 1 through February 29.

(b) Bag limits, boat limits, hook limits. In times and areas when the recreational season for rockfish is open, there is a 3-hook limit per fishing line, and the bag limit is 10 rockfish per day (excluding California scorpionfish), of which no more than 3 may be bocaccio (*Sebastes paucispinis*), no more than 3 may be canary rockfish (*S. pinniger*), and no more than 1 may be cowcod (*S. levis*). There is a per-boat limit of 2 cowcod. Multi-day limits are authorized by a valid permit issued by California and must not exceed the daily limit multiplied by the number of days in the fishing trip.

(c) Size limits. The following rockfish size limits apply: bocaccio may be no smaller than 10 in. (25 cm), cabezon (*Scorpaenichthys marmoratus*) may be no smaller than 14 in. (36 cm), kelp greenling (*Hexagrammos decagrammus*) may be no smaller than 12 in. (30 cm), and California scorpionfish (*Scorpaena guttata*) no smaller than 10 in. (25 cm).

(d) Dressing/Fileting. Rockfish skin may not be removed when fileting or otherwise dressing rockfish taken in the recreational fishery. Cabezon taken in the recreational fishery may not be fileted at sea.

(ii) Lingcod. South of Cape Mendocino and north of 36° N. lat., recreational fishing for lingcod is closed from March 1 through April 30. South of 36° N. lat., recreational fishing for lingcod is closed from January 1 through February 29. In times and areas when the recreational season for lingcod is open, there is a 3-hook limit per fishing line, and the bag limit is 2 lingcod per day, which may be no smaller than 26 in. (66 cm) TL. Multi-day limits are authorized by a valid permit issued by California and must not exceed the daily limit multiplied by the number of days in the fishing trip.

Oregon. The bag limits for each person engaged in recreational fishing seaward of Oregon are: 1 lingcod per day, which may be no smaller than 24 in. (61 cm) and no larger than 34" (86 cm) TL; and 10 rockfish per day, of which no more than 3 may be canary rockfish.

Washington. For each person engaged in recreational fishing seaward of Washington, the following seasons and bag limits apply:

(i) Rockfish. There is a rockfish bag limit of no more than 10 rockfish per day, of which no more than 2 may be canary rockfish and no more than 2 may be yelloweye rockfish (*S. ruberrimus*).

(ii) Lingcod. Recreational fishing for lingcod is closed between January 1, 2000 and March 31, 2000, and between November 1, 2000 and December 31, 2000. When the recreational season for lingcod is open, there is a bag limit of 1 lingcod per day, which may be no smaller than 24 in. (61 cm) TL.

Washington Coastal Tribal Fisheries

Sablefish. The allocation is 713 mt, 10% of the OY.

Rockfish.

(i) For the commercial harvest of black rockfish off Washington State, a HG of: 20,000 lb (9,072 kg) north of Cape Alava (48° 09'30" N. lat.) and 10,000 lb (4,536 kg) between Destruction Island (47° 40'00" N. lat.) and Leadbetter Point (46° 38'10" N. lat.).

(ii) Thornyheads are subject to a 300 lb (136 kg) trip limit.

(iii) Canary rockfish are subject to a 300 lb (136 kg) trip limited.

(iv) As published in this notice. The limits will not change unless the tribal limits are separately changed.

Lingcod. Subject to a 300 lb (136 kg) trip limit.

Pacific whiting. The allocation is 32,500 mt.

Effective April 1, 2000

Exempted trawl vessels participating in the pink shrimp fishery: groundfish landings limits. In any trip in which pink shrimp trawl gear is used, the amount of groundfish landed may not exceed the amount of pink shrimp landed. A vessel using shrimp trawl gear may land no more than 500 lb of groundfish per day, multiplied by the number of days in the fishing trip, and not to exceed 2,000 lb per trip. Within those limits, the following species-specific limits also apply:

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 41 of 58)

No more than 100 lb of canary rockfish in the month of April.
No more than 300 lb per month of canary rockfish, starting May 1.
No lingcod may be taken, retained, possessed or landed in April coastwide.
No more than 400 lb of lingcod per month, starting May 1.
North of 40°10' N. lat. the lingcod minimum size limit (total length) is 24 inches, and south of 40°10' N. lat. the minimum size limit (total length) is 26 inches.
No more than 2,000 lb of sablefish per month, starting April 1.

For vessels that participate in both the pink shrimp fishery and groundfish fishery during the same cumulative limit period, the larger limit applies but landings made using the gear with the smaller limit cannot be exceeded while using that gear, and count toward the larger limit. Landings limits are not additive; that is, the vessel may not retain a separate landings limit for each fishery.

Effective May 1, 2000 (May 16, 2000 for "B" platoon vessels)

Limited Entry Trawl Vessels With Large Footropes: limited entry trawl vessels with large footropes (footropes greater than 8 inches in diameter) may land no more than 400 lb per trip of flatfish other than Dover sole and rex sole coastwide.

Limited Entry Non-Trawl Fishery:

north of 40° 10' N. lat., the minor nearshore rockfish cumulative trip limit is increased from 2,400 lb per 2 months, of which no more than 1,200 may be species other than black or blue rockfish, to 3,000 lb per 2 months, of which no more than 1,400 lb may be species other than black or blue rockfish.

south of 40° 10' N. lat., the minor nearshore rockfish cumulative trip limit is increased to 1,300 lb per 2 months.

Open Access Non-Trawl Fishery:

north of 40° 10' N. lat., the minor nearshore rockfish cumulative trip limit is increased from 1,000 lb per 2 months, of which no more than 500 may be species other than black or blue rockfish, to 1,500 lb per 2 months, of which no more than 700 lb may be species other than black or blue rockfish. From May 1 through September 30, the trip limit for landings in Pacific City, Oregon is 2,200 lb of minor rockfish per month, of which no more than 700 lb may be species other than black or blue rockfish. After September, all landings of groundfish in Pacific City will be prohibited.

south of 40° 10' N. lat., the minor nearshore rockfish cumulative trip limit is increased to 800 lb per 2 months.

Limited Entry and Open Access Non-Trawl fisheries: north of 36° N. lat., the 2-month cumulative trip limit for sablefish is increased from 2,100 lb to 2,400 lb. The 300 lb daily-trip-limit remains in effect.

In addition to the changes listed above, the Council made the following clarifications to the management measures:

- 1) North of 40° 10' N. lat., Pacific ocean perch (POP) is managed with a species-specific cumulative trip limit of 2,500 lb per month in the limited entry fishery and 100 lb per month in the open access fishery; south of 40° 10' N. lat., POP is included in the trip limit for minor slope rockfish;
- 2) flag rockfish have been removed from the minor slope rockfish category north of 40° 10' N. lat.; and
- 3) red-banded rockfish are moved from the minor shelf rockfish category to the minor slope rockfish category.

Fisheries for lingcod coastwide and rockfish between 36° and 40° 10' N. lat. (off California) open May 1 under previously announced limits, except as modified by the increased limits for nearshore minor rockfish announced here.

Effective June 8, 2000

Temporary closure of the primary season for Pacific whiting south of 42° N. lat. at noon June 8, 2000, and reimposition of "per trip" limits for whiting until 0001 hours June 15, 2000, at which time the primary season south of 42° N. lat. will resume. This action is intended to keep the harvest of whiting at the 2000 allocation levels.

Effective June 9, 2000

Closure of the 2000 mothership fishery for Pacific whiting at 4:00 p.m. local time June 9, 2000, because the allocation for the mothership sector is projected to be reached by that time. This action is intended to keep the harvest of whiting at the 2000 allocation levels.

Effective July 17, 2000

Yellowtail Rockfish taken in limited entry small footrope trawl fisheries north of 40°10' N. lat.: 2-month cumulative trip limit is increased to: no more than 33% (by round weight) of all flatfish except arrowtooth flounder, plus 10% (by round weight) of arrowtooth flounder, but may not exceed 7,500 lb per trip and 30,000 lb per 2-month period. Yellowtail rockfish may not be landed without flatfish.

Arrowtooth Flounder taken in limited entry large footrope trawl fisheries: new per trip limit is set at 5,000 lb.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 42 of 58)

Minor Slope Rockfish south of 40°10' N. lat.:

limited entry 2-month cumulative trip limit for both trawl and fixed gear is increased to 7,000 lb.

open access 2-month cumulative trip limit is increased to 1,000 lb.

Minor Nearshore Rockfish:

limited entry, fixed gear 2-month cumulative trip limit is increased to: north of 40°10' N. lat., 5,000 lb per 2-month period, with a maximum of 1,800 lb other than blue or black rockfish; south of 40°10' N. lat., 2,000 lb per 2-month period.

open access 2-month cumulative trip limit is increased to: north of 40°10' N. lat., 3,000 lb per 2-month period, with a maximum of 900 lb of minor nearshore rockfish other than blue or black rockfish; south of 40°10' N. lat., 1,600 lb per 2-month period.

Limited Entry and Open Access Non-Trawl Fisheries north of 36° N. lat.: 2-month cumulative trip limit for sablefish is increased from 2,400 lb to 3,300 lb. The 300 lb daily-trip-limit remains in effect. Details for the limited entry, primary fixed gear sablefish fishery will be announced via a separate public notice, to follow immediately.

Effective August 1, 2000

Minor Shelf Rockfish south of 40°10' N. lat.: limited entry monthly cumulative trip limit for both trawl and fixed gear is reduced to 500 lb on August 1.

Lingcod: the open access fishery closes August 1. There will be no further lingcod landings for the remainder of the 2000 open access fishing season.

Effective August 6, 2000

Sablefish: tiered Cumulative Limit, Fixed Gear Fishery ("regular season"), Washington, Oregon, and California, north of 36°N. lat.:

fishery will begin at noon on August 6 and end at noon on August 15. Only limited entry permit holders with sablefish endorsements may participate in the regular season. A participant in the regular sablefish season may catch no more than the amount associated with the tier assigned to his permit. All weights are in round weight or round-weight equivalents. For dressed sablefish, a product recovery rate of 1.6 is used by the States of Washington, Oregon, and California.

tiered limits are: 81,000 lb for Tier 1; 37,000 lb for Tier 2, and 21,000 lb for Tier 3. No vessel may catch more than one cumulative limit.

in addition to the overall tiered cumulative limits for the regular season, there is a trip limit for sablefish smaller than 22 inches total length, which may comprise no more than 1,500 lb or 3% of all legal sablefish 22 inches or larger, whichever is greater. This limit applies per vessel per trip.

for enforcement purposes, there is a pre-season closure for all fixed gear north of 36° N. lat. during the 48-hours before the start of the regular season, between noon August 4 and noon August 6. All fixed gear (open access or limited entry) used to take and retain groundfish must be out of the water during the pre-season closure. Also, sablefish taken with fixed gear may not be retained or landed during the pre-season closure, even if caught before noon on August 4. Shrimp, prawn or crab pot vessels may set their gear during the 48-hour closure only if groundfish are not retained or landed from noon August 4 through noon August 6.

immediately after the end of the regular season, there will be a 30-hour post-season closure, during which time no sablefish may be taken with fixed gear (limited entry or open access). During the 30-hour post-season closure, which ends at 1800 hrs on August 16, sablefish taken and retained during the regular season may be possessed and landed. Gear that was set during the regular season may remain in the water during the post-season closure; however, gear used to take and retain groundfish may not be set or retrieved during this period.

if a vessel offloads more than 300 lb of sablefish taken and retained during the regular season, then that offloading must begin before 1800 hrs August 16, and be completed before the vessel returns to sea, or else the 300 lb daily-trip-limit will apply to fish remaining on board after 1800 hrs August 16.

during the regular season, there is no limited entry, daily-trip-limit fishery north of 36° N. lat., and limited entry fixed gear vessels without sablefish endorsements may not harvest any sablefish.

after the end of the post-season enforcement closure, at 1800 hrs on August 16, daily-trip-limits currently in effect will resume. These limits are 300 lb per day, and 3,300 lb cumulative per two-month period, north of 36° N. lat.

the regular season does not apply to the open access fishery coastwide, or to the limited entry fishery south of 36° N. lat.. However, the pre-and post-season closures north of 36° N. lat. do apply to the open access fishery.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 43 of 58)

about 3 weeks after the end of the regular season, if an adequate amount of the fixed gear sablefish allocation remains, there may be a mop-up fishery for limited entry permit holders with sablefish endorsements. Any mop-up fishery will be announced in the *Federal Register*.

the mop-up fishery would be followed by resumption of the daily-trip-limit fishery.

Effective September 5, 2000

Limited Entry, Fixed Gear Sablefish Fishery Mop-Up Season:

two-week mop-up season from noon September 5, 2000 until noon September 19, 2000. During the mop-up fishery, only one cumulative trip limit of 3,000 lb round weight (1,875 lb dressed weight) is available for each vessel with a limited entry, fixed gear permit with a sablefish endorsement. No vessel may catch more than one cumulative limit. Possession of more than one permit does not entitle a vessel to more than one cumulative limit. Once a vessel has landed its 3,000 lb limit, no more sablefish may be landed by that vessel until the daily-trip-limit fishery resumes at noon on September 19, 2000. The mop-up fishery takes place north of 36° degrees N. lat. only. All weights are in round weight or round-weight equivalents. The states of Washington, Oregon, and California use a conversion factor of 1.6 to convert the weight of dressed sablefish into round weight.

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

limited entry daily-trip-limit fishery will be closed during the mop-up fishery. Limited entry permit holders without sablefish endorsements may not land any sablefish during the mop-up period. After the mop-up fishery has ended on September 19 at noon, the limited entry daily-trip-limit fishery for fixed gear vessels operating north of 36° degrees N. lat. will resume under a 300 lb daily-trip-limit, and a 3,300 lb two-month cumulative limit.

Effective September 15, 2000

Closure of the 2000 primary season for the shore-based fishery for Pacific whiting and resumption of per-trip limits at 6 p.m local time September 15, 2000, because the allocation is projected to be reached. This action is intended to keep the harvest of whiting at the 2000 allocation levels.

Effective October 2, 2000

Adjustment to trip limits for groundfish taken off Washington, Oregon, and California are announced by the National Marine Fisheries Service (NMFS). These changes were recommended by the Pacific Fishery Management Council (Council) in consultation with the states of Washington, Oregon, and California, and are effective October 2, 2000, unless otherwise specified. These changes are intended to keep landings within the 2000 harvest guidelines and allocations for Pacific coast groundfish species. NMFS also announces the last cumulative trip limit period in 2000 for the "B" platoon.

Minor slope rockfish south of 40° 10' N. lat.:

limited entry trawl and fixed gear 2-month cumulative trip limit for the September to October period increases from 7,000 lb to 20,000 lb, beginning October 2, 2000. For the November to December period the trawl fishery limit is 10,000 lb per 1-month cumulative period while the fixed gear fishery continues as 20,000 lb for the 2-month period.

open access 2-month cumulative trip limit is increased from 1,000 lb to 3,000 lb for the September to October period beginning October 2, 2000, and continuing through the November to December period.

Sablefish:

limited entry trawl fishery, the 2-month cumulative trip limit is increased from 10,000 to 12,000 lb for the September to October period beginning October 2, 2000, and then changes to a 1-month limit of 6,000 lb for the November and December periods. The per-trip limit of 500 lb for sablefish smaller than 22 inches is removed for the remainder of the year.

limited entry fixed gear daily-trip-limit fishery north of 36° N. lat., the 2-month cumulative trip limit increases from 3,300 lb to 8,000 lb, beginning October 2, 2000, and continuing through the end of the year. The daily-trip-limit is increased to either: (1) 400 lb per day, or (2) one landing of sablefish per week above 400 lb, but not to exceed 1,000 lb. A vessel may not use both options in one week. A week is seven days, Sunday through Saturday.

open access, daily-trip-limit fisheries, the 2-month cumulative limit is removed, beginning October 2, 2000. The daily-trip-limit is increased to either: (1) 300 lb per day or (2) one landing of sablefish per week above 300 lb, but not to exceed 1,200 lb. A vessel may not use both options in one week. A week is seven days, Sunday through Saturday.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 44 of 58)

Minor nearshore rockfish north of 40° 10' N. lat.:

limited entry fixed gear 2-month cumulative trip limit is increased effective October 2, 2000, from 5,000 lb to 10,000 lb per 2-month period, with a maximum of 4,000 lb other than blue or black rockfish.

open access 2-month cumulative trip limit is increased beginning with the September to October period from 3,000 lb to 6,000 lb per 2-month period, with a maximum of 2,000 lb of minor nearshore rockfish, other than blue or black rockfish.

The State of California asked the Council to separate central and southern California waters in case rockfish fishery restrictions are needed in November or December to protect overfished species. The Council recommended setting separate cumulative trip limits for the area between 40° 10' N. lat. and 34° 27' N. lat., and the area south of 34° 27' N. lat. Possible restrictions will be addressed at the California Fish & Game Commission meeting in October. Any actions resulting from this meetings will be published in the *Federal Register* and announced by NMFS via public notice.

Minor nearshore rockfish fisheries from 40° 10' N. lat. southward to 34° 27' N. lat.:

limited entry, fixed gear, the 2-month cumulative trip limit increases to 6,000 lb beginning October 2, 2000. The limited entry fixed gear nearshore rockfish south of 34° 27' N. lat. 2-month cumulative limit will be 9,000 lb beginning October 2, 2000, and 3,000 lb for the November to December period.

open access, the 2-month cumulative limit increases to 4,000 lb effective October 2, 2000. The open access minor nearshore rockfish south 34° 27' N. lat. will be 6,000 lb for the September to October period, and 2,000 lb for the November to December period.

Yellowtail rockfish:

limited entry small footrope trawl fisheries, the 2-month cumulative trip limit for the November to December period is decreased to: no more than 33% (by weight) of all flatfish except arrowtooth flounder, plus 10% (by weight) of arrowtooth flounder, not to exceed 2,500 lb per trip. Yellowtail rockfish may not be landed without flatfish. This change is effective November 1, 2000.

limited entry mid-water trawl fishery north of 40° 10' N. lat., the 2-month cumulative limit for the November to December period increases to 30,000 lb, effective November 1, 2000.

"Other flatfish" (flatfish without species-specific trip limits, plus rex sole) taken in the limited entry large footrope trawl fisheries: the per-trip limit increases to 1,000 lb per trip, effective November 1, 2000.

Arrowtooth flounder taken in limited entry trawl fisheries: a new per-trip limit is set at 20,000 lb, effective November 1, 2000.

For vessels in the "B" platoon, the final cumulative trip limit period will be from November 16, 2000 through December 31, 2000. At any time during this period, each vessel in the "B" platoon is allowed to take and retain, possess, or land the equivalent of two 1-month cumulative limits (the November and December cumulative trip limits). For species for which there are 2-month cumulative limits, the vessels in the "B" platoon must take the final 2-month cumulative limit during the final period from November 16, 2000 through December 31, 2000.

Note: Operating in both limited entry and open access fisheries. A vessel that operates in both the open access and limited entry fisheries is not entitled to two separate trip limits for the same species. Please refer to the annual specification and management measures section IV.(A)(11).

Operating in areas with different trip limits. Because trip limits for a species or species group may differ in different geographic areas along the coast "crossover" provisions apply to vessels operating in different geographical areas that have different cumulative or "per trip" trip limits for the same species or species group. Please refer to the annual specification and management measures section IV.(A)(12).

Effective January 1, 2001

The following management measures for the groundfish fishery in 2001:

New Cumulative Trip Limit Periods for 2001. A cumulative trip limit is the maximum amount that may be taken and retained, possessed, or landed per vessel in a specified period of time without a limit on the number of landings or trips, unless otherwise specified. The cumulative trip limit periods for limited entry and open access fisheries, which start at 0001 hours and end at 2400 hours (local time), are as follows, unless otherwise specified:

(i) The 2-month periods are: January 1-February 28, March 1-April 30, May 1-June 30, July 1-August 31, September 1-October 31, and, November 1-December 31.

(ii) One-month means the first day through the last day of the calendar month.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 45 of 58)

(iii) One week means 7 consecutive days, Sunday through Saturday.

Sablefish size limit

The size limit for trawlers and limited entry, fixed-gear regular and mop-up sablefish fisheries has been eliminated.

Sablefish weight limit conversions. The following conversions apply to both the limited entry and open access fisheries when size and trip limits are effective for those fisheries. For headed and gutted (eviscerated) sablefish:

(i) The conversion factor established by the state where the fish is or will be landed will be used to convert the processed weight to round weight for purposes of applying the trip limit. (The conversion factor currently is 1.6 in Washington, Oregon, and California. However, the state conversion factors may differ; fishermen should contact fishery enforcement officials in the state where the fish will be landed to determine that state's official conversion factor.).

Operating in areas with different trip limits. Trip limits for a species or species group may differ in different geographic areas along the coast. The following "crossover" provisions apply to vessels operating in different geographical areas that have different cumulative or "per trip" trip limits for the same species or species group. Such crossover provisions do not apply to species that are subject only to daily-trip-limits, or to the trip limits for black rockfish off Washington.

(i) Going from a more restrictive to a more liberal area. If a vessel takes and retains any groundfish species or species group of groundfish in an area where a more restrictive trip limit applies before fishing in an area where a more liberal trip limit (or no trip limit) applies, then that vessel is subject to the more restrictive trip limit for the entire period to which that trip limit applies, no matter where the fish are taken and retained, possessed, or landed.

(ii) Going from a more liberal to a more restrictive area. If a vessel takes and retains a groundfish species or species group in an area where a higher trip limit or no trip limit applies, and takes and retains, possesses or lands the same species or species group 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.

(iii) Minor rockfish. Several rockfish species are designated with species-specific limits on one side of the 40°10' N. lat. management line, and are included as part of a minor rockfish complex on the other side of the line.

(a) If a vessel takes and retains minor slope rockfish north of 40°10' N. lat., that vessel is also permitted to take and retain, possess or land splitnose rockfish up to its cumulative limit south of 40°10' N. lat., even if splitnose rockfish were a part of the landings from minor slope rockfish taken and retained north of 40°10' N. lat. [Note: A vessel that takes and retains minor slope rockfish on both sides of the management line in a single cumulative limit period is subject to the more restrictive cumulative limit for minor slope rockfish during that period.]

(b) If a vessel takes and retains minor shelf rockfish north of 40°10' N. lat., that vessel is also permitted to take and retain, possess, or land chilipepper rockfish and bocaccio up to their respective cumulative limits south of 40°10' N. lat., even if either species is part of the landings from minor shelf rockfish taken and retained north of 40°10' N. lat. [Note: A vessel that takes and retains minor shelf rockfish on both sides of the management line in a single cumulative limit period is subject to the more restrictive cumulative limit for minor shelf rockfish during that period.]

(c) If a vessel takes and retains minor shelf rockfish south of 40°10' N. lat., that vessel is also permitted to take and retain, possess, or land yellowtail rockfish and POP up to their respective cumulative limits north of 40°10' N. lat., even if either species is part of the landings from minor shelf rockfish taken and retained south of 40°10' N. lat. [Note: A vessel that takes and retains minor shelf rockfish on both sides of the management line in a single cumulative limit period is subject to the more restrictive cumulative limit for minor shelf rockfish during that period.]

(iv) DTS complex. For 2001, differential trip limits are introduced for the "DTS complex" (Dover sole, shortspine thornyhead, longspine thornyhead, sablefish) north and south of the management line at 40°10' N. lat. Vessels operating in the limited entry trawl fishery are subject to crossover provisions when making landings that include any one of the four species in the "DTS complex." [Example: The January-February cumulative limit for Dover sole north of 40°10' N. lat. is 65,000 lb (29,484 kg) and the cumulative limit for sablefish in that same period and area is 5,000 lb (2,268 kg), while the cumulative limits south of 40°10' N. lat. are 35,000 lb (15,876 kg) for Dover sole and 8,000 lb (3,629 kg) for sablefish. Under the crossover provisions, a vessel may not take and retain Dover sole north of 40°10' N. lat. and then travel south of 40°10' N. lat. in that same 2-month period to take and retain the higher sablefish limit in the south.]

Sorting. It is unlawful for any person to "fail to sort, prior to the first weighing after offloading, those groundfish species or species groups for which there is a trip limit, size limit, quota, or harvest guideline, if the vessel fished or landed in an area during a time when such trip limit, size limit, harvest guideline, or quota applied." This provision applies to both the limited entry and open access fisheries. The following species must be sorted in 2000:

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 46 of 58)

(i) For vessels with a limited entry permit:

- (a) Coastwide—widow rockfish, canary rockfish, dark blotched rockfish, minor nearshore rockfish, minor shelf rockfish, minor slope rockfish; shortspine and longspine thornyheads; Dover sole; rex sole; petrale sole; other flatfish; arrowtooth flounder; lingcod; sablefish; and Pacific whiting;
- (b) N. of 40° 10' N. lat.—Pacific ocean perch, yellowtail rockfish, and, for fixed gear, black and blue rockfishes;
- (c) S. of 40° 10' N. lat.—chilipepper rockfish, bocaccio rockfish, splitnose rockfish, cowcod.

(ii) For open access vessels (vessels without a limited entry permit):

- (a) Coastwide—widow rockfish, canary rockfish, dark blotched rockfish; minor nearshore rockfish, minor shelf rockfish, minor slope rockfish, arrowtooth flounder, other flatfish, lingcod, sablefish, and Pacific whiting;
- (b) North of 40° 10' N. lat.—Black rockfish, blue rockfish, Pacific ocean perch, yellowtail rockfish;
- (c) South of 40° 10' N. lat.—chilipepper rockfish, bocaccio rockfish, splitnose rockfish, cowcod;
- (d) South of Point Conception—thornyheads.

New Limited Entry Trawl Gear Restrictions in 2001. Limited entry trip limits may vary depending on the type of trawl gear that is onboard a vessel during a fishing trip: large footrope, small footrope, or midwater trawl gear.

(i) Types of trawl gear.

- (a) Large footrope trawl gear is bottom trawl gear, as specified at 50 CFR 660.302 and 660.322(b), with a footrope diameter larger than 8 in. (20 cm) (including rollers, bobbins or other material encircling or tied along the length of the footrope).
- (b) Small footrope trawl gear is bottom trawl gear, as specified at 50 CFR 660.302 and 660.322(b), with a footrope diameter 8 in. (20 cm) or smaller (including rollers, bobbins or other material encircling or tied along the length of the footrope), except chafing gear may be used only on the last 50 meshes of a small footrope trawl, running the length of the net from the terminal (closed) end of the codend.
- (c) Midwater trawl gear is pelagic trawl gear, as specified at 50 CFR 660.302 and 660.322(b)(2). The footrope of midwater trawl gear may not be enlarged by encircling it with chains or by any other means.

(ii) Cumulative trip limits and prohibitions.

- (a) Large footrope trawl. It is unlawful to take and retain, possess or land any species of shelf or nearshore rockfish from a fishing trip if large footrope gear is onboard; this restriction applies coastwide from January 1 to December 31. North of 40°10' N. lat., it is unlawful to take and retain, possess or land petrale sole from a fishing trip if large footrope gear is onboard and the trip is conducted at least in part between May 1 and October 31; cumulative limits for "all other flatfish" (all flatfish except those with cumulative trip limits) are lower for vessels with large footrope gear on board if the trip is conducted at least in part between May 1 and October 31. South of 40°10' N. lat., it is unlawful to take and retain, possess, or land petrale sole from a fishing trip if large footrope gear is on board and the trip is conducted at least in part during May 1–October 31; cumulative limits for arrowtooth flounder and "all other flatfish" are lower for vessels with large footrope gear on board if the trip is conducted at least in part between May 1 and October 31. The presence of rollers or bobbins larger than 8 inches (20 cm) in diameter on board the vessel, even if not attached to a trawl, will be considered to mean a large footrope trawl is on board. Dates are adjusted for the "B" platoon.
- (b) Small footrope or midwater trawl gear. Cumulative trip limits for canary rockfish, widow rockfish, yellowtail rockfish, bocaccio, chilipepper, minor shelf rockfish, minor nearshore rockfish, and lingcod, are allowed only if small footrope gear or midwater trawl gear is used, and if that gear meets the specifications.
- (c) Midwater trawl gear. Higher cumulative trip limits are available for limited entry vessels using midwater trawl gear to harvest widow, yellowtail, or chilipepper rockfish. Each landing that contains widow, yellowtail, or chilipepper rockfish is attributed to the gear on board with the most restrictive trip limit for those species. Landings attributed to small footrope trawl must not exceed the small footrope limit, and landings attributed to midwater trawl must not exceed the midwater trawl limit. If a vessel has landings attributed to both types of trawls during a cumulative trip limit period, landings attributed to small footrope gear are counted toward the cumulative limit for midwater trawl gear.
- (d) More than one type of trawl gear on board. The cumulative trip limits must not be exceeded. It is legal to have more than one type of limited entry trawl gear on board, but the most restrictive trip limit associated with the gear on board will apply for that trip, and will count toward the cumulative trip limit for that gear.

(iii) Measurement. The footrope will be measured in a straight line from the outside edge to the opposite outside edge at the widest part on any individual part, including any individual disk, roller, bobbin, or any other device.

(iv) State landing receipts. Washington, Oregon, and California have indicated that they will require the type of trawl gear on board with the most restrictive limit to be recorded on the State landing receipt(s) for each trip, or an attachment to the State landing receipt.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 47 of 58)

(v) Gear inspection. All trawl gear and trawl gear components, including unattached rollers or bobbins, must be readily accessible and made available for inspection at the request of an authorized officer. No trawl gear may be removed from the vessel prior to offloading. All footropes shall be uncovered and clearly visible except when in use for fishing.

Permit transfers. Limited entry permit transfers are to take effect only on the first day of a major cumulative limit period (50 CFR 660.333(c)(1)), those days in 2001 are January 1, March 1, May 1, July 1, September 1, and November 1, and are delayed by 15 days (starting on the 16th of a month) for the "B" platoon.

Platooning—limited entry trawl vessels. Limited entry trawl vessels are automatically in the "A" platoon, unless the "B" platoon is indicated on the limited entry permit. If a vessel is in the "A" platoon, its cumulative trip limit periods begin and end on the beginning and end of a calendar month as in the past. If a limited entry trawl permit is authorized for the "B" platoon, then cumulative trip limit periods will begin on the 16th of the month (generally 2 weeks later than for the "A" platoon), unless otherwise specified.

(i) For a vessel in the "B" platoon, cumulative trip limit periods begin on the 16th of the month at 0001 hours, local time, and end on the 15th of the month. Therefore, the management measures announced herein that are effective on January 1, 2001, for the "A" platoon will be effective on January 16, 2001, for the "B" platoon. The effective date of any inseason changes to the cumulative trip limits also will be delayed for 2 weeks for the "B" platoon, unless otherwise specified.

(ii) A vessel authorized to operate in the "B" platoon may take and retain, but may not land, groundfish from January 1, 2001, through January 15, 2001.

(iii) A vessel authorized to operate in the "B" platoon will have the same cumulative trip limits for the November 16, 2001, through December 31, 2001, period as a vessel operating in the "A" platoon has for the November 1, 2001, through December 31, 2001 period.

Commonly used geographic coordinates.

Cape Falcon, OR	—	45° 46' N. lat.
Cape Lookout, OR	—	45° 20'15" N. lat.
Cape Blanco, OR	—	42° 50' N. lat.
Cape Mendocino, CA	—	40° 30' N. lat.
North/South management line	—	40° 10' N. lat.
Point Arena, CA	—	38° 57'30" N. lat.
Point Conception, CA	—	34° 27' N. lat.
International North Pacific Fisheries Commission (INPFC) subareas (for more precise coordinates for the Canadian and Mexican boundaries, see 50 CFR 660.304):		
(i) Vancouver	—	U.S.-Canada border to 47° 30' N. lat.
(ii) Columbia	—	47° 30' to 43° 00' N. lat.
(iii) Eureka	—	43° 00' to 40° 30' N. lat.
(iv) Monterey	—	40° 30' to 36° 00' N. lat.
(v) Conception	—	36° 00' N. lat. to the U.S.-Mexico border.

Cowcod Conservation Areas. Recreational and commercial fishing for groundfish is prohibited within the Cowcod Conservation Areas (CCAs), except that recreational and commercial fishing for minor nearshore rockfish is permitted in waters inside 20 fathoms (36.9 m). It is unlawful to take and retain, possess, or land groundfish inside the CCAs, except for nearshore rockfish taken in waters inside the 20 fathom (36.9 m) depth contour. Commercial fishing vessels may transit through the Western CCA with their gear stowed and groundfish on board only in a corridor through the Western CCA bounded on the north by the latitude line at 33°00'30" N. lat., and bounded on the south by the latitude line at 32° 59'30".

(i) The Western CCA is an area south of Point Conception that is bound by straight lines connecting all of the following points in the order listed:

33°50' N. lat., 119°30' W. long.;
 33°50' N. lat., 118°50' W. long.;
 32°20' N. lat., 118°50' W. long.;
 32°20' N. lat., 119°30' W. long.;
 33°00' N. lat., 119°30' W. long.;
 33°00' N. lat., 119°50' W. long.;
 33°30' N. lat., 119°50' W. long.;
 33°30' N. lat., 119°30' W. long.;
 and connecting back to 33°50' N. lat., 119°30' W. long.

(ii) The Eastern CCA is a smaller area west of San Diego and northwest of the U.S.-Mexico International Boundary that is bound by straight lines connecting all of the following points in the order listed:

32°40' N. lat., 118°00' W. long.;
 32°40' N. lat., 117°50' W. long.;
 32°36'42" N. lat., 117°50' W. long.;
 32°30' N. lat., 117°53'30" W. long.;

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 48 of 58)

32°30' N. lat., 118°00' W. long.;
and connecting back to 32°40' N. lat., 118°00' W. long.

New rockfish categories in 2001. Rockfish (except thornyheads) are divided into new categories north and south of 40° 10' N. lat., depending on the depth where they most often are caught: nearshore, shelf, or slope. New trip limits have been established for "minor rockfish" species according to these categories.

(i) Nearshore: minor rockfish species listed in Table 29. e.

(ii) Shelf: canary rockfish, shortbelly rockfish, widow rockfish, yellowtail rockfish, bocaccio, chilipepper rockfish, cowcod, and minor shelf rockfish species in Table 29. e.

(iii) Slope: Pacific ocean perch (POP), splitnose rockfish, dark blotched rockfish, and minor slope rockfish species in Table 29. e.

Table 29. e. – Minor Rockfish Species (excludes thornyheads)

North of 40°10' N. lat.	South of 40°10' N. lat.
NEARSHORE	
black, <i>Sebastes melanops</i>	black, <i>Sebastes melanops</i>
black and yellow, <i>S. chrysomelas</i>	black and yellow, <i>S. chrysomelas</i>
blue, <i>S. mystinus</i>	blue, <i>S. mystinus</i>
brown, <i>S. auriculatus</i>	brown, <i>S. auriculatus</i>
calico, <i>S. dalli</i>	calico, <i>S. dalli</i>
China, <i>S. nebulosus</i>	California Scorpionfish, <i>Scorpaena guttata</i>
copper, <i>S. caurinus</i>	China, <i>S. nebulosus</i>
gopher, <i>S. carnatus</i>	copper, <i>S. caurinus</i>
grass, <i>S. rastrelliger</i>	gopher, <i>S. carnatus</i>
kelp, <i>S. atrovirens</i>	grass, <i>S. rastrelliger</i>
olive, <i>S. serranoides</i>	kelp, <i>S. atrovirens</i>
quillback, <i>S. maliger</i>	olive, <i>S. serranoides</i>
treefish, <i>S. serriceps</i>	quillback, <i>S. maliger</i>
	treefish, <i>S. serriceps</i>
SHELF	
bronzespotted, <i>S. gilli</i>	bronzespotted, <i>S. gilli</i>
bocaccio, <i>S. paucispinis</i>	chameleon, <i>S. phillipsi</i>
chameleon, <i>S. phillipsi</i>	dwarf-red, <i>S. rufinus</i>
chilipepper, <i>S. goodei</i>	flag, <i>S. rubrivinctus</i>
cowcod, <i>S. levis</i>	freckled, <i>S. lentiginosus</i>
dwarf-red, <i>S. rufinus</i>	greenblotched, <i>S. rosenblatti</i>
flag, <i>S. rubrivinctus</i>	greenspotted, <i>S. chlorostictus</i>
freckled, <i>S. lentiginosus</i>	greenstriped, <i>S. elongatus</i>
greenblotched, <i>S. rosenblatti</i>	halfbanded, <i>S. semicinctus</i>
greenspotted, <i>S. chlorostictus</i>	honeycomb, <i>S. umbrosus</i>
greenstriped, <i>S. elongatus</i>	Mexican, <i>S. macdonaldi</i>
halfbanded, <i>S. semicinctus</i>	pink, <i>S. eos</i>
honeycomb, <i>S. umbrosus</i>	pinkrose, <i>S. simulator</i>
Mexican, <i>S. macdonaldi</i>	pygmy, <i>S. wilsoni</i>
pink, <i>S. eos</i>	redstriped, <i>S. proriger</i>
pinkrose, <i>S. simulator</i>	rosethorn, <i>S. helvomaculatus</i>
pygmy, <i>S. wilsoni</i>	rosy, <i>S. rosaceus</i>
redstriped, <i>S. proriger</i>	silvergrey, <i>S. brevispinis</i>
rosethorn, <i>S. helvomaculatus</i>	speckled, <i>S. ovalis</i>
rosy, <i>S. rosaceus</i>	squarespot, <i>S. hopkinsi</i>
silvergrey, <i>S. brevispinis</i>	starry, <i>S. constellatus</i>
speckled, <i>S. ovalis</i>	stripetail, <i>S. saxicola</i>
squarespot, <i>S. hopkinsi</i>	swordspine, <i>S. ensifer</i>
starry, <i>S. constellatus</i>	tiger, <i>S. nigrocinctus</i>
stripetail, <i>S. saxicola</i>	vermillion, <i>S. miniatus</i>
swordspine, <i>S. ensifer</i>	yelloweye, <i>S. ruberrimus</i>
tiger, <i>S. nigrocinctus</i>	yellowtail, <i>S. flavidus</i>
vermillion, <i>S. miniatus</i>	
yelloweye, <i>S. ruberrimus</i>	
SLOPE	
aurora, <i>S. aurora</i>	aurora, <i>S. aurora</i>
bank, <i>S. rufus</i>	bank, <i>S. rufus</i>

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 49 of 58)

blackgill, <i>S. melanostomus</i>	blackgill, <i>S. melanostomus</i>
darkblotched, <i>S. crameri</i>	darkblotched, <i>S. crameri</i>
redbanded, <i>S. babcocki</i>	Pacific ocean perch, <i>S. alutus</i>
rougheye, <i>S. aleutianus</i>	redbanded, <i>S. babcocki</i>
sharpchin, <i>S. zacentrus</i>	rougheye, <i>S. aleutianus</i>
shortraker, <i>S. borealis</i>	sharpchin, <i>S. zacentrus</i>
splitnose, <i>S. diploproa</i>	shortraker, <i>S. borealis</i>
yellowmouth, <i>S. reedi</i>	yellowmouth, <i>S. reedi</i>

Limited Entry Fishery

Most species taken in limited entry fisheries will be managed with cumulative trip limits, size limits, and seasons. The trawl fishery has gear requirements and trip limits that differ by the type of trawl gear on board. For the first time in 2001, cowcod retention is prohibited in all fisheries and groundfish vessels operating south of Point Conception must adhere to CCA restrictions.

Sablefish. The limited entry sablefish allocation is further allocated 58% to trawl gear and 42% to nontrawl gear.

- (i) Trawl trip and size limits. Management measures for the limited entry trawl fishery for sablefish are listed in Table 29.f.
- (ii) Nontrawl trip and size limits. To take, retain, possess, or land sablefish during the regular, or mop-up season for the nontrawl limited entry sablefish fishery, the owner of a vessel must hold a limited entry permit for that vessel, affixed with both a gear endorsement for longline or trap (or pot) gear, and a sablefish endorsement. See 50 CFR 663.23(a)(2)(i). A sablefish endorsement is not required to participate in the limited entry daily-trip-limit fishery.
 - (a) Regular and mop-up seasons. Starting and ending dates for the regular and mop-up seasons, and the size of the cumulative trip limits for the regular and mop-up seasons (see 50 CFR 660.323(a)(2)) will be announced later in the year.
 - (b) Daily-trip-limit—listed in Table 29. g., applies to sablefish of any size (the size limit on sable fish that was in effect in 2000 is no longer in effect), is in effect north of 36° N. lat. until the closed periods before or after the regular season as specified at 50 CFR 660.323(a)(2), between the end of the regular season and the beginning of the mop-up season, and after the mop-up season. The daily-trip-limit for sablefish taken and retained with nontrawl gear south of 36° N. lat. also is listed in Table 29. c., and continues throughout the year unless otherwise announced in the *Federal Register* because the regular and mop-up seasons do not apply south of 36° N. lat.

Whiting. Additional regulations that apply to the whiting fishery are found at 50 CFR 660.306 and 50 CFR 660.323(a)(3) and (a)(4).

- (i) Allocations. The nontribal allocations are HGs, based on percentages that are applied to the commercial OY of 162,900 mt in 2001 (see 50 CFR 660.323(a)(4)), as follows:
 - (a) Catcher/processor sector—55,386 mt (34%);
 - (b) Mothership sector—39,096 mt (24%);
 - (c) Shore-based sector—68,418 mt (42%). No more than 5% (3,421 mt) of the shore-based whiting allocation may be taken before the shore-based fishery begins north of 42° N. lat.
 - (d) Tribal allocation—See below.
- (ii) Seasons. The 2001 primary seasons for the whiting fishery start on the same dates as in 1999, as follows (see 50 CFR 660.323(a)(3)):
 - (a) Catcher/processor sector—May 15;
 - (b) Mothership sector—May 15;
 - (c) Shore-based sector—June 15 north of 42°00' N. lat.; April 1 between 42°00' -40°30' N. lat.; April 15 south of 40°30' N. lat.
- (iii) Trip limits.
 - (a) Before and after the regular season. The "per trip" limit for whiting before and after the regular season for the shore-based sector is announced in Table 29. b., as authorized at 50 CFR 660.323(a)(3) and (a)(4). This trip limit includes any whiting caught shoreward of 100 fathoms (183 m) in the Eureka area.
 - (b) Inside the Eureka 100-fm contour. No more than 10,000 lb (4,536 kg) of whiting may be taken and retained, possessed, or landed by a vessel that, at any time during a fishing trip, fished in the fishery management area shoreward of the 100-fathom (183-m) contour (as shown on NOAA Charts 18580, 18600, and 18620) in the Eureka area.

Black rockfish. The regulations at 50 CFR 660.323(a)(1) state: "The trip limit for black rockfish (*Sebastes melanops*) for commercial fishing vessels using hook-and-line gear between the U.S.-Canada border and Cape Alava (48° 09'30" N. lat.) and between Destruction Island (47° 40'00" N. lat.) and Leadbetter Point (46° 38'10" N. lat.), is 100 lb (45 kg) or 30%, by weight of all fish on board, whichever

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 50 of 58)

is greater, per vessel per fishing trip." These "per trip" limits apply to limited entry and open access fisheries, in conjunction with the cumulative trip limits and other management measures listed in Tables 29-g. and 29-h. The crossover provisions do not apply to the per trip limits.

Table 29-f. 2001 Trip Limits 1/ and Gear Requirements 2/ for Limited Entry Trawl Gear

Species/groups	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
Minor slope rockfish						
North	1,500 lb / 2 months		1,500 lb / 2 months		1,500 lb / month	
South	14,000 lb / 2 months		14,000 lb / 2 months		14,000 lb / month	
Splitnose-South	8,500 lb / 2 months		14,000 lb / 2 months		4,000 lb / month	
Pacific ocean perch 6/	1500 / month		2,500 lb / month		1,500 lb / month	
DTS complex - North						
Sablefish	5,000 lb / 2 months		14,000 lb / 2 months		5,000 lb / month	
Longspine thornyhead	6,000 lb / 2 months		6,000 lb / 2 months		6,000 lb / month	
Shortspine thornyhead	1,500 lb / 2 months		1,500 lb / 2 months		1,500 lb / month	
Dover sole	65,000 lb / 2 months		20,000 lb / 2 months		20,000 / month	
DTS complex - South						
Sablefish	8,000 lb / 2 months		11,000 lb / 2 months		8,000 lb / month	
Longspine thornyhead	6,000 lb / 2 months		6,000 lb / 2 months		6,000 lb / month	
Shortspine thornyhead	1,500 lb / 2 months		1,500 lb / 2 months		1,500 lb / month	
Dover sole	35,000 lb / 2 months		35,000 lb / 2 months		35,000 / month	
Flatfish - North						
Arrowtooth flounder	20,000 lb / trip		Small footrope: 30,000 lb/month for all flatfish except Dover sole. Large footrope: arrowtooth: 5,000 lb/trip; petrale sole, prohibited; rex sole, included in all other flatfish; all other flatfish, 2,000 lb/trip		20,000 lb / trip	
Petrale sole	No restriction				No restriction	
Rex sole	No limit				No Limit	
All other flatfish 3/	Small footrope, no limit; large footrope, 1,000 lb/trip				Small footrope, no limit; large footrope, 1,000 lb/trip	
Flatfish - South						
Arrowtooth flounder	20,000 lb / trip		Small footrope, no limit; large footrope, 5,000 lb/trip 2/		20,000 lb / trip	
Petrale sole	No restriction		No pound limit, but small footrope required 2/		No restriction	
Rex sole	No Limit					
All other flatfish 3/	Small footrope, no limit; large footrope, 1,000 lb/trip 2/					
Whiting shoreside 4/	20,000 lb / trip – before primary season		Primary season			20,000 lb / trip – after primary season
Use of small footrope bottom trawl or midwater trawl required for landing all the following species 5/:						
Minor Shelf rockfish						
North	300 lb / month		1,000 lb / month		300 lb / month	
South	500 lb / month		1,000 lb / month		500 lb / month	
Canary rockfish	100 lb / month		300 lb / month		100 lb / month	
Widow rockfish						
mid-water trawl	20,000 lb / 2 months		10,000 lb / 2 months		20,000 lb/ 2 months 2/	10,000 lb / 2 months
small footrope trawl	1,000 lb / month					
Yellowtail-North 6/						
mid-water trawl	30,000 lb / 2 months		15,000 lb / 2 months		20,000 lb / 2 months	
small footrope trawl	Without flatfish, 1,500 lb / month. As flatfish bycatch, per trip limit is the sum of 33% (by weight) of all flatfish except arrowtooth flounder, plus 10% (by weight) of arrowtooth flounder, not to exceed 2,500 lb/trip and 30,000 lb/ 2 months.		Without flatfish, 1,500 lb / month. As flatfish bycatch, per trip limit is the sum of 33% (by weight) of all flatfish except arrowtooth flounder, plus 10% (by weight) of arrowtooth flounder, not to exceed 7,500 lb/trip and 15,000 lb/ 2 months.		Without flatfish, 1,500 lb / month. As flatfish bycatch, per trip limit is the sum of 33% (by weight) of all flatfish except arrowtooth flounder, plus 10% (by weight) of arrowtooth flounder, not to exceed 2,500 lb/trip and 20,000 lb/ 2 months.	
Bocaccio-South 6/	300 lb / month		500 lb / month		300 lb / month	
Chilipepper-South 6/						
mid-water trawl	25,000 lb / 2 months					
small footrope trawl	7,500 lb / 2 months					
Cowcod - South						
Retention is Prohibited						

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 51 of 58)

Minor Nearshore rockfish			
North	200 lb / month		
South	200 lb / month		
Lingcod	No Retention	400 lb / month; 24-inch size limit 7/	No Retention

1/ These trip limits apply coastwide unless otherwise specified. North means 40° 10' N. lat. to the US-Canada border. "South" means 40° 10' N. lat. to the US-Mexico border.
 40° 10' N. lat. is about 20 nautical miles south of Cape Mendocino CA.
 2/ Gear requirements and prohibitions are explained above.
 3/ Other flatfish means all flatfish listed at 50 CFR 660.302 except those in this Table with a trip limit.
 4/ The whiting "per trip" limit in the Eureka area inside 100 fm is 10,000 lb / trip throughout the year. The 20,000 lb/trip limit applies before and after the primary season.
 5/ Small footrope trawl is a bottom trawl net with a footrope no larger than 8 in. (20 cm) in diameter. Midwater gear also may be used; the footrope must be bare.
 6/ Yellowtail rockfish and POP (south) and bocaccio and chilipepper, rockfish (north) are included in trip limits for minor shelf rockfish in the appropriate area.
 7/ Lingcod must be greater than or equal to 24 in. (61 cm) total length.
 To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

Table 29-g. 2001 Trip Limits 1/ for Limited Entry Fixed Gear

Species/groups	JAN-FEB	MAR-APR	MAY-JUN	JULY-AUG	SEP-OCT	NOV-DEC
Minor slope rockfish						
North	1,500 lb / 2 months		1,500 lb / 2 months			1,500 lb / month
South	14,000 lb / 2 months		14,000 lb / 2 months			14,000 lb / month
Splitnose-South	8,500 lb/2 mo.		14,000 lb / 2 months			4,000 lb / month
Pacific ocean perch 5/	1,500 lb / month		2,500 lb / month			1,500 lb / month
Sablefish (daily-trip-limit fishery) 2/						
North of 36 ° N. lat.	300 lb / day, 2,700 lb / 2 months.					
South of 36 ° N. lat.	350 lb / day or 1 landing per week of up to 1,050 lb					
Longspine thornyhead	6,000 lb / 2 months		6,000 lb / 2 months			6,000 lb / month
Shortspine thornyhead	1,500 lb / month		1,500 lb / month			1,500 lb / month
Dover sole						
North	65,000 lb / 2 months		20,000 lb / 2 months			20,000 / month
South	35,000 lb / 2 months		35,000 lb / 2 months			35,000 / month
Flatfish - North						
Arrowtooth flounder	20,000 lb / trip		30,000 lb/ month for all flatfish except Dover sole.			20,000 lb / trip
Petrale sole	No restriction					No restriction
Rex sole	No Limit					No Limit
Other flatfish 2/	No Limit					No Limit
Flatfish - South						
Arrowtooth flounder	20,000 lb / trip		No Limit			20,000 lb / trip
Petrale sole						
No Limit						
Rex sole						
No Limit						
Other flatfish 2/						
No Limit						
Shoreside whiting 3/						
20,000 lb / trip		Primary Season			20,000 lb / trip	
Minor Shelf rockfish						
North	300 lb / month		1,000 lb / month			300 lb / month
South						
40°10'-36°27' N. lat.	500 lb / month	CLOSED 4/		1,000 lb / month		500 lb / month
South of 34°27' N. lat.	CLOSED 4/	500 lb / month				
Canary-Coastwide						
North	100 lb / month		300 lb / month			100 lb / month
South						
40°10'-34°27' N. lat.	100 lb / month	CLOSED 4/		300 lb / month		100 lb / month
South of 34°27' N. lat.	CLOSED 4/	100 lb / month				
Widow rockfish Coastwide:						
North	3,000 lb / month					
South						
40°10'-34°27' N. lat.	3,000 lb/month	CLOSED 4/		3,000 lb / month		
South of 34°27' N. lat.	CLOSED 4/	3,000 lb/month				
Yellowtail-North 5/						
1,500 lb / month						
Bocaccio-South 5/						

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 52 of 58)

40°10'-34°27' N. lat.	300 lb / month	CLOSED 4/		500 lb / month	300 lb / month
South of 34°27' N. lat.	CLOSED 4/	300 lb / month			
Chilipepper-South 5/					
40°10'-34°27' N. lat.	2,500 lb /month	CLOSED 4/		2,500 lb / month	
South of 34°27' N. lat.	CLOSED 4/	2,500 lb/month			
Cowcod	CLOSED 4/ - All Retention is Prohibited				
Minor Nearshore rockfish					
North	10,000 lb/2 months, of which no more than 4,000 lb may be species other than black or blue rockfish 6/				
South					
40°10'-34°27' N. lat.	2,000 lb / 2 months	CLOSED 4/	Shoreward of 20 fathoms, 2,000 lb / 2 months, otherwise CLOSED 4/	2,000 lb / 2 months	
South of 34°27' N. lat.	Shoreward of 20 fathoms, 2,000 lb / 2 months, otherwise CLOSED 4/	2,000 lb / 2 months			
Lingcod 7/					
North	CLOSED 4/		400 lb / month		CLOSED 4/
South					
40°10'-34°27' N. lat.	CLOSED 4/			400 lb / month	CLOSED 4/
South of 34°27' N. lat.	CLOSED 4/		400 lb / month		CLOSED 4/

1/ Trip limits apply coastwide unless otherwise specified. North is 40° 10' N. lat. to the US-Canada border. South is 40° 10' N. lat. to the US-Mexico border.

2/ Other flatfish means all flatfish listed at 50 CFR 660.302 except those in this Table with a trip limit.

3/ The whiting "per trip" limit in the Eureka area for catch inside 100 fathoms is 10,000 lb / trip throughout the year.

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

5/ Yellowtail rockfish and POP (south) and bocaccio and chilipepper rockfish (north) are included in trip limits for minor shelf rockfish in the appropriate area.

6/ The "per trip" limit for black rockfish off Washington also applies.

7/ The size limit for lingcod is 24 in. (61 cm) in the north and 26 in. (66 cm) in the south, total length.

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

Trip Limits in the Open Access Fishery

Open access gear is gear used to take and retain groundfish from a vessel that does not have a valid permit for the Pacific coast groundfish fishery with an endorsement for the gear used to harvest the groundfish. This includes longline, trap, pot, hook-and-line (fixed or mobile), set net (south of 38° N. lat. only), and exempted trawl gear (trawls used to target non-groundfish species: pink shrimp or prawns, and, south of Pt. Arena, CA (38° 57'30" N. lat.), California halibut or sea cucumbers). Unless otherwise specified, a vessel operating in the open access fishery is subject to, and must not exceed any trip limit, frequency limit, and/or size limit for the open access fishery. The crossover provisions that apply to the limited entry fishery apply to the open access fishery as well.

Table 29-h. 2000 Trip Limits for All Open Access Gear Except Exempted Trawl Gear

Species/groups	JAN-FEB	MAR-APR	MAY-JUN	JULY-AUG	SEP-OCT	NOV	DEC
Minor slope rockfish							
North	500 lb / 2 months						
South	5,000 lb / 2 months						
Splitnose-South	200 lb / month						
POP 4/	100 lb / month						
Sablefish							
North of 36 °	300 lb / day, 2,700 lb / 2 months						
South of 36 °	350 lb / day						
Thornyheads (longspine and shortspine combined)							
North of 34°27' N. lat.	CLOSED 3/ - Retention is prohibited						
South of 34°27' N. lat.	50 lb / day, no more than 2,000 lb / 2 months						
Arrowtooth	200 lb / month						
Dover sole	(included in "other" flatfish limit)						
Petrale sole	(included in "other" flatfish limit)						
Near-shore flatfish	(included in "other" flatfish limit)						
"Other" flatfish 2/	300 lb / month						
Shoreside whiting	300 lb / month						
Minor Shelf Rockfish							
North	100 lb / month						

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 53 of 58)

South				
40°10-34°27' N. lat.	200 lb / month	CLOSED 3/		200 lb / month
South of 34°27' N. lat.	CLOSED 3/	200 lb / month		
Canary				
North 50 lb / month				
South				
40°10-34°27' N. lat.	50 lb / month	CLOSED		50 lb / month
South of 34°27' N. lat.	CLOSED	50 lb / month		
Widow				
North 3,000 lb / month				
South				
40°10-34°27' N. lat.	3,000 lb / month	CLOSED		3,000 lb / month
South of 34°27' N. lat.	CLOSED	3,000 lb / month		
Yellowtail-North 4/ 100 lb / month				
Bocaccio - South 4/				
40°10-34°27' N. lat.	200 lb / month	CLOSED		200 lb / month
South of 34°27' N. lat.	CLOSED	200 lb / month		
Chilipepper-South 4/				
40°10-34°27' N. lat.	2,500 lb / month	CLOSED 3/		2,500 lb / month
South of 34°27' N. lat.	CLOSED	2,500 lb / month		
Cowcod CLOSED 3/ - Retention is Prohibited				
Minor Nearshore Rockfish				
North 6/ 3,000 lb / 2 months, of which no more than 900 lb may be species other than black or blue rockfish 5/				
South				
40°10-34°27' N. lat.	1,800 lb / 2 months	CLOSED 3/	Shoreward of 20 fathom depth: 1,800 lb / 2 months, otherwise CLOSED 3/	1,800 lb / 2 months
South of 34°27' N. lat.	Shoreward of 20 fathom depth: 1,800 lb / 2 months, otherwise CLOSED 3/	1,800 lb / 2 months		
Lingcod 7/				
North		CLOSED 3/	400 lb / month	CLOSED 3/
South				
40°10-34°27' N. lat.	CLOSED 3/		400 lb / month	CLOSED 3/
South of 34°27' N. lat.	CLOSED 3/	400 lb / month		CLOSED 3/

1/ Trip limits apply coastwide unless otherwise specified. North is 40° 10' N. lat. to the US-Canada border. South is 40° 10' N. lat. to the US-Mexico border.

2/ Other flatfish means all flatfish listed at 50 CFR 660.302 except those in this Table with a trip limit.

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

4/ Yellowtail rockfish and POP (south) and bocaccio and chilipepper rockfish (north) are included in trip limits for minor shelf rockfish in the appropriate area.

5/ The "per trip" limit for black rockfish off Washington also applies.

6/ See text for limits specific to Pacific City, Oregon.

7/ The size limit for lingcod is 24 in. (61 cm) in the north and 26 in. (66 cm) in the south, total length.

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

All open access gear except exempt trawl gear. The trip limits, size limits, seasons, and other management measures for open access groundfish gear, except exempted trawl gear, are listed in Table 29. h. The trip limit at 50 CFR 660.323(a)(i) for black rockfish caught with hook-and-line gear also applies.

Groundfish taken by exempted trawl gear (e.g., by vessels engaged in fishing for spot and ridgeback prawns, California halibut, and sea cucumbers).

(i) Trip limits. No more than 300 lb (136 kg) of groundfish may be taken per vessel per fishing trip. Limits and closures in Table 29. d. also apply and are counted toward the 300 lb (136 kg) groundfish limit. In any landing by a vessel engaged in fishing for spot and ridgeback prawns, California halibut, or sea cucumbers with exempted trawl gear, the amount of groundfish landed may not exceed the amount of the target species landed, except that the amount of spiny dogfish (*Squalus acanthias*) landed may exceed the amount of target species landed. Spiny dogfish are limited by the 300 lb (136 kg) per trip overall groundfish limit. The daily-trip-limits for sablefish and thornyheads south of Pt. Conception, and the overall groundfish "per trip" limit may not be multiplied by the number of days of the fishing trip.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 54 of 58)

(ii) State law. These trip limits are not intended to supersede any more restrictive state law relating to the retention of groundfish taken in shrimp or prawn pots or traps.

(iii) Participation in the California halibut fishery. A trawl vessel will be considered participating in this fishery if:

(a) It is not fishing under a valid limited entry permit issued under 50 CFR part 660.333 for trawl gear;

(b) All fishing on the trip takes place south of Pt. Arena; and

(c) The landing includes California halibut of a size required by California Fish and Game Code section 8392(a), which states: "No California halibut may be taken, possessed or sold which measures less than 22 in. (56 cm) in total length, unless it weighs 4 pounds or more in the round, 3 and one-half pounds or more dressed with the head on, or 3 pounds or more dressed with the head off. Total length means the shortest distance between the tip of the jaw or snout, whichever extends farthest while the mouth is closed, and the tip of the longest lobe of the tail, measured while the halibut is lying flat in natural repose, without resort to any force other than the swinging or fanning of the tail."

(iv) Participation in the sea cucumber fishery. A trawl vessel is considered to be participating in the sea cucumber fishery if:

(a) It is not fishing under a valid limited entry permit issued under 50 CFR part 660.333 for trawl gear;

(b) All fishing on the trip takes place south of Pt. Arena; and

(c) The landing includes sea cucumbers taken in accordance with California Fish and Game Code section 8396, which requires a permit issued by the State of California.

Groundfish taken with exempted trawl gear by vessels engaged in fishing for pink shrimp. The trip limit for a vessel engaged in fishing for pink shrimp is 500 lb (227 kg) of groundfish per day, multiplied by the number of days of the fishing trip, but not to exceed 1,500 lb (907 kg) of groundfish per trip. The following sublimits also apply and are counted toward the overall 500 lb (227 kg) per day and 1,500 lb (907 kg) per trip groundfish limits:

(i) Canary rockfish:

(a) April 1 through 30, 2001: 50 lb (23 kg) per month

(b) Starting May 1, 2001: 200 lb (91 kg) per month

(ii) Lingcod:

(a) April 1 through 30, 2001: closed

(b) Starting May 1, 2001: 400 lb (181 kg) per month, with a minimum size limit (total length) of 24 inches (61 cm) north of 40°10' N. lat. and 26 inches (66 cm) south of 40°10' N. lat.

(c) November 1 through December 31: closed.

(iii) Sablefish: Starting April 1, 2001: 2,000 lb (907 kg) per month.

(iv) Thornyheads: Closed north of Pt. Conception (34°27' N. lat.)

All other groundfish species taken with exempted trawl gear by vessels engaged in fishing for pink shrimp are managed under the overall 500 lb (227 kg) per day and 1,500 lb (907 kg) per trip groundfish limits.

Operating in pink shrimp and other fisheries during the same cumulative trip limit period. A vessel that takes and retains pink shrimp and also takes and retains groundfish in either the limited entry or another open access fishery during the same applicable cumulative limit period that it takes and retains pink shrimp (which may be 1 month or 2 months, depending on the fishery and the time of year), the vessel may retain the larger

of the two limits, but only if the limit(s) for each gear or fishery are not exceeded when operating in that fishery or with that gear. The limits are not additive; the vessel may not retain a separate trip limit for each fishery.

Landings in Pacific City, OR. For these purposes, Pacific City, OR, is the area between 45°03'50" N. lat. and 45°20'15" N. lat.

(i) January 1 to March 31, 2001; October 1 to December 31, 2001: No more than 200 lb (91 kg) of minor nearshore rockfish may be landed per month in Pacific City, OR.

(ii) April 1 to September 30, 2001: No more than 2,200 lb (998 kg) of minor nearshore rockfish may be landed per month in Pacific City, OR. Within the 2,200 lb (998 kg) monthly limit, no more than 700 lb (318 kg) may be species other than black or blue rockfish.

Recreational Fishery

California. For each person engaged in recreational fishing seaward of California, the following seasons and bag limits apply:

(i) Cowcod conservation areas. Recreational fishing for groundfish is prohibited within the Cowcod Conservation Areas, as described above at IV.A.(20), except that fishing for minor nearshore rockfish is permissible in waters inside of the 20-fathom (36.9 m) depth contour.

(ii) Seasons.

(a) Rockfish. North of 40°10' N. lat., recreational fishing for rockfish is open from January 1 through December 31. South of 40°10' N. lat. and north of Point Conception (34°27' N. lat.), recreational fishing for rockfish is closed from March 1 through

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 55 of 58)

April 30. This area is also closed to recreational rockfish fishing from May 1 through June 30, except that fishing for minor nearshore rockfish is permitted inside the 20-fathom (36.9 m) depth contour. South of Point Conception (34°27' N. lat.), recreational fishing for rockfish is closed from January 1 through February 28, except that fishing for minor nearshore rockfish is permitted inside the 20-fathom (36.9 m) depth contour. Recreational fishing for cowcod is prohibited all year in all areas.

(b) Lingcod. South of Cape Mendocino and north of 34°27' N. lat., recreational fishing for lingcod is closed from March 1 through June 30. South of 34°27' N. lat., recreational fishing for lingcod is closed from January 1 through February 28.

(iii) Bag limits, boat limits, hook limits.

(a) Rockfish. In times and areas when the recreational season for rockfish is open, there is a 2-hook limit per fishing line, and the bag limit is 10 rockfish per day (excluding California scorpionfish), of which no more than 2 may be bocaccio (*Sebastes paucispinis*) and no more than 1 may be canary rockfish (*S. pinniger*). Cowcod (*S. levis*) can not be retained. Bocaccio and canary rockfish are not minor nearshore rockfish and thus, may not be retained in the areas between 40°10' N. lat. and Point Conception (34°27' N. lat.) from May 1 through June 30. Multi-day limits are authorized by a valid permit issued by California and must not exceed the daily limit multiplied by the number of days in the fishing trip.

(b) Lingcod. In times and areas when the recreational season for lingcod is open, there is a 2-hook limit per fishing line, and the bag limit is 2 lingcod per day. Multi-day limits are authorized by a valid permit issued by California and must not exceed the daily limit multiplied by the number of days in the fishing trip.

(iv) Size limits. The following total length size limits apply: bocaccio may be no smaller than 10 in. (25 cm), lingcod (*Ophiodon elongatus*) may be no smaller than 26 in. (66 cm), cabezon (*Scorpaenichthys marmoratus*) may be no smaller than 15 in. (36 cm), kelp greenling (*Hexagrammos decagrammus*) may be no smaller than 12 in. (30 cm), and California scorpionfish (*Scorpaena guttata*) no smaller than 10 in. (25 cm).

(v) Dressing/Fileting. Rockfish skin may not be removed when fileting or otherwise dressing rockfish taken in the recreational fishery. The following rockfish filet size limits apply: bocaccio filets may be no smaller than 5 in. (12.8 cm); California scorpionfish filets may be no smaller than 5 in. (12.8 cm) and brown-skinned rockfish filets may be no smaller than 6.5 in. (16.6 cm). "Brown-skinned" rockfish include the following species: brown (*S. auriculatus*), calico (*S. dalli*), copper (*S. caurinus*), gopher (*S. camatus*), kelp (*S. atrovirens*), olive (*S. serranoides*), speckled (*S. ovalis*), squarespot (*S. hopinski*), and yellowtail (*S. flavidus*). Cabezon and kelp greenling taken in the recreational fishery may not be fileted at sea. Lingcod filets may be no smaller than 18 in. (46.1 cm).

Oregon. The bag limits for each person engaged in recreational fishing seaward of Oregon are: 1 lingcod per day, which may be no smaller than 24 in. (61 cm) TL; and 10 rockfish per day, of which no more than 1 may be canary rockfish.

Washington. For each person engaged in recreational fishing seaward of Washington, the following seasons and bag limits apply:

(i) Rockfish. There is a rockfish bag limit of no more than 10 rockfish per day, of which no more than 2 may be canary rockfish or yelloweye rockfish (*S. ruberrimus*).

(ii) Lingcod. Recreational fishing for lingcod is closed between January 1, 2001 and March 15, 2001, and between October 15, 2001 and December 31, 2001. When the recreational season for lingcod is open, there is a bag limit of 2 lingcod per day, which may be no smaller than 24 in. (61 cm) TL.

Washington Coastal Tribal Fisheries

Sablefish. The allocation is 669 mt, 10% of the OY minus 3% for discard mortality.

Rockfish.

(i) For the commercial harvest of black rockfish off Washington State, a harvest guideline of: 20,000 lb (9,072 kg) north of Cape Alava (48° 09'30" N. lat.) and 10,000 lb (4,536 kg) between Destruction Island (47° 40'00" N. lat.) and Leadbetter Point (46° 38'10" N. lat.).

(ii) Thornyheads are subject to a 300 lb (136 kg) trip limit.

(iii) Canary rockfish are subject to a 300 lb (136 kg) trip limit.

(iv) As published in this notice. The limits will not change unless the tribal limits are separately changed.

Lingcod. Subject to a 300 lb (136 kg) trip limit.

Pacific whiting. The allocation is 27,500 mt.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 56 of 58)

Exempted Fishing Permits

Because whiting deteriorates rapidly, it must be handled quickly and immediately chilled to maintain the quality. As a result, many vessels dump catch directly or near directly into the hold and are unable to effectively sort their catch. The issuance of EFPs will allow vessels to delay sorting of prohibited species and groundfish caught in excess of cumulative trip limits until offloading. Delaying sorting until the vessel offloads will allow state biologists to collect incidental catch data for total catch estimates while maintaining whiting quality. Without an EFP, groundfish regulations at 50 CFR 660.306(b) require vessels to sort out prohibited species and return them to sea as soon as practicable with minimum injury. To allow state biologists to sample unsorted whiting, it is also necessary to include provisions for potential overages of groundfish trip limits which would be otherwise prohibited by regulations at 50 CFR 660.306 (h). NMFS approves the request to renew the EFP for the shore-based whiting fishery in 2001.

Effective May 1, 2001

Limited Entry Trawl Gear Limits for Flatfish North of 40°10' N. lat.: For the May to June period, the limit will be increased to a 50,000-lb (22,680 kg) per month limit for all flatfish except Dover sole, of which no more than 15,000 lb (6,804 kg) may be petrale sole and no more than 10,000 (4,536 kg) may be arrowtooth flounder. The large footrope trawl allowance for arrowtooth flounder will be set at 15,000 lb (6,804 kg) per trip for May.

Limited Entry Fixed Gear and Open Access Minor Nearshore Rockfish North of 40°10' N. lat.: For the May to December period, the limited entry fixed gear limit for minor nearshore rockfish north will be reduced to 7,000 lb (3,175 kg) per 2-month period, no more than 4,000 lb (1,814 kg) of which may be species other than black or blue rockfish. The current open access limit for minor nearshore rockfish north will be increased to 7,000 lb (3,175 kg) per 2-month period, no more than 900 lb (408 kg) of which may be species other than black or blue rockfish.

Open Access Fishery for Minor Nearshore Rockfish South of 40°10' N. lat.: The 2-month cumulative limit for the fishery south of 34°27' N. lat. for the March to December period will be reduced to 1,200 lb (544 kg) per 2 months. The 2-month cumulative limit for the fishery occurring between 40°10' N. lat. and 34°27' N. lat. shoreward of the 20 fathom depth contour for the May to June period will be reduced to 1,200 lb (544 kg) per 2 months; otherwise, this area is closed to nearshore rockfish until July 1, 2001. For the July to December period, the 2-month cumulative limit for the fishery occurring south of 40°10' N. lat. will be reduced to 1,200 lb (544 kg).

Open Access for Yellowtail Rockfish Taken with Salmon Troll Gear North of 40°10' N. lat.: The monthly cumulative limit for yellowtail rockfish caught in the salmon troll fishery is 300 lb (136 kg). If a vessel fishes with more than one open access gear type, then this limit cannot be added to the general 100 lb (45 kg) per month open access limit. Vessels are restricted from landing yellowtail (round weight) in excess of one half the weight of salmon (dressed weight) being landed.

Effective July 1, 2001

Limited Entry Trawl and Fixed Gear for Minor Slope Rockfish North and South of 40°10' N. lat.: The cumulative landing limits for the fishery south of 40°10' N. lat. is increased to 25,000 lb (11,340 kg) per 2 months. The cumulative landing limits for the fishery north of 40°10' N. lat. is increased to 2,000 lb (907 kg) per 2 months.

Limited Entry Trawl and Fixed Gear for Splitnose Rockfish South of 40°10' N. lat.: The splitnose slope rockfish cumulative landing limits for both trawl and fixed gear south of 40°10' N. lat. is increased to 25,000 lb (11,340 kg) per 2 months.

Limited Entry Trawl and Fixed Gear for POP: The limited entry POP cumulative landing limits for both trawl and fixed gear is increased to 3,500 lb (1,588 kg) per month for the July through October periods.

Limited Entry Trawl and Fixed Gear for Dover Sole North and South of 40°10' N. lat.: The limited entry Dover sole cumulative landing limits for both trawl and fixed gear south of 40°10' N. lat. is increased to 30,000 lb (13,608 kg) per 2 months for the July through August period, and to 30,000 lb (13,608 kg) per month for the September through December periods. The limited entry Dover sole cumulative landing limits for both trawl and fixed gear north of 40°10' N. lat. is increased to 15,000 lb (6,804 kg) per 2 months for the July through August period and to 15,000 lb (6,804 kg) per month for the September through December periods.

Limited Entry Trawl and Fixed Gear for Flatfish North of 40°10' N. lat.: The small footrope trawl limit is decreased to 45,000 lb (20,412 kg) per month; the sub-limit for petrale sole remains at 14,000 lb (6,804 kg) per month. The arrowtooth flounder limit is no longer a sub-limit and is changed to a per trip limit of no more than 7,500 lb (3,402 kg), not to exceed 30,000 lb (13,608 kg) per month. The large footrope limit for petrale sole, which was prohibited, is increased to 100 lb (45 kg) per trip. The limited entry fixed gear limits for flatfish are the same as the small footrope trawl limits.

Limited Entry Trawl for Yellowtail Rockfish North of 40°10' N. lat. and Widow Rockfish: The mid-water trawl limit for widow rockfish is 1,000 lb per month for July through September, unless trips include 10,000 lb or more of whiting, then 2,000 lb per month with a combined widow-yellowtail limit of 500 lb per trip; 10,000 lb per month in October (same as the small footrope limit). The mid-water trawl limit for yellowtail rockfish is 1,500 lb per month for July through September, unless trips include 10,000 lb or more of whiting, then 3,000 lb per month with a combined widow-yellowtail limit of 500 lb per trip; 15,000 lb per month in October (same as the small footrope limit).

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 57 of 58)

Limited Entry Fixed Gear and Open Access for Sablefish North of 36° N. lat.: The landing limits for the limited entry fisheries north of 36° N. lat. for the July to August period is 300 lb (136 kg) per day or one landing per week of up to 900 lb (408 kg), not to exceed 3,600 lb (1,633 kg) per 2 months. For September through December the limit is 1,800 lb (816 kg) per month. The landing limits for the open access fisheries north of 36° N. lat. for July through August is 300 lb (136 kg) per day or one landing per week of up to 800 lb (408 kg), not to exceed 4,800 lb (2,177 kg) per 2 months. For September through December the limit is 2,400 lb (1,089 kg) per month.

Effective August 21, 2001

The primary season for the shore-based sector ends at noon August 21. Per-trip limits are reimposed at that time.

Effective September 1, 2001

NMFS reapports 10,000 mt of surplus whiting from the tribal allocation to the catcher/processor, mothership, and shore-based sectors in the same proportions as each sector's allotted portion of the commercial OY.

Effective September 26, 2001

Closure of the 2001 primary season for the shore-based fishery for Pacific whiting and resumption of the 20,000 lb per trip limit at 8 p.m. local time.

Effective October 1, 2001

Taking and retaining, possessing or landing is prohibited for all of the following:

Limited entry trawl DTS complex (Dover sole, shortspine and longspine thornyhead, and sablefish) coastwide;

Limited entry trawl and open access minor slope rockfish north of 40°10' N. lat.;

Limited entry trawl and fixed gear and open access Pacific ocean perch and canary rockfish coastwide;

Limited entry trawl and fixed gear and open access bocaccio rockfish south of 40°10' N. lat.

Limited entry trawl and fixed gear and open access shelf rockfish, including minor shelf rockfish, widow rockfish, and yellowtail rockfish, coastwide;

Limited entry fixed gear and open access chilipepper rockfish south of 40°10' N. lat.

Closures in the open access fisheries apply to all gears, including exempted trawl gear fisheries.

The following trip limit adjustments apply:

For October, the limited entry small footrope trawl limit for flatfish other than Dover sole, rex sole, and arrowtooth flounder coastwide will remain at 45,000 lb per month, of which no more than 15,000 lb may be petrale sole. The limited entry large footrope trawl limit for flatfish other than Dover sole, rex sole, and arrowtooth flounder coastwide will remain at 1,000 lb per trip, of which no more than 100 lb per trip may be petrale sole.

During the November December period, the coastwide small footrope trawl limit for flatfish other than Dover sole, rex sole, and arrowtooth flounder coastwide is 30,000 lb per month and the large footrope trawl limit will remain at 1,000 lb per trip. The petrale sole limit for small and large footrope gear is 30,000 lb per month. No vessel may have more than one cumulative limit per period.

The limited entry small and large footrope trawl limits for arrowtooth flounder coastwide is decreased to 5,000 lb per trip limit and 30,000 lb per month.

The current limited entry mid-water trawl cumulative limits for yellowtail rockfish, north of 40°10' N. lat., and widow rockfish are extended through the month of October (3,000 lbs per /month yellowtail, 2,000 lbs per month widow, but no more than 500 lbs combined yellowtail and widow rockfish per trip, if landed with at least 10,000 lbs of whiting; otherwise 1,000 lbs per month). During the November and December period, the limited entry mid-water trawl limit for yellowtail rockfish north of 40°10' N. lat. is 15,000 lb per two months and 25,000 lb per two months for widow rockfish.

The current limited entry small footrope trawl limit for yellowtail rockfish taken as bycatch with flatfish north of 40°10' N. lat., is equal to the sum of 33% (by weight) of all flatfish except arrowtooth flounder, plus 10% (by weight) of arrowtooth flounder not to exceed 7,500 lb per trip and not to exceed 15,000 per two months, and is extended through the November and December period.

The limited entry small footrope trawl limit for chilipepper rockfish taken south of 40°10' N. lat. is decreased to 5,000 lb per two months for the November and December period.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 58 of 58)

The limited entry trawl trip limits for minor shelf rockfish will decrease north of 40°10' N. lat. to 300 lb per month and south of 40°10' N. lat. to 500 lb per month.

The limited entry fixed gear and open access trip limits for minor nearshore rockfish taken north of 40°10' N. lat. will be 2,000 lb per month, no more than 800 lb of which may be species other than black or blue rockfish, and south of 40°10' N. lat. will be 3,000 lb per two months starting in October.

The limited entry trawl and fixed gear and open access trip limits for lingcod coastwide will increase to 500 lb per month during October. Lingcod retention is prohibited in any fishery in November and December.

Effective October 29, 2001

Closure of the recreational fishery for rockfish and lingcod off California south of 40°10' N. lat. and seaward of the 20 fathom (36.9 m) depth contour through December 31, 2001.

Effective November 13, 2001

Closure of the 2001 at-sea catcher/processor fishery for Pacific whiting at 6 p.m. local time.

Effective December 1, 2001

The limited entry trawl landing limit for Dover sole is 1,000 lb per trip.

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

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

Sources: 1982 - 47 FR 43964 (October 5, 1982) and 48 FR 8542 (February 14, 1983)

1983 - 48 FR 6715 (February 15, 1985)

1984 - 49 FR 1060 (January 9, 1984) and 49 FR 27518 (July 5, 1984)

1985 - 50 FR 471 (January 4, 1985)

1986 - 51 FR 1255 (January 10, 1986) and 51 FR 12622 (April 14, 1986)

1987 - 52 FR 682 (January 8, 1987) and 52 FR 31034 (August 19, 1987)

1988 - 53 FR 248 (January 6, 1988)

1989 - 54 FR 32 (January 3, 1989)

1990 - 55 FR 1036 (January 11, 1990)

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

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

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

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

b/ Total all areas.

c/ Monterey Bay only.

d/ There are insufficient data to calculate an ABC.

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

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

g/ All areas north of 39°N latitude.

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

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

* No change from 1983.

a/ U.S. portion.

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

c/ Total all areas.

d/ Monterey Bay only.

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

f/ All areas north of 39° N latitude.

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

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

a/ U.S. portion.

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

c/ Total all areas.

d/ Monterey Bay only.

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

f/ All areas north of 39°N latitude.

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

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

a/ U.S. portion.

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

c/ Total all areas.

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

e/ All areas north of 39° N latitude.

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

Species	Vancouver ^{a/}	Columbia	Eureka	Monterey	Conception	Total
Roundfish						
Lingcod	1,000	4,000	500 ^{b/}	1,100 ^{b/}	400 ^{b/}	7,000
Pacific Cod	2,200	900	-	-	-	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 ^{b/}	2,000 ^{b/}	6,100
Canary	800	2,100	600	-	-	3,500
Chilipepper ^{c/}	-	-	-	b/	b/	3,600
Yellowtail	1,100	2,600 ^{d/}	300	-	-	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, rattfish, morids, grenadiers, jack mackerel, and arrowtooth flounder.

f/ All areas north of 39° N latitude.

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

Species	Source ^{a/}	Vancouver ^{b/}	Columbia	Eureka	Monterey	Conception	Total
Roundfish							
Lingcod	FMP	1,000	4,000	500 ^{c/}	1,100 ^{c/}	400 ^{c/}	7,000
Pacific Cod	FMP	2,200	900				3,100
Pacific Whiting ^{d/}	FMP	-	-	-	-	-	327,000
Sablefish ^{e/}	1987	-	-	-	-	-	10,000
Rockfish							
Pacific Ocean Perch ^{e/}	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 ^{c/}	2,000 ^{c/}	6,100
Canary		800	2,100	600			3,500
Chilipepper ^{e/}	1986	-	-	-	c/	c/	3,600
Yellowtail	1985	1,100	2,600 ^{f/}	300			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, rattfish, morids, grenadiers, jack mackerel, and arrowtooth flounder.

h/ All areas north of 39° N latitude.

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

Species	Source ^{a/}	Vancouver ^{b/}	Columbia	Eureka	Monterey	Conception	Total	1988
Roundfish								
Lingcod	FMP	1,000	4,000	500 ^{c/}	1,100 ^{c/}	400 ^{c/}	7,000	7,000
Pacific Cod	FMP	-	-	-	-	-	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 ^{c/}	2,000 ^{c/}	6,100	6,100
Canary		800	2,100	600	-	-	3,500	3,500
Chilipepper ^{d/}	1986	-	-	-	c/	c/	3,600	3,600
Yellowtail	1988	1,100 ^{f/}	2,900 ^{g/}	300	-	-	4,300	4,000
Remaining Rockfish	1984	800	3,700	1,900	4,300	3,300	14,000	14,000
Flatfish								
Dover Sole	1984	2,400	11,500	8,000	5,000	1,000	27,900	27,900
English Sole ^{d/}	1986	-	-	-	-	-	1,900	1,900
Petrale Sole	1987	600	1,100	500	800	200	3,200	3,200
Other Flatfish	FMP	700	3,000	1,700	1,800	500	7,700	7,700
Other Fish^{h/}								
Jack Mackerel ^{i/}	FMP	-	-	-	-	-	12,000	12,000
Others	1984	2,500	7,000	1,200	2,000	2,000	14,700	14,700

a/ Date refers to the date of the Council status of stocks document.

b/ U.S. portion.

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

d/ Total all areas.

e/ Combined U.S. and Canadian waters. About 75% of the harvestable stock or 225,000 mt is expected to occur in U.S. waters in 1989.

f/ U.S. portion of the Vancouver area, based on 50% of the total area stock.

g/ Includes 100 mt designated for southern most portion of Columbia area and subject to different trip limit regulations.

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

i/ All areas north of 39° N latitude.

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

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

a/ Date refers to the date of the Council status of stocks document.

b/ U.S. portion.

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

d/ Total all areas.

e/ Combined U.S. and Canadian waters. About 70 to 80 percent of the harvestable stock or 172,000 to 196,000 mt is expected to occur in U.S. waters in 1989.

f/ The FMP limits ABC increases to 30 percent per year; 13,000 mt is below the ABC of 13,900 to 43,000 mt recommended by the GMT.

g/ GMT recommended 7,900 mt; the Council set ABC at 8,900 mt and OY at 9,800 to 10,000 mt.

h/ U.S. portion of the Vancouver area, based on 50 percent of the total area stock.

i/ Includes 100 mt designated for southern most portion of Columbia area and subject to different trip limit regulations.

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

k/ All areas north of 39° N latitude.

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

Species	Vancouver ^{a/}	Columbia	Eureka	Monterey	Conception	Total	Harvest Guideline/ Quota ^{b/}
Roundfish							
Lingcod	1,000	4,000	500 ^{d/}	1,100 ^{d/}	400 ^{d/}	7,000	-
Pacific Cod ^{c/}	-	-	-	-	-	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	-	-	2,900	3,500
Chilipepper ^{c/}	-	-	-	d/	d/	3,600	3,600 ^{f/}
Yellowtail	1,200	3,100 ^{h/}	300	-	d/	4,600 ^{i/}	4,300 ^{f/}
Thornyhead	d/	3,200	1,300	1,400	-	7,900	-
Remaining Rockfish	800	3,700	1,900	4,300	3,300	14,000	14,000
Sebastes Complex	2,800	8,300	-	-	-	11,100	11,100
Flatfish							
Dover Sole	2,400	6,100	8,000	5,000	1,000	22,500	22,500
English Sole ^{c/}	-	-	-	-	-	1,900	-
Petrale Sole	600	1,100	500	800	200	3,200	-
Other Flatfish	700	3,000	1,700	1,800	500	7,700	-
Other Fish^{j/}							
Jack Mackerel ^{k/}	-	-	-	-	-	52,600	46,500
Others	2,500	7,000	1,200	2,000	2,000	14,700	-

a/ U.S. portion.

b/ All are harvest guidelines except Pacific whiting, shortbelly rockfish, and jack mackerel, which are quotas.

c/ Total all areas.

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

e/ The ABC is coastwide, including Canadian waters. The quota designated for all U.S. waters is based on 90% of the coastwide ABC.

f/ The harvest guideline is for the combined Columbia and Vancouver areas.

g/ Includes Eureka area, but its contribution is small, and recreational catch.

h/ Includes 100 mt designated for southern most portion of Columbia area and subject to different trip limit regulations.

i/ The Council set ABC above the GMT recommendation of 5,900 mt coastwide due to uncertainty in the assessment.

j/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and jack mackerel.

k/ All areas north of 39° N latitude. The quota was reduced to account for catches outside the management area.

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

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

a/ U.S. portion.

b/ Total all areas.

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

d/ Coastwide ABC including Canadian waters; harvest guideline for U.S. waters only.

e/ Vancouver and Columbia areas combined.

f/ The ABC is for these areas combined. For bocaccio, the Eureka area contribution is small.

g/ The thornyhead preliminary harvest guideline applies coastwide for the two species combined.

h/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and jack mackerel.

i/ All areas north of 39° N latitude. The 1991 quota was reduced to 46,500 mt to account for anticipated catches outside the management area.

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

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

a/ U.S. portion.

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

c/ Coastwide ABC including Canadian waters. Preliminary harvest guideline for 1993 is 80% of coastwide value.

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

e/ All areas north of 39° N latitude.

f/ The 1,550 mt harvest guideline applies to the Vancouver and Columbia areas combined.

g/ Total all areas.

h/ The harvest guideline applies to the Columbia and Vancouver areas.

i/ The ABC is for these areas combined. For bocaccio, the Eureka area contribution is small.

j/ The 1,540 mt harvest guideline applies to the Eureka, Monterey, and Conception areas.

k/ The thornyhead harvest guideline includes both species in the Monterey, Eureka, and Columbia areas.

l/ The Council adopted a 6,000 mt harvest guideline for the Columbia area in 1993. The 17,900 mt harvest guideline applies coastwide.

m/ Includes sharks, skates, rays, ratfish, morids, and grenadiers.

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

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

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

b/ U.S. portion.

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

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

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

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

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

- g/ The Pacific ocean perch harvest guideline applies to the Vancouver and Columbia areas combined. A discard factor of 16% was deducted from the 1993 harvest guideline to determine the 1994 harvest guideline.
- h/ Total all areas.
- i/ The Sebastes north harvest guideline applies to the Vancouver and Columbia areas and equals the sum of the ABCs in those areas: canary (2,300 mt), yellowtail (6,740 - 300 mt) and remaining rockfish (7,000 mt). The 300 mt subtracted from the yellowtail rockfish harvest guideline applies to the Eureka area.
- j/ The Sebastes south ABC and harvest guideline for the Eureka, Monterey, and Conception areas is the sum of the ABCs in those areas: bocaccio (1,540 mt), canary (600 mt), chilipepper (4,000 mt), yellowtail (300 mt), and remaining rockfish (7,000 mt). The bocaccio harvest guideline for commercial fisheries will be reduced 200 mt to account for anticipated recreational harvest.
- k/ The 1,540 mt bocaccio harvest guideline applies to the Eureka, Monterey and Conception areas.
- l/ The yellowtail rockfish assessment addresses three separate areas: Vancouver, Columbia north of Cape Lookout, and Columbia south of Cape Lookout plus Eureka. For this table, the Columbia ABC applies to north Columbia only, and the Eureka ABC applies to Eureka plus south Columbia. The total yellowtail rockfish ABC is divided into two harvest guidelines: 4,160 mt for Vancouver plus Columbia north of Cape Lookout, and 2,580 mt for Eureka plus Columbia south of Cape Lookout. Separate harvest guidelines are established for the Sebastes complex north and south of the Eureka-Columbia border. Therefore, 300 mt of the yellowtail rockfish southern harvest guideline is included in the southern Sebastes complex harvest guideline and the remainder of the yellowtail rockfish southern harvest guideline is included in the northern Sebastes harvest guideline. A 16% discard factor will be added to certain landings inseason. This will affect inseason landings estimates for Sebastes complex also.
- m/ The thornyhead harvest guideline includes both species in the Monterey, Eureka, and Columbia areas. A discard factor (eight percent) has been subtracted from the previous harvest guideline.
- n/ The reduction in the harvest guideline for Dover sole in the Columbia area to 5,000 mt in 1994 is the second step towards the 4,000 mt ABC in 1995. The 16,900 mt Dover sole harvest guideline applies coastwide.
- o/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and other groundfish species noted above in c/.

TABLE 43. Open access and limited entry allocations for 1994 (in metric tons).

Species	Harvest Guideline	Open Access		Limited Entry	
		Percent	Metric Tons	Percent	Metric Tons
Lingcod		4,000	17.40	700	82.60
Sablefish	Nontreaty	6,700	8.75	590	91.25
POP		1,300	0.40	10	99.60
Widow		6,500	3.80	250	96.20
Sebastes Complex ^{a/}	North	13,240	10.30	1,360	89.70
	South	13,440	34.50	4,640	65.50
Bocaccio		1,340	34.50	460	65.50
Yellowtail ^{b/}	North	4,160	10.30	430	89.70
	South	2,580	10.30	270	89.70

a/ North or South of the Columbia-Eureka border (43° N latitude).

b/ North or south of Cape Lookout (45°20'15" N latitude).

TABLE 44. Council ABCs and harvest guidelines for 1995 for the Washington, Oregon, and California region by management areas (in thousands of mt). Page 1 of 2.

Species	Acceptable Biological Catch						Harvest Guideline a/
	Vancouver ^{a/}	Columbia	Eureka	Monterey	Conception	Total	
Roundfish							
Lingcod	1.3		0.3	.7	0.1	2.4 ^{b/}	2.4
Pacific Cod	-	-		c/		3.2	
Whiting	-	-	-	-	-	223.0	178.4 ^{d/}
Sablefish		8.7			.425	9.1 ^{e/}	7.8
Jack Mackerel ^{f/}	-	-	-	-	-	52.6	52.6
Rockfish							
Pacific Ocean Perch	0.00000	0.00000		c/		0.00	1.3 ^{g/}
Shortbelly ^{h/}	-	-	-	-	-	23.5	23.5
Widow ^{i/}	-	-	-	-	-	7.7	6.5 ^{i/}
Sebastes Complex							
Northern area ^{j/}	-	-				11.9	11.8
Southern area ^{k/}			-	-	-	13.2	13.2
Bocaccio	c/			1.7 ^{l/}		1.7	1.7
Canary	1.0		0.25		c/	1.25	.85 ^{m/}
Chilipepper	c/			4.0		4.0	
Yellowtail ^{n/}	1.19	2.97	2.58		c/	6.74	4.16, 2.18
Remaining Rockfish	0.8	3.7		7.0		11.5	
Thornyheads	-	-	-	-	-	8.0 ^{o/}	o/
Shortspine	-	-	-	-	-	1.0	1.5
Longspine	-	-	-	-	-	7.0	6.0
Flatfish							
Dover Sole	2.4	3.0	2.9	5.0	1.0	14.3	2.85; ^{p/} 13.6
English Sole	2.0			1.1		3.1	
Petrale Sole	1.2		0.5	0.8	0.2	2.7	
Arrowtooth ^{h/}	-	-	-	-	-	5.8	
Other flatfish	0.7	3.0	1.7	1.8	0.5	7.7	
Other Fish ^{q/}	2.5	7.0	1.2	2.0	2.0	14.7	

TABLE 44. Council ABCs and harvest guidelines for 1995 for the Washington, Oregon, and California region by management areas (in thousands of mt) Page 2 of 2.

- a/ U.S. portion.
- b/ The lingcod assessment is for the entire Vancouver area, including Canada, and the Columbia area north of Cape Falcon. The U.S. ABC is based on 50% of the ABC for this area plus 400 mt for the Columbia area south of Cape Falcon. The coastwide harvest guideline equals the sum of the ABCs and includes recreational harvest of 900 mt. The remaining 1,500 mt is allocated for all commercial gears.
- c/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Other Fish" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the areas footnoted only.
- d/ Total whiting ABC for U.S. plus Canada. The 1995 U.S. harvest guideline is 80% of the total ABC. There is a shorebased reserve of 71,400 mt, 40% of the harvest guideline.
- e/ The 1995 sablefish ABC of 8,700 mt was calculated using a reduced estimated discard (900 mt), which is subtracted along with the Conception area ABC to obtain the harvest guideline. The harvest guideline applies to all areas except Conception; the ABC for that area is 425 mt.
- f/ All areas north of 39°N latitude, and includes the area beyond the EEZ (200nm).
- g/ The Pacific ocean perch harvest guideline applies to the Vancouver and Columbia areas combined. It is intended to allow landing of incidental and small directed catches, and includes an assumed discard factor of 16%.
- h/ Total all areas.
- i/ For 1995, a 16% discard factor is included in the ABC and subtracted out to obtain the harvest guideline.
- j/ The 1995 *Sebastes* north harvest guideline, which applies to the Vancouver and Columbia areas, is established by summing the ABCs (except for canary rockfish, where the harvest guideline is used) in those areas: canary (850 mt), yellowtail (6,740 mt minus 300 mt) and remaining rockfish (4,500 mt). The 300 mt subtracted from the yellowtail rockfish harvest guideline applies to the Eureka area. All discard is counted toward the harvest guideline.
- k/ The 1995 *Sebastes* south harvest guideline applies to the Eureka, Monterey, and Conception areas and equals the sum of the ABCs in those areas: bocaccio (1,700 mt), canary (250 mt), chilipepper (4,000 mt), yellowtail (300 mt), and remaining rockfish (7,000 mt). Anticipated recreational harvest of bocaccio will be deducted before limited entry/open access allocations are calculated.
- l/ The 1995 bocaccio harvest guideline is set equal to the sum of the three ABCs; no discard adjustment was made because few trips were impacted by the limits in 1994. Anticipated recreational harvest is subtracted before determining open access and limited entry allocations.
- m/ The 1995 ABC for canary rockfish in the combined Vancouver-Columbia area (1,000 mt) represents a 56% reduction from 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 from trip limit management.
- n/ For this table, the Columbia ABC applies to north Columbia only, and the Eureka ABC applies to Eureka plus south Columbia. The total 1995 yellowtail rockfish ABC is divided into two harvest guidelines: 4,160 mt for Vancouver plus Columbia north of Cape Lookout (close to Cape Falcon), and 2,580 mt for Eureka plus Columbia south of Cape Lookout. Separate harvest guidelines are established for the *Sebastes* complex north and south of the Eureka-Columbia border. Therefore, 300 mt of the yellowtail rockfish southern harvest guideline was included in the southern *Sebastes* complex harvest guideline and the remainder of the yellowtail rockfish southern harvest guideline was included in the northern *Sebastes* harvest guideline. As in 1994, a 16% discard factor will be added to certain landings inseason. This will affect inseason landings estimates for *Sebastes* complex also.
- o/ The 1995 ABCs and harvest guidelines for the two thornyhead species are coastwide north of Pt. Conception. The 1995 shortspine harvest guideline is above its ABC but below its overfishing level. The longspine harvest guideline is less than its ABC in order to ease management of shortspines and because of expected future declines in longspine ABC. A discard factor will be added to landings inseason, depending on what trip limits are adopted.
- p/ The GMT proposed ABC ranges for Dover sole in the Columbia area (1,700 mt to 3,800 mt) and the Eureka area (3,500 mt to 2,500 mt). The Council adopted ABCs of 3,000 mt and 2,900 mt, respectively. The coastwide and Columbia area harvest guidelines (13,600 mt and 2,850 mt) reflect a five percent discard deduction.
- q/ Includes sharks, skates, rays, rattfish, morids, grenadiers, and other groundfish species noted above in c/.

TABLE 45. Open access and limited entry allocations for 1995 (in thousands of metric tons).

Species	Harvest Guideline	Open Access		Limited Entry	
		Percent	Metric Tons (thousands)	Percent	Metric Tons (thousands)
Lingcod ^{a/}		19.1	0.29	80.9	1.21
Sablefish ^{b/}	Nontreaty	6.6	0.463	93.4	6.557
Widow		3.7	0.24	96.3	6.26
Sebastes Complex	North	9.6	1.13	90.4	10.67
	South	32.6	4.24	67.4	8.76
Bocaccio		32.6	0.49	67.4	1.01
Yellowtail	North	9.6	0.40	90.4	3.76
	South	9.6	0.25	90.4	2.33

a/ The commercial harvest guideline of 1,500 mt is calculated by subtracting anticipated recreational catch (900 mt) from the overall harvest guideline (2,400 mt).

b/ Tribal harvest (780 mt) is subtracted from the overall harvest guideline (7,800 mt) before allocations are calculated. The limited entry allocation is further subdivided between trawl (3,803 mt) and nontrawl (2,754 mt).

TABLE 46. Council ABCs and harvest guidelines for 1996 for the Washington, Oregon, and California region by management areas (in thousands of mt). Page 1 of 2

Species	Acceptable Biological Catch						1996 Harvest Guideline
	Vancouver ^{a/}	Columbia	Eureka	Monterey	Conception	Total	
Roundfish							
Lingcod ^{b/}	1.3		0.3	.7	0.1	2.4	2.4
Pacific Cod	-	-		c/		3.2	
Whiting ^{d/}	-	-	-	-	-	265.0	212.0
Sablefish ^{e/}			8.7		.425	9.1	7.8
Jack Mackerel ^{f/}	-	-	-	-	-	52.6	52.6
Rockfish							
Pacific OceanPerch ^{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							
Shortspine ^{o/}	-	-	-	-	-	8.0	
Shortspine ^{o/}	-	-	-	-	-	1.0	1.5
Longspine ^{o/}	-	-	-	-	-	7.0	6.0
Flatfish							
Dover Sole ^{p/ q/}	.82- 1.57	3.0	2.9	3.16- 4.36	1.0	10.88-12.83	11.05 2.85
English Sole	2.0			1.1		3.1	
Petrale Sole	1.2		0.5	0.8	0.2	2.7	
Arrowtooth ^{h/}	-	-	-	-	-	5.8	
Other flatfish	0.7	3.0	1.7	1.8	0.5	7.7	
Other Fish ^{r/}	2.5	7.0	1.2	2.0	2.0	14.7	

TABLE 46. Council ABCs and harvest guidelines for 1996 for the Washington, Oregon, and California region by management areas (in thousands of mt) Page 2 of 2.

- a/ U.S. portion.
- b/ The lingcod assessment is for the entire Vancouver area, including Canada, and the Columbia area north of Cape Falcon. The 1996 U.S. ABC is based on 50% of the ABC for this assessment area plus 400 mt for the Columbia area south of Cape Falcon. The 1996 harvest guideline equals the sum of the ABCs and includes estimated recreational harvest of 900 mt. The remaining 1,500 mt is for commercial harvest.
- c/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Other Fish" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the areas footnoted only.
- d/ The whiting ABC and harvest guideline were finalized at the March 1996 Council meeting. The harvest guideline is 80% of the coastwide ABC for harvest in U.S. waters.
- e/ The 1996 sablefish ABC includes 900 mt of estimated trawl discard, which was subtracted along with the 425 mt Conception area ABC to obtain the harvest guideline. The harvest guideline applies to all areas except Conception.
- f/ The jack mackerel harvest guideline includes all areas north of 39° N latitude, and includes the area beyond the EEZ (200nm).
- g/ The Pacific ocean perch harvest guideline applies to the Vancouver and Columbia areas combined. The Council's final recommendation is 750 mt, slightly below the overfishing level and projected 1995 catch, which is 800 mt.
- h/ The shortbelly rockfish ABC and harvest guideline are the total for all areas.
- i/ The widow rockfish ABC includes a 16% discard factor which is included in the ABC and subtracted out to obtain the harvest guideline.
- j/ The Sebastes north harvest guideline of 11,180 mt, which applies to the Vancouver and Columbia areas, is established by summing the ABCs (except for canary rockfish, where the harvest guideline is used) in those areas: canary (850 mt), yellowtail (6,740 mt coastwide minus 300 mt for the Eureka area minus 570 mt discard due to restrictive trip limits) and remaining rockfish (4,500 mt).
- k/ The Sebastes south harvest guideline (13,200 mt) applies to the Eureka, Monterey, and Conception areas and equals the sum of the ABCs in those areas: bocaccio (1,700 mt), canary (250 mt), chilipepper (4,000 mt), yellowtail in the Eureka area (300 mt), and remaining rockfish (7,000 mt). Recreational catch of bocaccio (200 mt) is subtracted to determine the commercial harvest guideline of 1,500 mt.
- l/ For bocaccio, no discard factor is deducted because few trips were impacted by the limits in recent years. Anticipated recreational harvest (200 mt) will be subtracted before determining open access and limited entry allocations.
- m/ The 1996 canary rockfish ABC for the Vancouver and Columbia areas combined (1,000 mt) is the same as in 1995. The 850 mt harvest guideline reflects a 150 mt reduction for anticipated discard.
- n/ The 1993 yellowtail rockfish assessment addressed three separate areas: U.S.-Vancouver, Columbia north of Cape Falcon, and Columbia south of Cape Falcon plus Eureka. For this table, the 2,970 mt Columbia ABC applies to north Columbia only, and the 2,580 mt Eureka ABC applies to Eureka plus south Columbia. The total 1996 yellowtail rockfish ABC is divided into two harvest guidelines: 3,590 mt for Vancouver plus Columbia north of Cape Lookout (close to Cape Falcon), and 2,580 mt for Eureka plus Columbia south of Cape Lookout. Separate harvest guidelines are established for the Sebastes complex north and south of the Eureka-Columbia border. Therefore, 300 mt of the yellowtail rockfish southern harvest guideline is included in the southern Sebastes complex harvest guideline and the remainder of the yellowtail rockfish southern harvest guideline is included in the northern Sebastes harvest guideline. 570 mt of anticipated discard is deducted in setting the northern harvest guidelines for both yellowtail and the Sebastes complex ($4,160 \text{ mt} \div 1.16 = 570 \text{ mt}$).
- o/ The ABCs and harvest guidelines for the two thornyhead species are coastwide north of Pt. Conception. The 1996 harvest guideline for each species is the same as its 1995 harvest guideline. A discard factor will be added to landings inseason.
- p/ The Vancouver ABC for Dover sole is a range from the ABC recommended in the recent assessment (818 mt) up to the 1990-1994 average landing level (1,565 mt). In the Monterey area, the lower end of the ABC range (3,164 mt) is the 1990-1994 average landing level and the upper end of the range is the level proposed in the recent assessment (4,363 mt). The coastwide ABC is the sum of the area ABCs, which is a range of 10,882 mt-12,828 mt. This includes a five percent discard inflation.
- q/ The coastwide Dover sole harvest guideline (11,050 mt) is the sum of the ABCs minus five percent for assumed discard. The harvest guideline recommendation for the Columbia area is 2,850 mt, which also reflects a five percent discard deduction. The coastwide harvest guideline recommendation uses the recent average catch levels (the upper end of the Vancouver ABC and the lower end of the Monterey ABC) combined with the other ABCs and with 5 percent of the total deducted for discard.
- r/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and other groundfish species noted above in c/.

TABLE 47. Open access and limited entry allocations for 1996 (in thousands of metric tons).

Species	1996 ABC	1996 Harvest Guideline	Tribes	1996 Allocations			
				Limited Entry		Open Access	
				1,000 mt	Percent	1,000 mt	Percent
Roundfish							
Lingcod	2.4	2.4 ^{a/}		1.21	80.9	0.29	19.1
Sablefish	9.1	7.8	0.78	6.557 ^{b/}	93.4	0.463	6.6
Rockfish							
Widow	7.7	6.5		6.26	96.3	0.24	3.7
Shortspine	1.0	1.5		1.49	>99.0	0.004	<1.0
Sebastes Complex							
Northern area	11.9	11.2 ^{c/}		10.12	90.4	1.08	9.6
Southern area	13.2	13.2 ^{d/}		8.76	67.4	4.24	32.6
Bocaccio	1.7	1.7 ^{e/}		1.01	67.4	0.49	32.6
Canary	1.25	0.85		0.78	91.2	0.07	8.8
Yellowtail	6.74	3.6N		3.25	90.4	0.35	9.6
		2.58S		2.33	90.4	0.25	9.6

a/ The open access and limited entry allocations for lingcod are applied only to the commercial portion of the harvest guideline, which is 1,500 mt in 1996 (900 mt is deducted for anticipated recreational harvest).

b/ The limited entry sablefish allocation is further allocated 58% (3,803 mt) to the trawl fishery and 42% (2,754 mt) to the nontrawl fishery.

c/ Within the Sebastes complex north, harvest guidelines for commercial harvest of black rockfish by the Makah, Quileute, Hoh, and Quinault Indian tribes remain at 20,000 pounds north of Cape Alava (48°09'30"N) and 10,000 pounds between Destruction Island (47°40'00"N) and Leadbetter Point (46°38'10"N).

d/ The Sebastes south harvest guideline includes the bocaccio harvest guideline. The open access and limited entry allocations are applied only to the commercial portion of the bocaccio harvest guideline. Therefore, 200 mt is deducted prior to calculating the allocations.

e/ The open access and limited entry allocations for bocaccio are applied only to the commercial portion of the harvest guideline, which is 1,500 mt in 1996 (200 mt is deducted for anticipated recreational harvest).

TABLE 48. Council ABCs and harvest guidelines for 1997 for the Washington, Oregon, and California region by management area (in thousands of metric tons).
Page 1 of 2

ROUND FISH	ABC					Total	HARVEST GUIDELINE		
	Vancouver ^{a/}	Columbia	Eureka	Monterey	Concep	ABC	HG	HG area	
Lingcod ^{b/}	1.3		0.3	0.7	0.1	2.4	2.4	WOC	
Pacific cod	3.2		c/			3.2	none	--	
Whiting	290.0 ^{d/}					290.0	232.0 ^{e/}	US	
Sablefish ^{f/}	8.7				0.425	9.125	7.8 ^{f/}	VCEM	
Jack mackerel ^{g/}	52.6					52.6	52.6	WOC +	
ROCKFISH OTHER THAN SEBASTES COMPLEX	Vancouver ^{a/}	Columbia	Eureka	Monterey	Concep	ABC	HG	HG area	
POP	0.00	0.00				0.00	0.75 ^{h/}	VC	
Shortbelly	23.5					23.5	23.5	WOC	
Widow	7.7					7.7	6.5 ^{i/}	WOC	
Thornyheads		8 ^{j/}				8	--	--	
Shortspine		1 ^{j/}				1 ^{j/}	1.38 ^{k/}	n of Pt Conc	
Longspine		7 ^{j/}				7 ^{j/}	6.0 ^{l/}	n of Pt Conc	
SEBASTES COMPLEX	Vancouver ^{a/}	Col - N	Col - S	Eureka	Monterey	Concep	ABC	HG ^{m/}	HG area
Sebastes-N ^{n/}	7.130						7.130	6.656 ^{o/}	VC
Sebastes-S ^{n/}					9.664		9.664	9.284 ^{p/}	EMC
bocaccio					0.265		0.265	.387	EMC
canary	1.22						1.220	1.00	VC
chilipepper	c/				4.0		4.00	none	
yellowtail	.454	.984 ^{q/}	.335 ^{r/}				1.773 ^{r/}	2.762	VC
remaining rockfish	2.295 ^{s/}				1.431 ^{s/}				
bank	c/				0.081		0.08	none	
bocaccio	0.424							none	
canary					0.085		0.085	none	
darkblotched	0.209				0.047		0.26	none	
POP					0.02 ^{t/}		0.020	none	
redstripe	0.768				c/		0.77	none	
sharpchin	0.398				0.071		0.47	none	
silvergrey	0.051				c/		0.05	none	
splitnose	0.274				0.868		1.14	none	
yelloweye	0.039				c/		0.04	none	
yellowmouth	0.132				c/		0.13	none	
yellowtail				0.104 ^{t/}	0.155		0.259	none	
Other rockfish ^{u/}	1.842				3.968			none	

TABLE 48. Council ABCs and harvest guidelines for 1997 for the Washington, Oregon, and California region by management area (in thousands of metric tons).
Page 2 of 2

FLATFISH							
	Vancouver ^{a/}	Columbia	Eureka	Monterey	Concep	ABC	HG ^{d/} HG area
Dover	.82- 1.57 ^{v/}	3	2.9	3.16-4.36 ^{w/}	1	10.88-12.83 ^{x/}	11.05 ^{y/} WOC 2.85 ^{y/} COL only
English sole	2		1.1			3.1	none
Petrale sole	1.2		0.5	0.8	0.2	2.7	none
Arrowtooth flounder	5.8					5.8	none
Other flatfish	0.7	3	1.7	1.8	0.5	7.7	none
OTHER FISH ^{y/}							
	Vancouver	Columbia	Eureka	Monterey	Concep	ABC	HG
	2.5	7	1.2	2	2	14.7	none

^{a/} U.S. portion, except as noted.
^{b/} Lingcod - same as 1996. The 1995 assessment addressed the entire Vancouver area, including Canada, and the Columbia area north of Cape Falcon. The 1997 ABC recommendation is the same as for 1996, and is based on 50% of the ABC for the assessment area, plus 400 mt for the Columbia area south of Cape Falcon. The harvest guideline recommendation is also the same as 1996, and equals the sum of the ABCs, including estimated recreational harvest of 900 mt. The remaining 1,500 mt is for commercial harvest.
^{c/} These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "other fish" category for the areas footnoted, and rockfish species are included in the "other rockfish" category for the areas footnoted only.
^{d/} Whiting - the ABC range is coastwide, including Canada, and is based on the hybrid F moderate exploitation rate policy, using the average of the 50th and 75th percentile recruitment levels.
^{e/} Whiting harvest guideline - the harvest guideline, which applies to U.S. waters, is 80% of the ABC range. Any allocation to tribal fisheries will be deducted prior to allocating among non-Indian sectors.
^{f/} Sablefish - Same as 1996; ABC includes 900 mt of estimated trawl discard. Harvest guideline (7,800 mt) applies only north of the Conception area (i.e., north of 36°N latitude), calculated by subtracting the 900 mt from the 8,700 mt ABC. The treaty tribes will be allocated 780 mt, and the remaining 7,020 mt is divided between the limited entry (6,557 mt) and open access (463 mt) fisheries. Allocation harvest guidelines are established: 58% (3,803 mt) to the trawl fishery and 42% (2,754 mt) to the nontrawl fishery.
^{g/} Jack mackerel - same as 1996. The FMP manages fishing only north of 39°N latitude; however, landings outside the EEZ and south of 39°N latitude are counted towards the ABC and harvest guideline. The DAP is equal to the harvest guideline.
^{h/} Pacific ocean perch - same as 1996. ABCs for Vancouver and Columbia remain at zero; the harvest guideline applies to the Vancouver and Columbia areas combined, and is set at the level of anticipated incidental catch. It applies to landed catch and assumes additional fish will be discarded.
^{i/} Widow rockfish - same as 1996. The 6,500 mt harvest guideline is derived by subtracting 16% (1,200 mt) of the ABC for estimated discards.
^{j/} Thornyheads - the ABCs and harvest guidelines for the two species are the same as 1996 and apply north of Pt. Conception.
^{k/} Shortspine thornyhead - the harvest guideline (1,380 mt) is for landed catch, equivalent to 1996. The total catch level of 1,500 mt is 50% above the ABC, but below the overfishing level, in order to allow greater harvest of longspine thornyhead. Eight percent is deducted for discard.
^{l/} Longspine thornyhead - harvest guideline same as 1996, which is 1,000 mt below the ABC to help prevent overharvest of shortspine thornyhead.
^{m/} Harvest guidelines for *Sebastes* complex (north and south), bocaccio, canary rockfish, and yellowtail rockfish are for total catch. Discard and bycatch adjustments will be made inseason based on best available data as it becomes available.
^{n/} The *Sebastes* complex (north) ABC includes all rockfish species listed below in the Vancouver and Columbia areas combined, including other rockfish and 335 mt of the ABC for yellowtail rockfish in the South Columbia/Eureka area. Likewise, *Sebastes* south includes all rockfish in the Eureka, Monterey and Conception areas combined, including 104 mt of the South Columbia/Eureka area yellowtail rockfish ABC.
^{o/} The *Sebastes* complex north harvest guideline is the sum of the harvest guidelines for canary and yellowtail rockfish, plus the sum of the ABC or recent catch, whichever is less, for all Vancouver/Columbia area rockfish species below, including "other rockfish." It includes 162 mt of the yellowtail rockfish harvest guideline for the Eureka area. Within the *Sebastes* north, harvest guidelines for commercial harvest of black rockfish by the Makah, Quileute, Hoh, and Quinault Indian tribes remain at 20,000 pounds north of Cape Alava (48°09'30"N) and 10,000 pounds between Destruction Island (47°40'00"N) and Leadbetter Point (46°38'10"N).
^{p/} The Southern *Sebastes* complex harvest guideline includes the bocaccio harvest guideline plus the sum of the lesser of the ABC or recent catch for all Eureka/Monterey/Conception area rockfish below in this table. It includes 162 mt of the yellowtail rockfish harvest guideline.
^{q/} Yellowtail rockfish ABC (N. Columbia area) - applies to the Columbia area north of Cape Falcon.
^{r/} Yellowtail rockfish (S. Columbia) - applies to the Columbia area south of Cape Falcon. The assessment combines the S. Columbia and Eureka areas; 104 mt of the ABC has been apportioned to the Eureka area ABC.
^{s/} Remaining rockfish includes the species below in the table, but not the "Other rockfish" catch.
^{t/} Pacific ocean perch - the new *Sebastes* complex assessment proposes a new ABC (20 mt) for the Eureka, Monterey and Conception area.
^{u/} Other rockfish includes offshore *Sebastes* species not identified above in this table. It is based on the *Sebastes* complex assessment of commercial landings and includes an estimate of recreation landings.
^{v/} Dover sole ABC - (Vancouver area) same as 1996, which is a range from the ABC recommended in the 1995 assessment (818 mt) up to the 1990-1994 average landing level (1,565 mt).
^{w/} Dover sole (Monterey) - same as 1996; the lower end of the ABC range (3,164 mt) is the 1990-1994 average landing level, and the upper end of the range is the level proposed in the 1995 assessment.
^{x/} Dover sole (coastwide) - same as 1996; the ABC is the sum of the area ABCs, which is a range of 10,882 - 12,828 mt; it includes a 5 percent discard inflation.
^{y/} Includes sharks, skates, rays, rattfish, morids, grenadiers, and other groundfish species noted above in c/.

TABLE 49. Open access and limited entry allocations for 1997 (in thousands of mt).

Species	1997 ABC	1997 Harvest Guideline	Tribes	1997 Allocations			
				Limited Entry		Open Access	
				1,000 mt	Percent	1,000 mt	Percent
Roundfish							
Lingcod	2.4	2.4 ^{a/}		1.21	80.9	0.29	19.1
Sablefish	9.125	7.8	0.78	6.557 ^{b/}	93.4	0.463	6.6
Rockfish							
Widow	7.7	6.5		6.26	96.3	0.24	3.7
Shortspine thornyhead	1.0	1.38		1.38	>99.0	0.004	<1.0
Sebastes Complex							
Northern area	7.130	6.656 ^{c/}		6.02	90.4	.64	9.6
Southern area	9.664	9.284 ^{d/}		6.26	67.4	3.03	32.6
Bocaccio	.265	.387 ^{e/}		.224	67.4	0.108	32.6
Canary	1.22	1.0		.912	91.2	0.09	8.8
Yellowtail	1.773	2.762		2.5	90.4	0.27	9.6

- a/ The open access and limited entry allocations for lingcod are applied only to the commercial portion of the harvest guideline, which is 1,500 mt in 1997 (900 mt is deducted for anticipated recreational harvest).
- b/ The limited entry sablefish allocation is further allocated 58% (3,803 mt) to the trawl fishery and 42 percent (2,754 mt) to the nontrawl fishery.
- c/ Within the Sebastes complex north, harvest guidelines for commercial harvest of black rockfish by the Makah, Quileute, Hoh, and Quinalt Indian tribes remain at 20,000 pounds north of Cape Alava (48°09'30"N) and 10,000 pounds between Destruction Island (47°40'00"N) and Leadbetter Point (46°38'10"N).
- d/ The Sebastes south harvest guideline includes the bocaccio harvest guideline. The open access and limited entry allocations are applied only to the commercial portion of the bocaccio harvest guideline. Therefore, 55 mt is deducted prior to calculating the allocations.
- e/ The open access and limited entry allocations for bocaccio are applied only to the commercial portion of the harvest guideline, which is 387 mt in 1997 (55 mt is deducted for anticipated recreational harvest).

Table 50. Final Council recommendations for 1998 ABCs and harvest guidelines for the Washington, Oregon, and California region by management area (in thousands of metric tons). Changes from 1997 are **bold**. Page 1 of 3

ROUNDFISH	Final ABC					U.S. Total (except as noted)	Final Harvest Guideline	
	Vancouver a/	Columbia	Eureka	Monterey	Conception		Total Catch	Landed Catch
Lingcod b/	1.021		.139	.325	.046	1.532 b/	.838	b/
Pacific cod	3.2		c/			3.2	none	
Whiting d/			290.0			290.0 d/	232.0	232.0
Sablefish e/		5.2				5.2 e/	5.2	4.68
Conception area					0.425	0.425		0.425
Jack mackerel			52.6			52.6 f/	52.6	52.6
ROCKFISH OTHER THAN SEBASTES COMPLEX								
	Vancouver	Columbia	Eureka	Monterey	Conception	Coastwide Total (except as noted)	Total Catch	Landed Catch
Pacific ocean perch	0.00	0.00				0.00		0.65 g/
Shortbelly			23.5			23.5	23.5	23.5
Widow			5.75 h/			5.75 h/	4.960	4.276
Thornyheads								
Shortspine i/			1.0 i/					1.177 i/
Conception area north of Pt. Conception							0.175	0.123
Longspine j/			4.102 j/			4.102 j/	4.102 j/	3.733
Conception area north of Pt. Conception							0.428	0.390
SEBASTES COMPLEX								
	Vancouver a/	Columbia	Eureka	Monterey	Conception	Total for areas noted	Total Catch	Landed catch
Sebastes-N k/	8.647					8.647 k/	7.057	6.391
Sebastes-S l/				8.999		8.999 l/	8.439	
bocaccio m/				0.23		0.23 m/	0.23	
canary n/	1.045					1.045 n/	1.045	.878
chilipepper	c/			3.4 o/		3.4 o/	none	
yellowtail p/	4.657					4.657 p/	3.118	2.619
remaining rockfish	2.295 q/			1.401 q/				
bank	c/			0.081		0.08	none	
bocaccio	0.424						none	
canary				0.085			none	
darkblotched	0.209			0.047		0.26	none	
POP				0.02 r/		0.020	none	
redstripe	0.768			c/		0.77	none	
sharpchin	0.398			0.071		0.47	none	

Table 50. Final Council recommendations for 1998 ABCs and harvest guidelines for the Washington, Oregon, and California region by management area (in thousands of metric tons). Page 2 of 3

	Final ABC					Final Harvest Guideline		
	Vancouver	Columbia	Eureka	Monterey	Conception	Coastwide ABC	Total Catch	Landed Catch
silvergrey	0.051		c/			0.05	none	
splitnose	0.274			0.868		1.14	none	
yelloweye	0.039		c/			0.04	none	
yellowmouth	0.132		c/			0.13	none	
yellowtail			0.074 i/	0.155		0.229	none	
Other rockfish s/	1.842			3.968			none	
FLATFISH								
Dover sole t/	8.373				1.053	9.426	9.426	8.955 t/
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 FISHu/	2.5	7	1.2	2	2	14.7	none	

- a/ U.S. portion, except as noted.
- b/ Lingcod - the 1997 assessment addresses the entire Vancouver area, including Canada, and the Columbia area. The 1998 Council's Vancouver/Columbia area ABC of 1,021 mt is the $F_{35\%}$ level and includes the Canadian portion of the Vancouver area; it is approximately 46.4% of the 2,230 mt ABC estimated for this area in the previous assessment. The U.S. portion of the Vancouver ABC is 450 mt, based on biomass distribution determined by the NMFS surveys (44% in U.S. waters). The southern area ABCs are reduced from the 1997 levels in proportion to the reduction in the northern area. The total U.S. ABC would be 960 mt. The coastwide harvest guideline recommendation (838 mt) applies to U.S. waters only and is the sum of the individual $F_{40\%}$ values for each area (i.e., 40.5% of the 1997 ABCs). Anticipated 1998 recreational catch is 438 mt, which leaves 400 mt as the commercial harvest guideline.
- 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/ The whiting ABC is coastwide including Canada. The 1997 STAR panel suggested a harvest range of 174,000 mt to 309,000 mt; the Council's final ABC is the same as 1997; the harvest guideline is based on 80% taken in the U.S. The Council anticipates 25,000 mt will be taken by Makah Indian fishers; the remainder will be allocated 42% to the shore-based sector, 34% to the factory trawler fishery, and 24% to the mothership processor sector. The DAP is set equal to the harvest guideline.
- e/ Sablefish - the 5,200 mt ABC and 4,680 mt harvest guideline apply north of the Conception area (i.e., north of 36°N latitude). The Conception area ABC, which is based on historical landings, remains the same as 1997. As in previous years, ten percent of the northern harvest guideline will be set aside for the treaty tribes. The remainder will be divided between the limited entry and open access fisheries, and the limited entry portion will be allocated 58% to the trawl fishery and 42% to the nontrawl fishery. The Council recommended establishment of a separate harvest guideline for the Conception area equal to the ABC (425 mt); limited entry and open access allocations will not be established unless landings approach the harvest guideline.
- f/ Jack mackerel - the FMP manages fishing only north of 39°N latitude; however, landings outside the EEZ and south of 39°N latitude are counted towards the ABC and harvest guideline. The DAP is equal to the harvest guideline.
- g/ Pacific ocean perch - ABCs for Vancouver and Columbia remain at zero. The harvest guideline is reduced from 1997, applies to the Vancouver and Columbia areas combined, and is set at the level of incidental catch observed in 1997. It applies to landed catch.
- h/ Widow rockfish - the ABC is based on the $F_{40\%}$ harvest rate, which is the current MSY proxy for rockfish species. The landed catch harvest guideline (4,276 mt) was calculated in the assessment, based on the $F_{45\%}$ harvest rate; a 16% discard adjustment factor is added to obtain the total catch harvest guideline of 4,960 mt.
- i/ Shortspine thornyhead - the 1,000 mt ABC and harvest guideline are based on the status quo; the harvest guideline would apply north of Point Conception; however, a 123 mt landed catch harvest guideline is proposed for the portion of the Conception area north of Point Conception. Therefore, 123 mt is subtracted from 1,300 mt to obtain the harvest guideline

Table 50. Final Council recommendations for 1998 ABCs and harvest guidelines for the Washington, Oregon, and California region by management area (in thousands of metric tons). Page 3 of 3

- for the Vancouver-Columbia-Eureka-Monterey area. The 123 mt Conception harvest guideline is based on recent landed catch in the northern Conception area. The total catch harvest guideline reflects an additional 30% for discard.
- j/ Longspine thornyhead - the ABC (4,102 mt) north of the Conception area is the average of the three year individual ABCs calculated in the 1997 assessment. The harvest guideline represents a nine percent reduction from ABC to account for market discard. The Council established a harvest guideline for the Conception area north of Point Conception equivalent to the average 1995 to 1996 catch (428 mt for total catch or 390 mt for landed catch). Landed catch reflects nine percent assumed discard.
 - k/ Sebastes complex (north) includes all rockfish species listed below in the U.S. Vancouver and Columbia areas combined, including other rockfish. The total catch harvest guideline equals the sum of yellowtail and canary rockfish harvest guidelines, plus the ABC for other rockfish, plus the sum of the ABCs or recent catch (whichever is less) for the species in "remaining rockfish."
 - l/ Sebastes complex (south) includes all rockfish listed below in the Eureka, Monterey, and Conception areas combined, including 74 mt for the Eureka yellowtail rockfish ABC. The ABC is lower than in 1997 due to reduction in the ABCs for yellowtail rockfish in the Eureka area, bocaccio, and chilipepper, which are based on $F_{40\%}$. The harvest guideline is the sum of either the ABCs or recent catch levels, whichever is less (except the chilipepper ABC is used instead of the recent catch level to calculate the southern harvest guideline).
 - m/ For bocaccio, the ABC and harvest guideline range are based on the estimated $F_{40\%}$ value. Anticipated 1998 recreational catch is 40 mt.
 - n/ The canary rockfish ABC and total catch harvest guideline are based on the $F_{40\%}$ level; the landed catch equivalent (878 mt) reflects a 16% discard adjustment.
 - o/ Chilipepper rockfish - the ABC has been reduced to approximate the $F_{40\%}$ level.
 - p/ Yellowtail rockfish - the Council's final ABC (4,657 mt) applies to the Vancouver area (including the Canadian portion) and the Columbia area. Approximately 76% of the survey biomass estimate in the assessment area is in U.S. waters, so 3,539 mt is the U.S. portion of the ABC. Seventy-four mt is transferred to the Eureka area, leaving 3,465 mt. The harvest guideline is 90% (3,118 mt) of the U.S. portion of the ABC as a precautionary measure.
 - q/ Remaining rockfish includes all rockfish species below in the table except the "Other rockfish" category.
 - r/ Pacific ocean perch - the ABC (20 mt) for the Eureka, Monterey, and Conception area is based on the 1996 Sebastes complex assessment.
 - s/ Other rockfish includes offshore Sebastes species not identified above in this table. It is based on the 1996 Sebastes complex assessment of commercial landings and includes an estimate of recreational landings.
 - t/ Dover sole - the 1997 assessment evaluates the resource north of the Conception area as a unit. The ABC is for total catch, based on the $F_{35\%}$ harvest rate. The landed catch harvest guideline of 8,955 mt assumes five percent of the total catch is discarded.
 - u/ Includes sharks, skates, rays, rattfish, morids, grenadiers, and other groundfish species noted above in c/.

TABLE 51. Open access and limited entry allocations for 1998 (in thousands of mt).

Species	1998 ABC	1998 Landed Catch Harvest Guideline	Tribes	1998 Allocations			
				Limited Entry		Open Access	
				1,000 mt	Percent	1,000 mt	Percent
Roundfish							
Lingcod	0.96	0.838 ^{a/}		0.324	80.9	0.076	19.1
Sablefish	5.2	4.68	0.468	3.934 ^{b/}	93.4	0.278	6.6
Rockfish							
Widow	5.75	4.276		4.118	96.3	0.158	3.7
Shortspine thornyhead	1.0	1.082 ^{c/}		1.082	>99.0	0.004	<1.0
Sebastes Complex							
Northern area	7.057 ^{d/}			6.127	90.4	.651	9.6
Southern area	8.999	8.439 ^{e/}		5.6	67.4	2.738	32.6
Bocaccio	.230	.230 ^{f/}		.128	67.4	0.062	32.6
Canary	1.045	.878		.801	91.2	.077	8.8
Yellowtail	3.465	2.911		2.631	90.4	0.279	9.6

a/ The open access and limited entry allocations for lingcod are applied only to the commercial portion of the harvest guideline, which is 400 mt in 1998 (438 mt is deducted for anticipated recreational harvest).

b/ The limited entry sablefish allocation is further allocated 58% (2,282 mt) to the trawl fishery and 42 percent (1,652 mt) to the nontrawl fishery.

c/ The shortspine harvest guideline of 1,082 mt applies north of the Conception area. There is a separate ABC of 113 mt for the portion of the Conception area north of Pt. Conception.

d/ Within the Sebastes complex north, harvest guidelines for commercial harvest of black rockfish by the Makah, Quileute, Hoh, and Quinault Indian tribes remain at 20,000 pounds north of Cape Alava (48°09'30"N) and 10,000 pounds between Destruction Island (47°40'00"N) and Leadbetter Point (46°38'10"N).

e/ The Sebastes south harvest guideline includes the bocaccio harvest guideline. The open access and limited entry allocations are applied only to the commercial portion of the bocaccio harvest guideline. Therefore, 40 mt of anticipated recreational catch is deducted prior to calculating the allocations.

f/ The open access and limited entry allocations for bocaccio are applied only to the commercial portion of the harvest guideline, which is 190 mt in 1998 (40 mt is deducted for anticipated recreational harvest).

TABLE 52. Final 1999 ABCs and Optimum Yields (harvest guidelines) for the Washington, Oregon, and California region by management area (metric tons). Page 1 of 3

ROUNDFISH	Final ABC					Final OY		Expected Landed Catch ^{a/}
	Vancouver ^{b/}	Columbia	Eureka	Monterey	Conception	U.S. Total	Total Catch	
Lingcod ^{c/}	450		139	325	46	960 c/	730 c/	666
Pacific cod	3,200			d/		3,200	NA d/	
Whiting ^{e/}			232,000 e/			232,000 e/	232,000	
Sablefish ^{f/}			9,692 f/			9,692 f/	7,919 f/	7,128
Conception area					472	472	472	425

ROCKFISH OTHER THAN SEBASTES COMPLEX

	Final OY					Total for areas noted	Total Catch	Expected Landed Catch
	Vancouver	Columbia	Eureka	Monterey	Conception			
POP	695 g/					695 g/	595 g/	500 g/
Shortbelly			23,500			23,500	23,500	
Widow			5,750 ^{h/}			5,750 h/	5,023 h/	3,962 h/
Chilipepper	c/			3,724 ^{i/}		3,724 i/	3,724 i/	3,724 i/
Splitnose ^{j/}				868		868	868 j/	729 j/
Thornyheads								
Shortspine ^{k/}		1,261 k/				1,261 k/	1,150 k/	805 k/
Conception area					175	175	175	123
Longspine ^{l/}		4,102 l/				4,102 l/	4,102	3,733
Conception area					429	429	429	390

SEBASTES COMPLEX

	Final OY					Total for areas noted	Total Catch	Expected Landed Catch
	Vancouver ^{b/}	Columbia	Eureka	Monterey	Conception			
Sebastes-N ^{m/}	8,647					8,647 m/	6,617 m/	5,421 m/
Sebastes-S ^{n/}				4,731		4,731 n/	2,705 ^{o/}	2,705
bocaccio ^{p/}	420			230 p/		230 p/	230 p/	230 p/
canary ^{q/}	1,045					1,045 q/	857 q/	689 q/
yellowtail ^{r/}	3,465					3,465 r/	3,435 r/	2,407 r/
remaining rockfish	2,295 ^{s/}			898 s/				
bank	c/			81		81	NA	
blackgill ^{t/}	c/				365	365 t/		
bocaccio	0					0	NA	
canary				85		85	NA	
darkblotched	209			47		260	NA	
POP				20 ^{u/}		20	NA	
redstripe	768			d/		770	NA	
sharpchin	398			71		470	NA	
silvergrey	51			d/		51	NA	
splitnose	274					274	NA	
yelloweye	39			d/		39	NA	
yellowmouth	132			d/		130	NA	
yellowtail			74 n/		155	229	NA	
Other rockfish ^{v/}	1,842 v/			3,603 v/			NA	

TABLE 52. Final 1999 ABCs and Optimum Yields (harvest guidelines) for the Washington, Oregon, and California region by management area (metric tons). Page 2 of 3

FLATFISH	Final ABC					Final OY	
	Vancouver	Columbia	Eureka	Monterey	Conception	Coastwide ABC	Total Catch Expected Landed Catch
Dover sole ^{w/}	8,373				1,053	9,426	9,426 w/ 8,955
English sole	2,000			1,100		3,100	NA
Petrale sole	1,200		500	800	200	2,700	NA
Arrowtooth flounder			5,800			5,800	NA
Other flatfish	700	3,000	1,700	1,800	500	7,700	NA
OTHER FISH ^{x/}	2,500	7,000	1,200	2,000	2,000	14,700	NA

- a/ In this table, expected landed catch usually refers to the target for the commercial fishery. However, in some cases (such as lingcod and chilipepper) it applies to the total expected catch by all sectors.
- b/ ABC applies to the U.S. portion of the Vancouver area, except as noted.
- c/ Lingcod - the 1997 assessment addressed the entire Vancouver area, including Canada, and the Columbia area. The GMT's final 1999 ABC recommendation of 960 mt is the F35% level and applies only to the U.S. portion of the stock (44% of the Vancouver area total) and is equivalent to the 1998 value. The Council applied the 60% reduction observed in the northern areas to the southern area ABCs based on scientific advice that stock conditions were at least as bad in the southern region. Under the default harvest policy adopted in September 1998, OY would be zero for this overfished stock (current egg production potential is estimated to be 8.8% of pristine); however, the Council chose a final total catch OY of 730 mt to address unavoidable bycatch, rebuilding needs, and competing use by several fishing sectors. The recreational sector is expected to take 310 mt. The expected landed catch of 666 mt for all fisheries reflects 64 mt of anticipated discard in the limited entry fishery.
- d/ These species are neither common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in a non-numerical OY for the "other fish" category for the areas footnoted, and rockfish species are included in the "other rockfish" category for the areas footnoted only.
- e/ The whiting ABC and OY (232,000 mt) applies to U.S. waters. ABC and OY are based on the 1999 stock assessment and application of F35% and the default OY policy, with 80% set as the U.S. share. The 1999 Treaty Tribes' allocation is 32,500 mt, which was subtracted from the final OY, and the remainder allocated 42% to the shore-based sector, 34% to the factory trawler fishery, and 24% to the mothership processor sector. The Council chose ABC at the upper end of the range of plausible harvests identified in the assessment.
- f/ Sablefish - the 9,692 mt final Council ABC and 7,919 mt final OY apply north of 36°N latitude. The stock is estimated to be at 37% of its pristine level, but there is substantial uncertainty in the biomass estimate. The ABC is based on F35%, while the total catch OY is based on F40%. The 7,128 mt landed catch OY for the northern area is the total catch OY (7,919 mt) reduced by 10% (791 mt) for anticipated discard. Ten percent (713 mt) of the northern harvest guideline is set aside for the treaty tribes; the remainder (6,415 mt) is divided between the limited entry (5,992 mt) and open access (423 mt) fisheries. The limited entry portion will be allocated 58% (3,475 mt) to the trawl fishery and 42% (2,516 mt) to the nontrawl fishery. The ABC and OY for the Conception area (south of 36°N latitude), which are based on historical landings, remain the same as 1998. There are no limited entry and open access allocations for the Conception area at this time.
- g/ Pacific ocean perch - the 695 mt final ABC for the combined Vancouver and Columbia areas is based on the 1998 stock assessment and application of the F40% harvest rate. The Council deviated from the default OY policy and set OY near the expected 1998 harvest level because incidental capture of this species is considered unavoidable under current management of other groundfish species. The landed catch OY is 500 mt.
- h/ Widow rockfish - the 5,750 mt ABC, based on the F40% harvest rate, is unchanged from 1998. The stock is estimated to be at 29% of its pristine reproductive potential. The total catch OY (5,023 mt) will be reduced to account for an expected recreational catch of 42 mt and an assumed limited entry fishery discard rate of 16%. The commercial landed catch equivalent will also be reduced to account for anticipated bycatch in the at-sea fisheries for Pacific whiting.
- i/ Chilipepper rockfish - the ABC (3,724 mt) is based on the 1998 assessment and application of the F40% harvest rate. The stock is estimated to be above the 40% precautionary threshold. The Council recommended removal of this species from the southern Sebastes complex and establishment of a separate ABC and OY. In accordance with the default harvest policy, OY is equal to the ABC. An open access allocation will be established for 1999.
- j/ Splitnose rockfish (often called "rosefish") has been removed from the southern Sebastes complex, and a separate OY (868 mt) has been established. The landed catch OY (729 mt) reflects a 16% assumed discard.
- k/ Shortspine thornyhead - the Council's final ABC recommendation (1,261 mt) is calculated based on a synthesis of two stock assessments prepared in 1998 and application of the F35% harvest rate. The assessment addressed the area north of 36°N latitude, which is the northern boundary of the Conception area. Therefore this ABC and OY apply only to that area. The GMT estimates the current stock size is 32% of the pristine (unfished) abundance. The final OY, which is based on the F35% harvest rate and application of the default harvest policy, is 1,150 mt. The landed catch equivalent (805 mt) reflects a 30% reduction for discard. A separate ABC and OY (based on historical catch) are established for the part of the Conception area north of Point Conception. There is no ABC or OY for the southern Conception area.
- l/ Longspine thornyhead - the final ABC (4,102 mt) north of the Conception area is the same as in 1998, based on the average of the 3 year individual ABCs. The stock is estimated to be above the 40% precautionary threshold so the preliminary total catch OY is also 4,102 mt. The landed catch equivalent (3,733 mt) represents a 5% reduction to account for market discard. The ABC and OY for the Conception area apply north of Point Conception. The southern Conception area has neither an ABC or OY.
- m/ Sebastes complex (north) includes all rockfish species listed below in the U.S. Vancouver and Columbia areas combined, including other rockfish and bocaccio in the north (420 mt). The total catch OY is the sum of 75% of the "remaining rockfish" total plus 50% of the "other rockfish" total, plus the final OYs for canary and yellowtail, and zero for bocaccio. The reduction in the contribution of remaining and other rockfish is intended to address uncertainty in stock status due to limited information. The expected commercial landed catch target reflects expected recreational harvest of 818 mt and a 16% discard adjustment for the limited entry fishery.
- n/ Sebastes complex (south) includes all rockfish listed below in the Eureka, Monterey and Conception areas combined, except chilipepper and splitnose. The final ABC is the sum of all those individual species ABCs in the three areas.
- o/ Sebastes South OY - the total catch OY is the sum of the final OY for bocaccio rockfish plus 75% of the "remaining rockfish" (except splitnose) ABC plus 50% of the "other rockfish" ABC. The recommendation to reduce the amounts contributed to OY by the other species is based on the extremely limited information on most rockfish species.
- p/ For bocaccio in the south, the final ABC (230 mt) is based on the estimated F40% value. This stock in this area is estimated to be at only 7% of its unfished level and is considered to be overfished. Under the default harvest policy adopted in September 1998, OY would be zero; however, the Council chose a final OY of 230 mt to account for unavoidable bycatch expected to occur in the commercial and recreational fisheries under existing management of other rockfish species. The recreational sector in California is expected to take 80 mt.
- q/ The canary rockfish final ABC is based on the F40% level; the GMT revised its estimate of stock size relative to pristine from 30% to 26%. This reduced the total catch OY recommendation to 857 mt; after subtracting expected recreational harvest (32 mt) the landed catch target for commercial fishers would be 689 mt, reflecting a 16% discard adjustment for the limited entry sector.

TABLE 52. Final 1999 ABCs and Optimum Yields (harvest guidelines) for the Washington, Oregon, and California region by management area (metric tons). Page 3 of 3

- r/ Yellowtail rockfish - the final ABC recommendation (3,465 mt) applies to the Columbia area and the U.S. portion of the Vancouver area; it reflects a transfer of 74 mt to the Eureka area. The stock is estimated to be at 39% of its pristine level. The Council based its final OY recommendation (3,435 mt) on the F40% yield and the default OY policy. The landed catch equivalent for commercial fishers reflects a 16% discard reduction factor for the limited entry fishery and 600 mt of anticipated discard in the at-sea fisheries for Pacific whiting.
- s/ Remaining rockfish: in the north this includes bocaccio and all rockfish species listed below in the table except the "Other rockfish" category. In the south, includes all rockfish species below in the table except the "Other rockfish" category; bocaccio is not included.
- t/ Blackgill rockfish - the 1998 stock assessment estimates the Conception area stock to be at about 51% of pristine levels. The 365 mt ABC is based on F40%. This stock was previously included in the "other rockfish" category; the ABC for that group was reduced by 365 mt and the ABC for "remaining rockfish" increased by that amount. The GMT will monitor landings, and if they reach 300 mt, the GMT will alert the Council to the possible need for management action or a stock assessment.
- u/ Pacific ocean perch - the ABC (20 mt) for the Eureka, Monterey and Conception area is based on the 1996 Sebastes complex assessment.
- v/ Other rockfish includes offshore Sebastes species not identified above in this table. The final ABC recommendation is based on the 1996 Sebastes complex assessment of commercial landings and includes an estimate of recreational landings which has been revised from the 1998 estimate.
- w/ Dover sole - The 1997 assessment evaluated the resource north of 36° N. lat. as a unit, and provided an ABC for landed catch based on the F35% harvest rate. The Conception area ABC is at the level established in the original FMP. The ABCs represent total catch, and were converted by estimating that 5% of the total catch is discarded. Therefore, the coastwide ABC and OY of 9,426 mt are for total catch, with a landed catch equivalent of 8,955 mt.
- x/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and other groundfish species noted above in d/.

Table 53. Expected Limited Entry and Open Access Allocations in 1999.

All Amounts in Metric Tons												
	OY	Tribal	Rec	Open Access			Limited Entry			Total Commercial Catch	Commercial Landed Catch	
				Percent	Total Catch	Landed Catch	Total Catch	At-Sea Bycatch	Landed			Trawl
ROUND FISH												
Lingcod	730	1	310	19.1%	80	80	339			275		355
Sablefish	7,919	713		6.6%	423	423	5,991			5,991	3,475	6,414
Pacific Ocean Perch	595						595			500		500
Widow	5,023		42	3.7%	184	184	4,797	300		3,777		3,962
Chilipepper	3,724		73	32.6%	1,190	1,190	2,461			2,461		3,651
Splitnose	868						868			729		729
Thornyheads												
Shortspine	1,150			0.25%	3	3	1,147			803		806
Longspine	4,102						4,102			3,733		3,733
Sebastes-North	6,617	14	818	9.6%	555	555	5,229	600		4,033		4,588
Yellowtail	3,435		32	9.6%	327	327	3,077	600		2,080		2,407
Canary	857		50	8.8%	71	71	736			618		689
Sebastes-South	2,705		1,309	32.6%	455	455	941			941		1,396
Bocaccio	230		80	32.6%	49	49	101					150

The open access and limited entry shares (except for sablefish) are calculated as follows. Subtract any expected tribal and recreational catch from the optimum yield (OY), and then multiply by the open access percent share to get the open access allocation. If discard is anticipated in the open access fishery, an appropriate amount is subtracted from the open access share, and the remainder is the open access landed catch. After subtracting the open access allocation from OY, any expected bycatch in the at-sea whiting fishery is subtracted. Next, the assumed discard rate in the limited entry fisheries is applied to the remaining limited entry allocation. The total commercial landed catch is the sum of the open access landed catch plus the limited entry landed catch.

For sablefish, an assumed discard rate of ten percent is applied to the OY, which leaves 7,127 mt, followed by deducting ten percent for tribal fisheries. Next, the open access percent is applied to get the open access allocation (423 mt). The remainder is allocated 42% (2,516 mt) to fixed gear fishers and 58% (3,475 mt) to the trawl sector.

Table 54. Final 2000 acceptable biological catch (ABC) and optimum yield (OY) specifications for the Washington, Oregon, and California region by management area (metric tons). (Page 1 of 4)

ROUNDFISH	Final 2000 ABC					Final 2000 OY	
	Vancouver ^{a/}	Columbia	Eureka	Monterey	Conception	U.S. Total	(Total Catch)
Lingcod ^{b/}	450		250			700 ^{b/}	378 ^{b/}
Pacific cod	3,200			^{c/}		3,200	NA ^{c/}
Whiting ^{d/}			232,000 ^{d/}			232,000 ^{d/}	232,000
Sablefish ^{e/}			9,692 ^{e/}			9,692 ^{e/}	7,919 ^{e/}
Conception area					472	472	472
ROCKFISH	Vancouver	Columbia	Eureka	Monterey	Conception	Total	Total Catch
Pacific ocean perch		713 ^{f/}		^{c/}		713 ^{f/}	270 ^{f/}
Shortbelly			13,900 ^{g/}			13,900	13,900 ^{g/}
Widow			5,750 ^{h/}			5,750 ^{h/}	4,333 ^{h/}
Canary ^{i/}			287 ^{i/}			287 ^{i/}	200 ^{i/}
Chilipepper				3,681 ^{j/}		3,681 ^{j/}	2,000 ^{j/}
Bocaccio ^{k/}		^{c/}		164		164 ^{k/}	100 ^{k/}
Splitnose ^{l/}				820		820	615 ^{l/}
Yellowtail ^{m/}		3,539		^{c/}		3,539 ^{m/}	3,539 ^{m/}
Thornyheads							
Shortspine ^{n/}		1,261 ^{n/}				1,261 ^{n/}	970 ^{n/}
Conception area					175	175	175
Longspine ^{o/}			4,102 ^{o/}			4,102 ^{o/}	4,102
Conception area					429	429	429
Cowcod				19	5	24	<5 ^{p/}
Minor Rockfish N ^{q/}		5,693 ^{i/}				5,693 ^{q/}	3,814 ^{q/}
Minor Rockfish S ^{r/}				3,457		3,457 ^{r/}	1,899
Remaining rockfish ^{s/}		3,625		680 ^{s/}			
bank		^{c/}		81		81	NA
black ^{v/}		1,200				1,200	NA
blackgill ^{u/}		^{c/}		440 ^{u/}		440 ^{u/}	NA
bocaccio		424				424	NA
chilipepper		43				43	NA
darkblotched		237		19		256	NA
redstripe		768		^{c/}		768	NA
sharpchin		409		60		469	NA
silvergrey		51		^{c/}		51	NA
splitnose		322		^{c/}		322	NA
yelloweye		39		^{c/}		39	NA
yellowmouth		132		^{c/}		132	NA
yellowtail				155		155	NA
Other rockfish ^{v/}		2,068 ^{v/}		2,702 ^{v/}			NA

Table 54 (continued). Final 2000 acceptable biological catch (ABC) and optimum yield (OY) specifications for the Washington, Oregon, and California region by management area (metric tons). (Page 2 of 4)

FLATFISH	Final 2000 ABC					Final 2000 OY	
	Vancouver	Columbia	Eureka	Monterey	Conception	Total ABC	(Total Catch)
Dover sole ^{w/}	8,373				1,053	9,426	9,426 ^{w/}
English sole	2,000	1,100				3,100	NA
Petrale sole	1,450 ^{x/}	500	800	200		2,950	NA
Arrowtooth flounder	5,800					5,800	NA
Other flatfish	700	3,000	1,700	1,800	500	7,700	NA
OTHER FISH ^{y/}	2,500	7,000	1,200	2,000	2,000	14,700	NA

- a/ ABC applies to the U.S. portion of the Vancouver area, except as noted. For lingcod, the U.S. ABC is set at 44% of the total for the area.
- b/ Lingcod - the rebuilding analysis calculates the probability the northern (Vancouver-Columbia) stock would rebuild within 10 years if various levels of catch occur. The OY is based on the rebuilding plan and is intended as a first step towards rebuilding the stock in the specified time.
- c/ These species are neither common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod in the areas footnoted is included in the non-numerical OY for "other fish." Rockfish species are included in either the "other rockfish" or "remaining rockfish" category for the areas footnoted only.
- d/ Whiting is believed to be at 37% of its unfished biomass. The U.S.-Canada average ABC of 310,000 mt for 1999-2000 is reduced to 290,000 mt following application of the 40-10 default harvest policy, and is based on an MSY proxy of $F_{40\%}$. The U.S. portion remains at 80%, or 232,000 mt. The treaty tribes' allocation will be subtracted from the final OY, and the remainder will be allocated 42% to the shore-based sector, 34% to the factory trawler sector, and 24% to the mothership processor sector.
- e/ Sablefish - the 9,692 mt ABC, based on $F_{35\%}$, is the same as 1999; the final OY (7,919 mt) is the same as 1999, it is based on $F_{35\%}$ and application of the default OY (40-10) policy. This OY will apply north of 36° N latitude. The stock is estimated to be at 37% of its unfished level, but there is substantial uncertainty in the biomass estimate. The landed catch equivalent for the northern area will be the total catch OY reduced by 10% for anticipated discard. Ten percent of the northern harvest guideline is set aside for the treaty tribes; the remainder is divided between the limited entry and open access fisheries. The limited entry portion will be allocated 58% to the trawl fishery and 42% to the nontrawl fishery. The ABC and OY for the Conception area (south of 36° N latitude), which are based on historical landings, also remain the same as 1999. There are no limited entry and open access allocations for the Conception area at this time.
- f/ Pacific ocean perch - the ABC for this overfished stock in the combined Vancouver, Columbia, and Eureka areas is based on the 1998 assessment for Vancouver and Columbia (695 mt), plus 18 mt for Eureka. OY is based on calculations in the rebuilding program.
- g/ Shortbelly rockfish remains a virtually unexploited stock, and is difficult to assess quantitatively. The 1989 assessment provided two alternative yield calculations of 13,900 mt and 47,000 mt. NMFS recruitment surveys indicate poor recruitment in most years since 1989, indicating low recent productivity and a naturally declining population. The ABC and OY are, therefore, set at the low end of the range in the assessment, 13,900 mt.
- h/ Widow rockfish - the 5,750 mt ABC, based on the $F_{40\%}$ harvest rate, is unchanged from 1999. The stock is estimated to be at 29% of its unfished reproductive potential. The final total catch OY (4,333 mt) is based on $F_{45\%}$ and the 40-10 default OY policy; the commercial total catch target of 4,291 mt is derived by subtracting 42 mt to account for an expected recreational catch. The open access allocation is determined by applying the open access percentage to the commercial total catch target. The limited entry allocation is determined by subtracting the open access allocation. The limited entry allocation is reduced by 300 mt for anticipated bycatch in the offshore whiting fishery, and the remainder is reduced by 16% to account for anticipated bycatch in the non-whiting fisheries, to derive a landed catch equivalent.
- i/ Two canary rockfish assessments addressed the northern and southern portions of the stock. The GMT combined the results, which resulted in a biomass range estimated to be between about 7% of unfished in the south to 20% of unfished in the north. The coastwide ABC (287 mt) is based on the upper end of each assessment, at $F_{40\%}$. The coastwide OY is 200 mt (based on the northern assessment). Recreational fisheries are expected to take 80 mt of the OY in 2000. The 1999 canary rockfish OY applied to the Vancouver and Columbia areas only; coastwide landings have been about 1,100 mt in recent years. The stock appears to be overfished, and a rebuilding plan will be required in 2001.

Table 54 (continued). Final 2000 acceptable biological catch (ABC) and optimum yield (OY) specifications for the Washington, Oregon, and California region by management area (metric tons). (Page 3 of 4)

- j/ Chilipepper rockfish - In 1999, the 3,724 mt chilipepper ABC and OY included 43 mt for the Eureka area, which is moved to the northern remaining rockfish ABC in 2000. The 2000 ABC (3,681 mt) for the Monterey and Conception areas is based on the 1998 assessment and application of the $F_{40\%}$ harvest rate. The stock is estimated to be above the 40% precautionary threshold, so the default OY would equal ABC. However, the Council set OY at 2,000 mt, the recent average landed catch, to reduce bocaccio bycatch.
- k/ For bocaccio in the south, the ABC is based on $F_{40\%}$ and the OY of 100 mt is based on the rebuilding plan.
- l/ Splitnose rockfish (often called "rosefish") - a separate OY (868 mt) was established for the Eureka-Monterey-Conception area in 1999, equal to ABC. For year 2000, the southern ABC applies only to the Conception and Monterey areas. Accordingly, the southern ABC of 820 mt is derived by subtracting 48 mt for the Eureka area, and the northern ABC is increased by that 48 mt. The northern ABC for the Vancouver-Columbia-Eureka area is 322 mt. The 615 mt OY for the southern area reflects a 25% precautionary adjustment because of the less-rigorous assessment for this stock. In the north, splitnose is included in the minor rockfish OY.
- m/ Yellowtail rockfish - the ABC recommendation (3,539 mt) applies to the Eureka, Columbia, and U.S. portion of the Vancouver areas. The stock is estimated to be at 39% of its unfished level. The final OY recommendation is based on $F_{40\%}$ and application of the 40-10 policy. A landed catch equivalent for commercial fishers will be based on a 16% discard reduction for landings in the limited entry fishery and subtraction of anticipated discard in the at-sea fisheries for Pacific whiting.
- n/ Shortspine thornyhead is estimated to be at 32% of its unfished level. The ABC (1,261 mt) for the area north of 36°N latitude (Vancouver through Monterey areas) is the same as 1999, calculated based on a synthesis of two stock assessments prepared in 1998 and application of the $F_{35\%}$ harvest rate. The 970 mt OY is based on $F_{40\%}$ and the 40-10 policy. A separate ABC and OY (based on historical catch) have been established for the part of the Conception area north of Point Conception in recent years. There is no ABC or OY for the southern Conception area.
- o/ Longspine thornyhead - the ABC (4,102 mt) north of the Conception area is the same as in 1999, based on the average of the 3-year individual ABCs at $F_{35\%}$. The stock is estimated to be above the 40% precautionary threshold. The landed catch equivalent will reflect a 5% reduction to account for market discard. The ABC and OY for the Conception area apply north of Point Conception. The southern Conception area has neither an ABC or OY.
- p/ Cowcod - the 1999 assessment of the Conception area indicates this stock is overfished, with abundance below 10% of the unfished level. The Council recommends ABC in the Conception area be 5 mt (based on the assessment) and 19 mt in the Monterey area (based on average landings from 1983-1997). The OY for the Monterey and Conception areas is no more than 5 mt in 2000.
- q/ Minor Rockfish (north) - this new category includes the "Remaining Rockfish" and "Other Rockfish" categories in the U.S. Vancouver, Columbia, and Eureka areas combined. The "remaining rockfish" category includes the rockfish species that have been assessed by less-vigorous methods than stock synthesis, except for black rockfish. The "other rockfish" category includes the rockfish that have never been assessed. The total catch OY is the sum of 75% of the "remaining rockfish" total plus 50% of the "other rockfish." The reduction in the contribution of remaining and other rockfish is intended to address uncertainty in stock status due to limited information.
- r/ Minor Rockfish (south) - this new category includes the "Remaining Rockfish" and "Other Rockfish" categories in the Monterey and Conception areas combined. The ABC is the sum of all those individual species ABCs in the two areas. The total catch OY is the sum of 75% of the "remaining rockfish" ABC plus 50% of the "other rockfish" ABC. This precautionary reduction reflects the extremely limited information on most rockfish species.
- s/ Remaining rockfish includes all rockfish species below in the table except the "other rockfish" category; 75 mt of the blackgill rockfish ABC is included in the "other rockfish" category.
- t/ Black rockfish: this 1,200 mt is the sum of the ABC calculated for the assessment area (700 mt) plus the average catch in the unassessed area (500 mt). This stock contributes 950 mt towards the Minor rockfish OY in the north: 700 mt for the assessed area and 50% of the unassessed area. The 50% reduction is a precautionary adjustment consistent with other recommendations.
- u/ Blackgill rockfish - the 1998 stock assessment estimates the Conception area stock to be at about 51% of pristine levels with 365 mt as the ABC based on $F_{40\%}$; 75 mt was added for the Monterey area and is included in the "other rockfish" total below. Upon completion of the Conception area assessment in 1998, the ABC for that portion of the stock was moved from the "other rockfish" category to the "remaining rockfish" category. If annual landings reach 300 mt, the GMT will alert the Council to the possible need for management action or a stock assessment.

Table 54 (continued). Final 2000 acceptable biological catch (ABC) and optimum yield (OY) specifications for the Washington, Oregon, and California region by management area (metric tons). (Page 4 of 4)

-
- v/ Other rockfish includes rockfish species of the genus *Sebastes* not identified above in this table. The ABC recommendation is based on the 1996 *Sebastes* complex review of commercial landings and includes an estimate of recreational landings. These species have never been formally assessed.

 - w/ Dover sole - The 1997 assessment evaluated the resource north of 36° N latitude as a unit, and provided an ABC for landed catch based on the $F_{35\%}$ harvest rate. The Conception area ABC is at the level established in the original FMP. The ABCs represent total catch, and were converted by estimating that 5% of the total catch is discarded. Therefore, the coastwide ABC and OY of 9,426 mt are for total catch with a landed catch equivalent of 8,955 mt.

 - x/ Petrale sole - The 1999 assessment calculates the ABC in the Vancouver and Columbia areas at 1,447 mt, which is rounded to 1,450 mt. The stock size has been increasing and is estimated to be at 42% of its unfished size in 1999. The coastwide ABC (2,950 mt) is the sum of the areas.

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

Table 55. Allowable Biological Catches (ABC), Optimum Yields (OYs), and Allocations for 2000 (metric tons).

Species or Group	2000 Total ABC	Optimum Yield (OY)						Open-Access		Limited-entry		
		Total					Non-trib. Comm.	%	Landed catch	Total catch	At-sea Bycatch	Landed
		Catch	Landed	Tribal	Rec.	Comp						
Lingcod	700	378			215		163	19.0%	31	132		132
Whiting	290,000	232,000	232,000	32,500			199,500					
Sablefish	9,692	7,919	7,128	713		29	7,177	9.4%	600	5,785		5,785
Conception	472	472	425				472					
Dover sole	9,426	9,426	8,955			21	9,405			9,405		8,955
English sole	3,100											
Petrale sole	2,700											
Arrowtooth flounder	5,800											
Other flatfish	7,700											
Thornyheads												
Shortspine	1,261	970	676			10	960	0.27%	3	948		664
Conception	175	175	123				175	0.27%	0	175		122
Longspine	4,102	4,102	3,733			3	4,099			4,099		3,730
Conception	429	429	390				429			429		390
Widow	5,750	4,333	3,416		51		4,282	3.0%	128	4,154	300	3,237
Canary	356	200	183		80		120	12.3%	15	105		88
POP		270	227				270			270		227
Yellowtail	3,539	3,539	2,529		90		3,449	8.3%	286	3,163	600	2,153
Chilipepper Splitnose (Rosefish)	3,724	2,000	1,826		45		1,955	44.3%	866	1,089		915
Bocaccio	820	615	517							615		517
Cowcod	164	100	100		45		55	44.3%	24	31		31
		< 5	< 5		< 5		< 5		< 5			< 5
Minor Rockfish												
<u>Low recreational catch</u>												
North	5,693	3,814			766		3,048	8.3%	253	2,795		
Near-shore		1,072			707		365		193	172		
Shelf		1,242			59		1,183		50	1,133		
Slope		1,500					1,500		10	1,490		
<u>High recreational catch</u>												
South	3457	1,899			571		1,328		588	740		
Near-shore		680			379		301		233	68		
Shelf		787			192		595		258	337		
Slope		432					432		97	335		

TABLE 56. 2001 Specifications of acceptable biological catch (ABC) and optimum yields (OYs), by International North Pacific Fisheries Commission (INPFC) Areas (weights in metric tons [mt]). Page 1 of 4.

Species	ACCEPTABLE BIOLOGICAL CATCH						OY (Total catch)
	Vancouver ^{a/}	Columbia	Eureka	Monterey	Conception	Total Catch	
ROUND FISH							
Lingcod ^{b/}	610		509			1,119	611
Pacific Cod	3,200		c/			3,200	na
Pacific Whiting ^{d/}	190,400					190,400	190,400
Sablefish ^{e/} (north of 36°)	7,661				--	7,661	6,895
Sablefish ^{f/} (south of 36°)	--				425	425	212
FLAT FISH							
Dover sole ^{g/}	7,151				1,053	8,204	7,677
English sole	2,000		1,100			3,100	na
Petrable sole ^{h/}	1,262		500	800	200	2,762	na
Arrowtooth flounder	5,800					5,800	na
Other flatfish	700	3,000	1,700	1,800	500	7,700	na
ROCK FISH:							
Pacific Ocean Perch	1,541			--		1,541	303
Shortbelly ^{j/}	13,900					13,900	13,900
Widow ^{k/}	3,727					3,727	2,300
Canary ^{l/}	228					228	93
Chilipepper ^{m/}	c/			2,700		2,700	2,000
Bocaccio ^{n/}	c/			122		122	100
Splitnose ^{o/}	c/			615		615	461
Yellowtail ^{p/}	3,146			c/		3,146	3,146
Shortspine thornyhead north of 36° q/ r/	757				--	757	689
south of 36° ^{s/}	--				123	123	62
Longspine thornyhead north of 36° q/t/	2,461				--	2,461	2,461
south of 36° ^{u/}	--				390	390	195
Cowcod ^{v/}	c/			19		19	2.4
	c/				2.4	2.4	2.4
Darkblotched ^{w/}	302-349					302-349	130

TABLE 56. 2001 Specifications of acceptable biological catch (ABC) and optimum yields (OYs), by International North Pacific Fisheries Commission (INPFC) Areas (weights in metric tons [mt]). Page 2 of 4.

Species	ACCEPTABLE BIOLOGICAL CATCH					Total Catch	OY (Total catch)
	Vancouver	Columbia	Eureka	Monterey	Conception		
Minor Rockfish North ^{x/}		4,823		--		4,823	3,137
Minor Rockfish South ^{y/}		--		3,556		3,556	2,040
Remaining rockfish		2,755		854		--	--
bank ^{z/}		c/		350		350	--
black ^{aa/}		1,115				1,115	--
blackgill ^{bb/}		c/		343			--
bocaccio - north		318				318	--
chilipepper-north		32				32	--
redstripe		576		c/		576	--
sharpchin		307		45		352	--
silvergrey		38		c/		38	--
splitnose		242		c/		242	--
yelloweye		29		c/		29	--
yellowmouth		99		c/		99	--
yellowtail-south				116		116	--
Other rockfish ^{cc/}		2,068		2,702		--	--
OTHER FISH ^{dd/}	2,500	7,000	1,200	2,000	2,000	14,700	na

a/ ABC applies to the U.S. portion of the Vancouver area, except as noted under individual species.

b/ Lingcod was designated as overfished in 1999 when the biomass was believed to be at 10% of the unfished biomass. A coastwide assessment was conducted in 2000 and confirmed that the stock is overfished coastwide. Separate ABCs were calculated for the northern (Vancouver-Columbia) and southern (Eureka-Monterey-Conception) areas based on $F_{45\%}$ F_{MSY} proxy. The stock assessment included parts of Canadian waters; however, the U.S. portion of the ABC for the Vancouver area was set at 44% of the total for that area. The total catch OY of 611 mt is the sum of the yield for the northern (307 mt) and the southern (304 mt) assessments where a constant exploitation rate that results in a 60% probability of rebuilding the stock to F_{MSY} within 9 years was used. The total catch OY is reduced by 360 mt for the amount that is estimated to be taken by the recreational fishery, resulting in a commercial OY of 251 mt. Tribal vessels land a small amount of lingcod, but do not have a specific allocation at this time. No discards are assumed.

c/ "Other species", these are neither common nor important to the commercial and recreational fisheries in the areas footnoted. Accordingly, Pacific cod is included in the noncommercial OY of "other fish" and Rockfish species are included in either the "other rockfish" or "remaining rockfish" for the areas footnoted only.

d/ Whiting is believed to be at less than 40% of its unfished biomass. The 1998 assessment was updated for 2000 using limited new data. The U.S.-Canada ABC (266,000 mt) is based on the updated assessment with the application of an F_{MSY} proxy of $F_{40\%}$. Because the biomass is estimated to be within the precautionary zone, the 40-10 default harvest policy was applied reducing the coastwide ABC to 238,000 mt. The whiting U.S. ABC is 80% (190,400 mt) of the 238,000 mt. The U.S. total catch OY was then set equal to the U.S. ABC. The commercial OY for whiting is 162,900 mt (the 190,400 mt OY minus the 27,500 mt tribal allocation), and is allocated 42% to the shore-based sector, 24% to the mothership sector, and 34% to the catcher-processor sector. Discards of whiting are estimated from observer data and counted towards the OY inseason.

e/ Sablefish north of 36° N latitude is believed to be at 37% of its unfished biomass. The 7,661 ABC for the area north of 36° N latitude is based on a $F_{45\%}$ F_{MSY} proxy. The total catch OY (6,895 mt) is based on the application of the 40-10 harvest rate policy, because the biomass is estimated to be in the precautionary zone. The total catch OY is reduced by 690 mt for the tribal set aside and by 24 mt for the compensation to vessels that conducted resource surveys. The remaining 6,181 is the commercial total catch OY. The open access allocation of 9.4% of the commercial OY, results in a total catch OY of 581 mt. The limited entry allocation of 90.6% of the commercial OY, results in a total catch OY of 5,600 mt. The limited entry OY is further divided with 58% (3,248 mt) allocated to the trawl fishery and 42% (2,352 mt) allocated to the nontrawl fishery. For the first time in 2000, discard rates will be applied by sector to obtain landed catch value.

f/ Sablefish in the Conception area has an ABC (425 mt) based on historical landings. To address uncertainty in stock assessment due to limited information, the ABC was reduced by 50% to obtain the OY (212 mt). There are no limited entry or open access allocations in the Conception area at this time.

TABLE 56. 2001 Specifications of acceptable biological catch (ABC) and optimum yields (OYs), by International North Pacific Fisheries Commission (INPFC) Areas (weights in metric tons [mt]). Page 3 of 4

- g/ Dover sole north of 36° N latitude was assessed as a unit in 1997 and provided an ABC (7,151 mt) for landed catch based on a $F_{40\%} F_{MSY}$ proxy. The Conception area ABC (1,053 mt) is at the level established in the original FMP, and was based on average landings. To address uncertainty in stock assessment due to limited information, the Conception area landed catch ABC was reduced by 50% to obtain the landed catch value. The ABC in this table represents total catch and was determined by estimating that 5% of the total catch was discarded to obtain the landed catch. Therefore, the coastwide ABC and total catch OY is 7,677 mt. The OY is further reduced by 67 mt as compensation to vessels that conducted resource surveys, resulting in a commercial OY of 7,610 mt.
- h/ Petrale Sole was believed to be at 42% of its unfished biomass following a 1999 assessment. For 2000, the final ABC for the Vancouver-Columbia area (1,262 mt) is based on a $F_{40\%} F_{MSY}$ proxy. The ABCs for the Eureka, Monterey, and Conception areas (1,500 mt) continues at the same level as 2000.
- i/ Pacific ocean perch (POP) was designated as overfished in 1999. The ABC (1541 mt) is based on the 2000 assessment for the Vancouver-Columbia area (1,523 mt at $F_{50\%} F_{MSY}$ proxy), plus 18 mt for the Eureka area. The 2001 OY of 303 mt for the Vancouver-Columbia-Eureka area was set in the rebuilding plan. Discards are assumed to be 16% for a landed catch value of 255 mt.
- j/ Shortbelly rockfish remains an unexploited stock and is difficult to assess quantitatively. The 1989 assessment provided 2 alternative yield calculations of 13,900 mt and 47,000 mt. NMFS surveys indicate poor recruitment in most years since 1989, indicating low recent productivity and a naturally declining population in spite of low fishing pressure. The ABC and OY therefore are reduced to 13,900 mt, the low end of the range in the assessment.
- k/ Widow rockfish is believed to be at 24% of its unfished biomass indicating that its overfished at this time. The ABC (3,727 mt) is based on the 2000 assessment with a $F_{50\%} F_{MSY}$ proxy. Two OY options were presented to the Council ranging from 2,864 (Based on $F_{50\%} F_{MSY}$ proxy and the 40-10 harvest policy) to 1,775 mt (based on $F_{65\%} F_{MSY}$ proxy and the 40-10 harvest policy). The Council adopted the average of the option range resulting in a total catch OY of 2,300 mt. The OY is reduced by 40 mt for the amount estimated to be taken as recreational catch, resulting in a commercial OY of 2,260 mt. The open access allocation (68 mt) is 3% of the commercial OY. The limited entry allocation (2,192 mt) is 97% of the commercial OY. The limited entry allocation is further reduced by 250 mt for anticipated bycatch in the offshore whiting fishery, and the remainder (1,942 mt) is reduced by 16% (311 mt) to account for trip limit induced discards, resulting in a landed catch equivalent for the limited entry fishery of 1,631 mt (excluding harvest in the whiting fishery).
- l/ Canary rockfish is believed to be at 22% of its unfished biomass in the north (north of Cape Blanco) and 8% of its unfished biomass in the south (south of Cape Blanco). Canary rockfish was declared overfished in 2000. In 1999, two assessments addressed the northern and southern portions of the stock. Although each area was assessed separately, there is no definitive evidence of separate northern and southern stocks. The coastwide ABC (228 mt) is based on a F_{MSY} proxy of $F_{50\%}$. The coastwide OY (93 mt) is based on the rebuilding plan and is the sum of 73 mt for the northern area, plus 20 mt for the southern area. The OY is reduced by 44 mt for the estimated recreational catch and 5 mt for research surveys, resulting in a commercial OY of 44 mt. Tribal vessels land a small amount of canary rockfish, but do not have a specific allocation at this time. The open access allocation (5 mt) is 12.3% of the commercial OY. The limited entry allocation (39 mt) is 87.7% of the commercial OY. The limited entry allocation is further reduced by 3 mt for anticipated bycatch in the offshore whiting fishery, and the remainder (36 mt) is reduced by 16% (6 mt) to account for trip limit-induced discards, resulting in a landed catch equivalent for the limited entry fishery of 30 mt (excluding harvest in the whiting fishery). However, the specific open access/limited entry allocation has been suspended during the rebuilding period as necessary to meet the overall rebuilding target while allowing harvest of healthy stocks.
- m/ Chilipepper rockfish - the ABC (2,700 mt) for the Monterey-Conception area is based on the 1998 stock assessment with the application of $F_{50\%} F_{MSY}$ proxy. Because the biomass is believed to be above 40% of unfished, plus the default OY could be set equal to the ABC. However, the OY is set at 2,000 mt, near the recent average landed catch, to discourage effort on chilipepper which is known to have bycatch of bocaccio rockfish. The OY is reduced by 15 mt for the amount estimated to be taken in the recreational fishery, resulting in a commercial OY of 1,985 mt. Open access is allocated 44.3% (879 mt) of the commercial OY and limited entry is allocated 55.7% (1,106 mt) of the commercial OY. The assumed discard in the limited entry fishery is 16%, resulting in a landed catch value of 929 mt.
- n/ Bocaccio rockfish is believed to be at 2% of its unfished biomass and was designated as overfished in 1999. The ABC of 122 mt is based on a $F_{50\%} F_{MSY}$ proxy. The OY (100 mt) is based on the rebuilding plan which is designed to rebuild the stock to MSY in 38 years. The OY is reduced by 48 mt for the amount estimated to be taken as recreational harvest, resulting in a 52 mt commercial OY. No discard amount is assumed within this OY.
- o/ Splitnose rockfish (also called "rosefish") - The 2001 ABC of 615 mt in the southern area (Monterey-Conception) is based on the F_{MSY} proxy of $F_{50\%}$. The 461 mt OY for the southern area reflects a 25% precautionary adjustment, because of the less rigorous assessment for this stock. In the north, splitnose is included in the minor rockfish OY. The assumed discard is 16% for a landed catch value of 387 mt.
- p/ Yellowtail rockfish is believed to be at 63% of its unfished biomass. The ABC of 3,146 mt is based on a 2000 stock assessment for the Vancouver-Columbia-Eureka areas with the F_{MSY} Proxy of $F_{50\%}$. The OY (3,146 mt) was set equal to the ABC. To derive the commercial OY (3,086 mt) the OY is reduced by 60 mt, the amount estimated to be taken in the recreational fishery. The open access allocation (256 mt) is 8.3% of the commercial OY. The limited entry allocation (2,830 mt) is 91.7% of the commercial OY. The limited entry landed catch allocation (1,810 mt) is determined by subtracting 675 mt for anticipated bycatch in the whiting fishery then deducting 16% from the remainder.
- q/ Thornyheads - The treaty tribes estimate that 3-4 mt of thornyheads will be taken in 2001 under a trip limit of 300 lb per trip. This small amount is not subtracted from the thornyhead OYs at this time.
- r/ Shortspine thornyhead was believed to be at 32% of its unfished biomass in 1999. The ABC (757 mt) in the north (Vancouver-Columbia-Eureka-Monterey) is based on a synthesis of two stock assessments conducted in 1998 with the application of a $F_{50\%} F_{MSY}$ proxy. The OY (689 mt) is based on applying the 40-10 harvest policy, because the biomass is in the precautionary zone. The commercial OY is reduced by 4.1 mt deducted for compensation fishing as compensation to vessels that conducted resource surveys. Open access is allocated 0.27% (2 mt) of the commercial OY and limited entry is allocated 55.7% (683 mt) of the commercial OY. A 20% rate of discard is applied to the limited entry allocation to obtain the landed catch value of 546 mt.

TABLE 56. 2001 Specifications of acceptable biological catch (ABC) and optimum yields (OYs), by International North Pacific Fisheries Commission (INPFC) Areas (weights in metric tons [mt]). Page 4 of 4.

- s/ Shortspine thornyhead - A separate ABC (120 mt) is established for the Conception area and is based on historical catch for the portion of the Conception area north of 34° 27' N latitude (Point Conception). To address uncertainty in the stock assessment due to limited information, the ABC was reduced by 50% to obtain the OY (62 mt). There is no ABC or OY for the southern Conception area.
- t/ Longspine thornyhead is believed to be above 40% of its unfished biomass. The ABC (2,461 mt) in the north (Vancouver-Columbia-Eureka-Monterey) is based on the average of the 3-year individual ABCs at a $F_{50\%}$. The total catch OY (2,461 mt) is set equal to the ABC. The Commercial OY (2,453 mt) is determined by deducting 8 mt for compensation to vessels that conducted resource surveys. To derive the landed catch equivalent of 2,043 mt, the limited entry allocation is reduced by 17% (410 mt) for estimated discards.
- u/ Longspine thornyhead - A separate ABC (390 mt) is established for the Conception area and is based on historical catch for the portion of the Conception area north of 34°27' N latitude (Point Conception). The ABC was reduced by 50% to obtain the OY (195 mt). This was done to address uncertainty in stock assessment due to limited information. There is no ABC or OY for the southern Conception Area.
- v/ Cowcod in the Conception area was assessed in 1999 and is believed to be less than 10% of its unfished biomass and was therefore declared as overfished in 2000. The ABC in the Conception area (5 mt) is based on the 1999 assessment, while the ABC for the Monterey (19 mt) is based on average landings from 1993-1997. An OY of 4.8 (2.4 mt in each area) was set to allow for rebuilding.
- w/ Darkblotched rockfish was assessed in 2000 and is believed to be at 22% of its unfished biomass. The stock is considered to be overfished at this time. Historical catch assumptions from 1965-1978 affect the estimate of unfished biomass and a ABC range is presented at this time. The lower ABC (302 mt) is based on the assumption that 10% of the red rockfish catch during the 1960s and 1970s was darkblotched rockfish; the upper ABC (349 mt) assumes 0% was darkblotched. The OY (130 mt) is the constant annual catch that would rebuild the stock in 10 years, based on the assumption that 5% of the catch was darkblotched. Open access is allocated 2.3% (3 mt) of the commercial OY and limited entry is allocated 97.7% (127 mt) of the commercial OY (130 mt). Limited entry discard is assumed to be 16% of the allocation resulting in a limited entry landed catch value of 106 mt.
- x/ Minor rockfish north includes the "remaining rockfish" and "other rockfish" categories in the Vancouver, Columbia, and Eureka areas combined. These species include "remaining rockfish", which generally includes species that have been assessed by less rigorous methods than stock assessment, and "other rockfish", which includes species that do not have quantifiable assessments. The ABC is the sum of the individual "remaining rockfish" ABCs plus the "other rockfish" ABCs. To obtain total catch OY (3,137 mt), the remaining rockfish ABCs were reduced by 25% and the other rockfish ABCs were reduced by 50%. This was a precautionary measure due to limited stock assessment information. The OY is reduced by 645 mt for the amount estimated to be taken in the recreational fishery, resulting in a commercial OY of 2,492 mt. Open access is allocated 9.6% (239 mt) of the commercial OY and limited entry is allocated 90.4% (2,253 mt) of the commercial OY. The discard is assumed to be 16% (353 mt), resulting in a landed catch value of 2139 mt.
- y/ Minor rockfish south includes the "remaining rockfish" and "other rockfish" categories in the Monterey and Conception areas combined. These species include "remaining rockfish", which generally includes species that have been assessed by less rigorous methods than stock assessment, and "other rockfish", which includes species that do not have quantifiable assessments. The ABC (3,556 mt) is the sum of the individual "remaining rockfish" ABCs plus the "other rockfish" ABCs. To obtain total catch OY (2,040 mt), the remaining rockfish ABCs were reduced by 25% and the other rockfish ABCs were reduced by 50%. This was a precautionary measure due to limited stock assessment information. The OY is reduced by 950 mt for the amount estimated to be taken in the recreational fishery, resulting in a commercial OY of 1,090 mt. Open access is allocated 44.3% (483 mt) of the commercial OY and limited entry is allocated 55.7% of the commercial OY.
- z/ Bank rockfish -- The ABC is 350 mt which is based on a 2000 assessment for the Monterey and Conception areas. This stock contributes 200 mt towards the minor rockfish OY in the south.
- aa/ Black rockfish -- the ABC (1,115 mt), which is based on a 2000 assessment, is the sum of the assessment area (615 mt) plus the average catch in the unassessed (500 mt). This stock contributes 865 mt towards the minor rockfish OY in the north.
- bb/ Blackgill rockfish is believed to be at 51% of its unfished biomass. The ABC for the Conception area (268 mt) was based on a F_{MSY} proxy of $F_{50\%}$, and 75 mt were added for the Monterey area. The ABC for the Monterey area is the OY it reduced by 25% for precautionary measures because of lack of information. This stock contributes 306 mt towards the minor rockfish south OY.
- cc/ "Other rockfish" includes rockfish species listed in 50 CFR 660.302 and California scorpionfish. The ABC is based on the 1996 review of commercial *Sebastes* landings and includes an estimate of recreational landings. These species have never been quantifiably assessed.
- dd/ "Other fish" includes sharks, skates, rays, ratfish, morids, grenadiers, and other groundfish species noted above in footnote b/.

TABLE 57. Overview of allowable biological catch (ABC), optimal yield (OY) and allocations (mt) for 2001 West Coast groundfish fisheries.

Species	2001 Total ABC	Total Catch OY	Landed Catch OY	Total Catch OY				Open-Access		Limited-Entry			
				Tribal	Rec.	Comp. ^{a/}	Non-Tribal Commercial	%	Landed Catch OY	Total Catch OY	At-sea Bycatch	Landed Catch OY	
ROUND FISH													
Lingcod ^{b/}	1,119	611	211		360		251	19.0%	48	203		163	
Whiting ^{c/}	190,400	190,400	190,400	27,500			162,900						
Sablefish													
N of 36 ^{d/}	7,661	6,895	6,206	690		24	6,181	9.4%	537	5,622		4,834	
Conception	425	212	212				212						
FLATFISH													
Dover sole	8,204	7,677	7,293			67	7,610			7,610		7,293	
English sole													
Petrale sole													
Arrowtooth flounder													
Other flatfish													
ROCKFISH													
Thornyheads													
Shortspine													
N of 36°	757	689	552			4	685	0.27%	2	683		546	
Conception	123	62	62				62	0.27%	0	0		0	
Longspine													
N of 36°	2,461	2,461	2,051			8	2,453			2,453		2,043	
Conception	390	195	195				195			0		0	
Widow	3,727	2,300	1,739		40		2,260	3.0%	68	2,192	250	1,631	
Canary	228	93	82		44	5	44	12.3%	5	39	3	30	
POP	1,541	303	255				303			303		255	
Yellowtail	3,146	3,146	2,126		60		3,086	8.3%	256	2,830	675	1,810	
Chilipepper	2,700	2,000	1,823		15		1,985	44.3%	879	1,106		929	
Splitnose (Rosefish)	615	461	387				461			461		387	
Bocaccio ^{b/}	122	100	80		48		52	44.3%	19	29		24	
Cowcod -		2			1.7		0		0			0	
N of 36°	19												
Conception	5	2					0		0			0	
Darkblotched	302-349	130	106				130		3	126		106	
MINOR ROCKFISH													
N. of Mendocino	4,823	3,137	2,784		645		2,492	9.6%	221	2,254		1,918	
Near-shore		987	966		575		412		181	222		211	
Shelf		990	843		70		920		34	880		740	
Slope		1,160	974				1,160		7	1,152		968	
S. of Mendocino	3,556	2,040	1,870		950		1,090	44.3%	414	597		506	
Near-shore		662	656		550		112		74	34		32	
Shelf		739	685		400		339		176	129		109	
Slope		639	528				639		164	434		365	

a/ Compensation OY represents an allocation to vessels that conduct resource surveys.

b/ The limited entry landed catch OY initially published in the *Federal Register* (66 FR 2338) in January 2001 for lingcod (203 mt) and bocaccio rockfish (29 mt) contained errors in the assumed discard rates. Corrected OY's were published in 66 FR 22467 in May, 2001.

c/ The commercial OY for whiting is allocated 42% to the shore-based sector, 24% to the mothership sector, and 34% to the catcher-processor sector. Discards of whiting are estimated from observer data and counted towards the OY inseason.

d/ The limited entry allocation of 90.6% of the commercial OY, results in a total catch OY of 5,600 mt. The limited entry OY is further divided with 58% (3,248 mt) allocated to the trawl fishery and 42% (2,352 mt) allocated to the nontrawl fishery.

TABLE 58. Landings and quotas/harvest guidelines for Pacific whiting (includes discards in the foreign, joint venture and at-sea processing sectors), 1978-2000.

Year	Foreign Fishery (mt)	Joint Venture (mt)	U.S.- Processed ^{a/} (mt)	Total Landings ^{b/} (mt)	Quota or Harvest Guideline (mt)	Quota Landed (percent)
1978	96,827	856	689	98,372	130,000	76
1979	114,910	8,834	937	124,681	198,900	63
1980	44,023	27,537	793	72,353	175,000	41
1981	70,366	43,557	838	114,761	175,000	66
1982	7,089	67,465	1,024	75,578	175,500	43
1983	0	72,100	1,051	73,151	175,500	42
1984	14,772	78,889	2,721	96,382	175,500	55
1985	49,853	31,692	3,894	85,439	175,000	49
1986	69,861	81,639	3,463	154,963	295,800	52
1987	49,656	105,997	4,795	160,448	195,000	82
1988	18,041	135,781	6,876	160,698	232,000	69
1989	0	203,578	7,418	210,996	225,000	94
1990	0	170,972	12,828	183,800	196,000	94
1991	0	0	217,505	217,505	228,000	95
1992	0	0	208,575	208,575	208,800	100
1993 ^{b/}	0	0	141,222	141,222	142,000	99
1994 ^{b/}	0	0	252,729	252,729	260,000	97
1995 ^{b/}	0	0	176,571	176,571	178,400	99
1996 ^{b/}	0	0	212,912	212,912	212,000	100
1997 ^{b/}	0	0	233,422	233,422	232,000	100
1998 ^{b/}	0	0	232,823	232,823	232,000	100
1999 ^{b/}	0	0	224,453	224,453	232,000	97
2000 ^{b/}	0	0	206,734	206,734	232,000	89

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 59. 2002 specifications of acceptable biological catch (ABC), optimum yields (OYs), and limited entry and open access allocations, by International North Pacific Fisheries Commission (INPFC) areas (weights in metric tons). (Page 1 of 6)

Species	ACCEPTABLE BIOLOGICAL CATCH						OY (Total catch)	Commercial OY (Total catch)	Allocations (Total catch)			
						Limited Entry			Open Access			
	Vancouver ^{a/}	Columbia	Eureka	Monterey	Conception	Total Catch			mt	%	mt	%
ROUND FISH												
Lingcod ^{b/}			745			745	577	251	203	81.0	48	19.0
Pacific cod	3,200			c/	3,200		na	3,200	--	--	--	--
Pacific whiting ^{d/}									--	--	--	--
Sablefish ^{e/} (north of 36°)	4,644				--	4,644	4,367	3,906	3,539	90.6	367	9.4
Sablefish ^{f/} (south of 36°)	-				333	333	229	229	--	--	--	--
FLAT FISH												
Dover sole ^{g/}	8,510					8,510	7,440	7,368	--	--	--	--
English sole	2,000	1,100			3,100		na	-	-	-	-	-
Petrale sole ^{h/}	1,262	500	800	200	2,762		na	-	-	-	-	-
Arrowtooth flounder	5,800					5,800	na	-	-	-	-	-
Other flatfish ^{i/}	700	3,000	1,700	1,800	500	7,700	na	-	-	-	-	-
ROCK FISH												
Pacific ocean perch ^{j/}	640				--	640	350	350	--	--	--	--
Shortbelly ^{k/}	13,900				13,900		13,900	13,900	--	--	--	--
Widow ^{l/}	3,727				3,727		856	853	827	97.0	26	3.0
Canary ^{m/}	228				228		93	44	39	87.7	5	12.3
Chilipepper ^{n/}	c/		2,700		2,700		2,000	1,985	1,106	55.7	879	44.3
Bocaccio ^{o/}	c/		122		122		100	44	25	55.7	19	44.3

TABLE 59. 2002 specifications of acceptable biological catch (ABC), optimum yields (OYs), and limited entry and open access allocations, by International North Pacific Fisheries Commission (INPFC) areas (weights in metric tons). (Page 2 of 6)

Species	ACCEPTABLE BIOLOGICAL CATCH						OY (Total catch)	Commercial OY (Total catch)	Allocations (Total catch)			
	Vancouver ^{a/}	Columbia	Eureka	Monterey	Conception	Total Catch			Limited Entry		Open Access	
									mt	%	mt	%
Splitnose ^{p/}	c/			615		615	461	461	--	--	--	--
Yellowtail ^{q/}	3,146			c/		3,146	3,146	3,131	2,871	91.7	260	8.3
Shortspine thornyhead ^{r/} (north of 34°27')	1,004					1,004	955	948	945	99.73	3	0.27
Longspine thornyhead ^{s/} (north of 36°)	2,461				--	2,461	2,461	2,455	--	--	--	--
Longspine thornyhead (south of 36°)	--				390	390	195	195	--	--	--	--
Cowcod ^{u/}	c/			19	--	19	2.4	0	--	--	--	--
	c/			--	5	5	2.4	0	--	--	--	--
Darkblotched ^{v/}	187					187	168	168	163	--	5	--
Yelloweye w/	22			5	--	27	13.5	3.69	--	--	--	--
Minor Rockfish North ^{x/}	4,795			--		4,795	3,115	2,442	2,239	91.7	203	8.3
Minor Rockfish South ^{y/}	--			3,506		3,506	2,015	1,283	714	55.7	569	44.3
Remaining Rockfish	2,727			854		--	--	--	--	--	--	--
bank ^{z/}	c/			350		350	--	--	--	--	--	--
black ^{aa/}	615		500			1,115	--	--	--	--	--	--
blackgill ^{bb/}	c/			75	268	343	--	--	--	--	--	--
bocaccio (north)	318					318	--	--	--	--	--	--
chilipepper (north)	32					32	--	--	--	--	--	--
redstripe	576			c/		576	--	--	--	--	--	--

TABLE 59. 2002 specifications of acceptable biological catch (ABC), optimum yields (OYs), and limited entry and open access allocations, by International North Pacific Fisheries Commission (INPFC) areas (weights in metric tons). (Page 3 of 6)

Species	ACCEPTABLE BIOLOGICAL CATCH						OY (Total catch)	Commercial OY (Total catch)	Allocations (Total catch)			
	Vancouver ^{a/}	Columbia	Eureka	Monterey	Conception	Total Catch			Limited Entry		Open Access	
									mt	%	mt	%
sharpchin		307			45	352	--	--	--	--	--	
silvergrey		38			c/	38	--	--	--	--	--	
splitnose		242			c/	242	--	--	--	--	--	
yellowmouth		99			c/	99						
yellowtail (south)					116	116						
Other rockfish ^{cc/}		2,068			2,652	--	--	--	--	--	--	
OTHER FISH ^{dd/}	2,500	7,000	1,200	2,000	2,000	14,700	na	--	--	--	--	

a/ ABC applies to the U.S. portion of the Vancouver area, except as noted under individual species.

b/ Lingcod was designated as overfished in 1999. Coastwide, lingcod is estimated to be at 15 percent of its unfished biomass. An assessment was conducted in 2000 and updated for 2001. The stock assessment included parts of Canadian waters, therefore the U.S. portion of the ABC for the Vancouver area was set at 44 percent of the total for that area. The ABC of 745 mt was calculated using an F_{MSY} proxy of F_{45%}. The total catch OY of 577 mt is based on a 60 percent probability of rebuilding the stock to B_{MSY} by the year 2009. The total catch OY is reduced by 326 mt, the amount that is estimated to be taken by the recreational fishery, resulting in a commercial OY of 251 mt. The open access total catch allocation is 48 mt (19 percent of the commercial OY) and the open access landed catch value is 38 mt. The limited entry total catch allocation is 203 mt and the landed catch value is 163 mt. The landed catch values are based on a new bycatch and discard analysis which correlates coincidental catch rates of lingcod with the expected catch of specific target species. A "mid" level bycatch range was selected, and the estimated discard mortality resulting from this was 13-20 percent. NMFS used 20 percent. Tribal vessels are expected to land a small amount of lingcod (4-5 mt), but do not have a specific allocation at this time.

c/ "Other species" - These species are neither common nor important to the commercial and recreational fisheries 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 either "other rockfish" or "remaining rockfish" for the areas footnoted only.

d/ A new Pacific whiting assessment is expected in early 2002. Therefore, final adoption of the ABC and OY is being deferred until early 2002, when the results of the new assessment become available.

e/ Sablefish north of 36° N lat. - A new sablefish assessment was done in 2001 for the area north of Point Conception (34°27' N lat.). Sablefish north of 34°27' N lat. is estimated to be between 27% and 38% of its unfished biomass. The ABC for the surveyed area (4,786 mt) is based on an environmentally driven model with an F_{MSY} proxy of F_{45%}. The ABC for the management area north of 36° N lat. is 4,644 mt (97.04% of the ABC from the surveyed area). The total catch OY for the area north of 36° N lat is 4,367 mt, which is based on the application of the 40-10 harvest rate policy, and is 97.04% of the OY from the surveyed area. The total catch OY is reduced by 10% for the tribal set aside (437 mt) and by 24.7 mt for compensation to vessels that conducted resource surveys. The remainder (3,906 mt) is the commercial total catch OY. The open access allocation of 9.4% of the commercial OY, results in an open access total catch OY of 367 mt. The limited entry total catch OY is 3,539 mt, 90.6% of the commercial OY. The limited entry total catch OY is further divided with 58% (2,052 mt) allocated to the trawl fishery and 42% (1,486 mt) allocated to the non-trawl fishery. Discard rates will be applied as follows: 21% for limited entry trawl, 8% for limited entry fixed gear and open access, and 3% for the tribal fisheries. The resulting landed catch values are: 1,601 mt for limited entry trawl, 1,367 mt for limited entry fixed gear, 338 mt for open access, and 424 mt for the tribal fisheries.

f/ Sablefish south of 36° N lat. - The ABC of 333 mt is the sum of 142 mt (2.96% of the ABC from the new 2001 survey based assessment) and 191 mt (based on historical landings). The total catch OY (229 mt) is the sum of 133 mt (2.96% of the OY from the new 2001 survey based assessment with the application of the 40-10 harvest rate policy) and 96 mt (that portion of the ABC based on historical landings south of Pt. Conception that was reduced by 50% to address uncertainty due to limited information). There are no limited entry or open access allocations in the Conception area at this time. The assumed discard value is 8%, resulting in a landed catch value of 211 mt.

TABLE 59. 2002 specifications of acceptable biological catch (ABC), optimum yields (OYs), and limited entry and open access allocations, by International North Pacific Fisheries Commission (INPFC) areas (weights in metric tons). (Page 4 of 6)

g/	Dover sole north of 34°27'N lat. was assessed as a unit in 2001 and is estimated to be at 29% of its unfished biomass. The ABC (8,510 mt) is based on an F_{MSY} proxy of $F_{40\%}$. Because the biomass is estimated to be in the precautionary zone, the total catch OY of 7,440 mt is based on the application of the 40-10 harvest rate policy. The OY is reduced by 71.6 mt for compensation to vessels that conducted resource surveys, resulting in a commercial OY of 7,368 mt. Discards are assumed to be 5%, resulting in a landed catch value of 7,000 mt.
h/	Petrale sole was estimated to be at 42% of its unfished biomass following a 1999 assessment. For 2002, the final ABC for the Vancouver-Columbia area (1,262 mt) is based on an $F_{40\%}$ F_{MSY} proxy. The ABCs for the Eureka, Monterey, and Concepcion areas (1,500 mt) continue at the same level as 2001.
i/	"Other flatfish" are those species that do not have individual ABC/OYs and include butter sole, curfin sole, flathead sole, Pacific sand dab, rex sole, rock sole, sand sole, and starry flounder. The ABC is based on historical catch levels.
j/	Pacific ocean perch (POP) was designated as overfished in 1999. The ABC (640 mt) is based on the 2000 assessment which was updated for 2001. The total catch OY (350 mt) is based on a 70 percent probability of rebuilding the stock to Bmsy by the year 2042. The landed catch value is 294 mt. The landed catch value is based on a new bycatch and discard analysis which correlates coincidental catch rates of POP with the expected catch of specific target species. A "mid" level bycatch range was selected, and the estimated discard mortality resulting from this was 16 percent. NMFS used 16 percent. Tribal vessels are expected to land only trace amounts of POP in 2002 and do not have a specific allocation at this time.
k/	Shortbelly rockfish remains an unexploited stock and is difficult to assess quantitatively. The 1989 assessment provided 2 alternative yield calculations of 13,900 mt and 47,000 mt. NMFS surveys have shown poor recruitment in most years since 1989, indicating low recent productivity and a naturally declining population in spite of low fishing pressure. The ABC and OY therefore are set at 13,900 mt, the low end of the range in the assessment.
l/	Widow rockfish was assessed in 2000 and is estimated to be at 24% of its unfished biomass. Therefore, it was declared overfished in 2001. The ABC (3,727 mt) is based on an $F_{50\%}$ F_{MSY} proxy. The OY (856 mt) is based on a 60% probability of rebuilding the stock to Bmsy within 37 years. The OY is reduced by 3 mt for the amount estimated to be taken as recreational catch, resulting in a commercial OY of 853 mt. The commercial OY is divided with open access receiving 3% (26 mt) and limited entry receiving 97% (827 mt). The landed catch equivalent for the open access fishery is 21 mt. The limited entry allocation is reduced by 150 mt for anticipated bycatch in the at-sea whiting fishery and an additional 40 mt for anticipated bycatch in the shore-based sector of the whiting fishery. The remainder of the limited entry allocation is reduced by 16% to account for discards in the trip limit fisheries. The landed catch equivalent, excluding the at-sea whiting fishery, is 575 mt. Tribal vessels are expected to land about 27 mt of widow rockfish in 2002, but do not have a specific allocation at this time.
m/	Canary rockfish is estimated to be at 22 percent of its unfished biomass in the north (north of Cape Blanco) and 8 percent of its unfished biomass in the south (south of Cape Blanco). Canary rockfish was declared overfished in 2000. The coastwide ABC (228 mt) is based on an F_{MSY} proxy of $F_{50\%}$. The coastwide OY of 93 mt (the sum of 73 mt for the northern area, plus 20 mt for the southern area) is based on a 52 percent probability of rebuilding the stock to Bmsy by the year 2056. The OY is reduced by 5 mt for research surveys and 44 mt for the estimated recreational catch, resulting in a commercial OY of 44 mt. The commercial OY is divided with open access receiving 12.3 percent (5 mt) and limited entry receiving 87.7 percent (39 mt). The landed catch value for the open access fishery is 4.5 mt. The 39 mt limited entry allocation is further reduced by 3 mt for anticipated bycatch in the offshore whiting fishery. The limited entry landed catch value is 30 mt. The landed catch value is based on a new bycatch and discard analysis which correlates coincidental catch rates of canary rockfish with the expected catch of specific target species. A "low" level bycatch range was selected and the estimated discard mortality resulting from this was 16 percent. NMFS used 16 percent. However, the specific open access/limited entry allocation has been suspended during the rebuilding period as necessary to meet the overall rebuilding target while allowing harvest of healthy stocks. Tribal vessels are expected to land about 2.5 mt of canary rockfish in 2002, but do not have a specific allocation at this time.
n/	Chilipepper rockfish - The ABC (2,700 mt) for the Monterey-Concepcion area is based on the 1998 stock assessment with the application of an $F_{50\%}$ F_{MSY} proxy. Because the unfished biomass is estimated to be above 40%, the default OY could be set equal to the ABC. However, the OY is set at 2,000 mt, near the recent average landed catch, to discourage effort on chilipepper, which is known to have bycatch of overfished bocaccio rockfish. The OY is reduced by 15 mt for the amount estimated to be taken in the recreational fishery, resulting in a commercial OY of 1,985 mt. Of the commercial OY, open access is allocated 44.3% (879 mt) and limited entry is allocated 55.7% (1,106 mt). The assumed discard is 16%, resulting in an open access landed catch value of 739 mt and a limited entry landed catch value of 929 mt.
o/	Bocaccio rockfish is estimated to be at 2 percent of its unfished biomass and was designated as overfished in 1999. The ABC of 122 mt is based on an $F_{50\%}$ F_{MSY} proxy. The OY (100 mt) is based on the rebuilding plan, which has a 67% probability of rebuilding the stock to Bmsy by the year 2033. The OY is reduced by 56 mt for the amount estimated to be taken as recreational harvest, resulting in a 44 mt commercial OY. Open access is allocated 44.3 percent (19 mt) of the commercial OY and limited entry is allocated 55.7 percent (25 mt) of the commercial OY. The open access landed catch value is 16 mt and the limited entry landed catch value is 21 mt. The landed catch values are based on a new bycatch and discard analysis which correlates coincidental catch rates of bocaccio with the expected catch of specific target species. A "high" level bycatch range was selected, and the estimated discard mortality resulting from this was 16 percent. NMFS used 16 percent.
p/	Splitnose rockfish - The 2001 ABC is 615 mt in the southern area (Monterey-Concepcion). The 461 mt total catch OY for the southern area reflects a 25% precautionary adjustment because of the less rigorous assessment for this stock. In the north, splitnose is included in the minor slope rockfish OY. The assumed discard is 16% for a landed catch value of 387 mt.

TABLE 59. 2002 specifications of acceptable biological catch (ABC), optimum yields (OYs), and limited entry and open access allocations, by International North Pacific Fisheries Commission (INPFC) areas (weights in metric tons). (Page 5 of 6)

q/	Yellowtail rockfish is estimated to be at 63% of its unfished biomass. The ABC of 3,146 mt is based on a 2000 stock assessment for the Vancouver-Columbia-Eureka areas with an F_{MSY} proxy of $F_{50\%}$. The OY (3,146 mt) was set equal to the ABC. To derive the commercial OY (3,131 mt) the total catch OY is reduced by 15 mt, the amount estimated to be taken in the recreational fishery. The open access allocation (260 mt) is 8.3% of the commercial OY. The limited entry allocation (2,871 mt) is 91.7% of the commercial OY. For anticipated bycatch in the at-sea whiting fishery, 400 mt is subtracted from the limited entry allocation. An additional 150 mt is deducted for the shore-based whiting fishery. The remainder (2,471 mt) is further reduced by 20% for assumed discard. The limited entry landed catch equivalent, excluding the at-sea whiting fishery, is 2,007 mt. The open access landed catch equivalent is 218 mt, given the assumed discard of 16%. Tribal vessels are expected to land about 300 mt of yellowtail rockfish outside their directed whiting fishery in 2002, but do not have a specific allocation at this time.
r/	Shortspine thornyhead - A new assessment was done for shortspine thornyhead in 2001 and the stock is estimated to be between 25 and 50 percent of its unfished biomass. The ABC (1,004 mt) for the area north of Pt. Conception (34°02'N lat.) is based on a $F_{50\%}$ proxy. The OY of 955 mt is based on the new survey with the application of the 40-10 harvest policy, resulting in a commercial OY of 948 mt. Open access is allocated 0.27 percent (3 mt) of the commercial OY and limited entry is allocated 99.73 percent (945 mt) of the commercial OY. A 20 percent rate of discard is applied to obtain a limited entry landed catch value of 757 mt. There is no ABC or OY for the southern Conception area. Tribal vessels are expected to land about 1 mt of shortspine thornyheads in, but do not have a specific allocation at this time.
s/	Longspine thornyhead is estimated to be above 40% of its unfished biomass. The ABC (2,461 mt) in the north (Vancouver-Columbia-Eureka-Monterey) is based on the average of the 3-year individual ABCs at an $F_{50\%}$ F_{MSY} proxy. The total catch OY (2,461 mt) is set equal to the ABC. The OY is further reduced by 6 mt for compensation to vessels that conducted resource surveys, resulting in a commercial OY of 2,455 mt. To derive the landed catch equivalent of 2,037 mt, the limited entry allocation is reduced by 17% for estimated discards.
t/	Longspine thornyhead - A separate ABC (390 mt) is established for the northern Conception area and is based on historical catch for the portion of the Conception area north of 34°27' N lat. (Point Conception). The ABC was reduced by 50% to obtain the OY (195 mt), this reduction addresses uncertainty in the stock assessment due to limited information. There is no ABC or OY for the southern Conception Area.
u/	Cowcod in the Conception area was assessed in 1999 and is estimated to be at less than 10% of its unfished biomass. Therefore cowcod was declared overfished in 2000. The ABC in the Conception area (5 mt) is based on the 1999 assessment, while the ABC for the Monterey area (19 mt) is based on average landings from 1993-1997. An OY of 4.8 mt (2.4 mt in each area) is based on a 55% probability of rebuilding the stock to B_{MSY} by the year 2094. Cowcod retention will not be permitted in 2002.
v/	Darkblotched rockfish was assessed in 2000 and is estimated to be at 22 percent of its unfished biomass. The stock was declared overfished in 2001. The ABC of 187 mt is based on an F_{MSY} proxy of $F_{50\%}$. The OY of 168 mt is based on a 70% probability of rebuilding the stock to B_{MSY} by 2034. For anticipated bycatch in the at-sea whiting fishery, 5 mt is subtracted from the limited entry allocation. The landed catch value for the remaining limited entry fisheries is 130 mt. The landed catch values are based on a new bycatch and discard analysis which correlates coincidental catch rates of darkblotched rockfish with the expected catch of specific target species. A "mid" level bycatch range was selected, and the estimated discard mortality resulting from this was 20 percent. NMFS used 20 percent. Specific open access/limited entry allocation has been suspended during the rebuilding period as necessary to meet the overall rebuilding target while allowing harvest of healthy stocks. Tribal vessels are expected to land minimal amounts of darkblotched rockfish in 2002, but do not have a specific allocation at this time.
w/	Yelloweye rockfish was assessed in 2001 and is estimated to be at 7% of its unfished biomass off northern California and at 13% of its unfished biomass off Oregon, indicating that it is overfished at this time. The 27 mt coastwide ABC (5 mt for the Monterey area and 22 mt for the areas north of 40°10' N lat.) is based on an F_{MSY} proxy of $F_{50\%}$. As a precautionary measure, until rebuilding measures can be adopted, the coastwide ABC has been reduced by 50% to obtain the OY of 13.5 mt (2.5 mt for the Monterey area and 11 mt for the areas north of 40°10' N lat.) The OY is reduced by 8.81 mt for the amount estimated to be taken as recreational harvest, and 1 mt for the amount expected to be taken in the tribal fishery, resulting in a commercial OY of 3.69 mt. Specific open access/limited entry allocation has been suspended during the rebuilding period as necessary to meet the overall rebuilding target while allowing harvest of healthy stocks.
x/	Minor rockfish north includes the "remaining rockfish" and "other rockfish" categories in the Vancouver, Columbia, and Eureka areas combined. These species include "remaining rockfish" which generally includes species that have been assessed by less rigorous methods than stock assessments, and "other rockfish" which includes species that do not have quantifiable assessments. The ABC (4,795 mt) is the sum of the individual "remaining rockfish" ABCs (2,727 mt) plus the "other rockfish" ABCs (2,068 mt). The remaining rockfish ABCs continue to be reduced by 25% ($F=0.75M$) as a precautionary adjustment. To obtain the total catch OY (3,115 mt) the remaining rockfish ABCs are further reduced by 25% with the exception of black rockfish (see footnote aa/), and other rockfish ABCs are reduced by 50%. This was a precautionary measure due to limited stock assessment information. The OY is reduced by 673 mt for the amount estimated to be taken in the recreational fishery, resulting in a commercial OY of 2,442 mt. Open access is allocated 8.3% (203 mt) of the commercial OY and limited entry is allocated 91.7% (2,239 mt) of the commercial OY. The discard is assumed to be 5% for nearshore rockfish, 16% for shelf rockfish, and 20% for slope rockfish, resulting in an open access landed catch value of 188 mt and a limited entry landed catch value of 1,852 mt. Tribal vessels are expected to land about 10 mt of minor rockfish (2 mt of minor nearshore rockfish, 4 mt of shelf rockfish, and 4 mt of slope rockfish) in 2002, but do not have a specific allocation at this time.

TABLE 59. 2002 specifications of acceptable biological catch (ABC), optimum yields (OYs), and limited entry and open access allocations, by International North Pacific Fisheries Commission (INPFC) areas (weights in metric tons). (Page 6 of 6)

y/	Minor rockfish south includes the "remaining rockfish" and "other rockfish" categories in the Monterey and Conception areas combined. These species include "remaining rockfish" which generally includes species that have been assessed by less rigorous methods than stock assessments, and "other rockfish" which includes species that do not have quantifiable assessments. The ABC (3,506 mt) is the sum of the individual "remaining rockfish" ABCs (854 mt) plus the "other rockfish" ABCs (2,652). The remaining rockfish ABCs continue to be reduced by 25% ($F=0.75M$) as a precautionary adjustment. To obtain total catch OY (2,015 mt), the remaining rockfish ABCs are further reduced by 25%, with the exception of blackgill rockfish (see footnote bb/), and the other rockfish ABCs were reduced by 50%. This was a precautionary measure due to limited stock assessment information. The OY is reduced by 732 mt for the amount estimated to be taken in the recreational fishery, resulting in a commercial OY of 1,283 mt. Open access is allocated 44.3% (569 mt) of the commercial OY and limited entry is allocated 55.7% (714 mt) of the commercial OY. The discard is assumed to be 5% for nearshore rockfish, 16% for shelf rockfish, and 20% for slope rockfish, resulting in an open access landed catch value of 484 mt and a limited entry landed catch value of 582 mt.
z/	Bank rockfish - The ABC of 350 mt is based on a 2000 assessment for the Monterey and Conception areas. This stock contributes 263 mt towards the minor rockfish OY in the south.
aa/	Black rockfish - The ABC (1,115 mt) which is based on a 2000 assessment, is the sum of the assessment area (615 mt) plus the average catch in the unassessed area (500 mt). To obtain the OY for the southern portion of this area, the ABC has been reduced by 50% as a precautionary measure due to limited information. For the assessed area the OY was set equal to the ABC. This stock contributes 865 mt towards the minor rockfish OY in the north.
bb/	Blackgill rockfish is estimated to be at 51% of its unfished biomass. The ABC (343 mt) is the sum of the Conception area ABC of 268 mt, based on the 1998 assessment with an F_{MSY} proxy of $F_{50\%}$, and the Monterey area ABC of 75 mt. This stock contributes 306 mt towards minor rockfish south (268 mt for the Conception area ABC and 38 mt for the Monterey area). The OY for the Monterey area is the ABC reduced by 50% for precautionary measures because of lack of information.
cc/	"Other rockfish" includes rockfish species listed in 50 CFR 660.302 and California scorpionfish. The ABC is based on the 1996 review of commercial <i>Sebastes</i> landings and includes an estimate of recreational landings. These species have never been quantifiably assessed. Beginning in 2002, an ABC and OY have been specified for yelloweye rockfish, in the Monterey and Conception areas. Therefore, it has been removed from the "other rockfish" category.
dd/	"Other fish" includes sharks, skates, rays, rattfish, morids, grenadiers, and other groundfish species noted above in footnote c/.

TABLE 60a. Council-adopted 2002 trip limits^{a/} and gear requirements^{b/} for limited entry trawl gear.

Species/groups	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
Minor slope rockfish						
North				1,800 lb/2 months		
South				50,000 lb/2 months		
Splitnose - South				25,000 lb/2 months		
Pacific ocean perch - North ^{c/}	2,000 lb/month			4,000 lb/month		2,000 lb/month
Chilipepper - South ^{c/}						
mid-water trawl				25,000 lb/2 months		
small footrope trawl				7,500 lb/2 months		
large footrope trawl				500 lb/trip, not to exceed small footrope cumulative 2-month limits at any time during the year.		
DTS complex - North						
Sablefish	6,000 lb/2 months	3,500 lb/2 months	6,000 lb/2 months	3,500 lb/2 months	2,500 lb/2 months	
Longspine thornyhead	10,000 lb/2 months	6,000 lb/2 months	3,000 lb/2 months	10,000 lb/2 months	2,000 lb/2 months	
Shortspine thornyhead	2,600 lb/2 months	2,000 lb/2 months	2,600 lb/2 months	2,600 lb/2 months	1,500 lb/2 months	
Dover sole	30,000 lb/2 months	28,000 lb/2 months	14,000 lb/2 months	28,000 lb/2 months	20,000 lb/2 months	14,000 lb/2 months
DTS complex - South						
Sablefish				4,500 lb/2 months		
Longspine thornyhead				10,000 lb/2 months		
Shortspine thornyhead				2,600 lb/2 months		
Dover sole				22,000 lb/2 months		
Flatfish - North						
All other flatfish ^{d/}	15,000 lb/month	35,000 lb/month				
Petrale sole	Not limited	30,000 lb/month, no more than 10,000 of which may be petrale sole	40,000 lb/month, no more than 15,000 of which may be petrale sole	50,000 lb/month, no more than 20,000 of which may be petrale sole	50,000 lb/month	Not limited
Rex sole	Not limited					Not limited
Arrowtooth flounder	30,000 lb/trip					30,000 lb/trip
Flatfish - South						

TABLE 60a. Council-adopted 2002 trip limits ^{a/} and gear requirements ^{b/} for limited entry trawl gear.

Species/groups	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
All other flatfish ^{d/}	Small footrope required: 70,000 lb/month, no more than 40,000 lb of which may be species other than Pacific sanddabs	Small footrope required: 70,000 lb/month, no more than 40,000 lb of which may be species other than Pacific sanddabs. Of the species other than Pacific sanddabs, no more than 15,000 lb may be petrale sole.				Small footrope required: 70,000 lb/month, no more than 40,000 lb of which may be species other than Pacific sanddabs
Petrale sole	Not limited					Not limited
Rex sole	Not limited					Not limited
Arrowtooth flounder	30,000 lb/trip		Small footrope required: 7,500 lb/trip, no more than 30,000 lb/month			
All other flatfish ^{d/} , including petrale sole - North and South	Large footrope: 1,000 lb/trip, not to exceed small footrope cumulative monthly limits at any time during the year.					
Whiting shoreside ^{e/}	20,000 lb/trip		Primary Season			
USE OF SMALL FOOTROPE BOTTOM TRAWL ^{f/} OR MIDWATER TRAWL REQUIRED FOR LANDING ALL OF THE FOLLOWING SPECIES:						
Minor shelf rockfish						
North	300 lb/month			1,000 lb/month		300 lb/month
South	500 lb/month			1,000 lb/month		500 lb/month
Canary rockfish	200 lb/2 months			600 lb/2 months		200 lb/2 months
Widow rockfish						
mid-water trawl	CLOSED ^{g/}		During primary whiting season, in trips of at least 10,000 lb of whiting: combined widow and yellowtail limit of 500 lb/trip, cumulative widow limit of 1,500 lb/month			CLOSED ^{g/}
small footrope trawl			1,000 lb/month			
Yellowtail - North ^{f/}						
mid-water trawl	CLOSED ^{g/}		During primary whiting season, in trips of at least 10,000 lb of whiting: combined widow and yellowtail limit of 500 lb/trip, cumulative yellowtail limit of 2,000 lb/month			CLOSED ^{g/}
small footrope trawl	Without flatfish, 1,000 lb/month. As flatfish bycatch, per trip limit is the sum of 33% (by weight) of all flatfish except arrowtooth flounder, plus 10% (by weight) of arrowtooth flounder, not to exceed 30,000 lb/2 months.					
Bocaccio - South ^{f/}	600 lb/2 months		1,000 lb/2 months			600 lb/2 months
Cowcod			CLOSED ^{g/}			

TABLE 60a. Council-adopted 2002 trip limits ^{a/} and gear requirements ^{b/} for limited entry trawl gear.

Species/groups	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
Minor nearshore rockfish						
North	300 lb/month			1,000 lb/month		300 lb/month
South	300 lb/month			1,000 lb/month		300 lb/month
Lingcod ^{b/}				800 lb/2 months		

a/ Trip limits apply coastwide unless otherwise specified. "North" means 40°10' N. lat. to the U.S.-Canada border. "South" means 40°10' N. lat. to the U.S.-Mexico border. 40°10' N. lat. is about 20 nm south of Cape Mendocino, CA.

b/ Gear requirements and prohibitions are explained above.

c/ Yellowtail rockfish and POP in the south, and bocaccio and chilipepper rockfishes in the north are included in the trip limits for minor shelf rockfish in the appropriate area.

d/ "Other" flatfish means all flatfish at 50 CFR 660.302 except those in this Table 3 with a trip limit.

e/ The whiting "per trip" limit in the Eureka area inside 100 fm is 10,000 lb/trip throughout the year. Outside Eureka area, the 20,000 lb/trip limit applies before and after the primary season.

f/ Small footrope trawl means a bottom trawl net with a footrope no larger than 8 inches (20 cm) in diameter. Midwater gear also may be used; the footrope must be bare. See above.

g/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated. See IV.A.(7).

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

TABLE 60b. Council-adopted 2002 trip limits ^{a/} for limited entry fixed gear.

Species/groups	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
Minor slope rockfish						
North	1,000 lb/month			5,000 lb/2 months		2,000 lb/2 months
South			25,000 lb/2 months			
Splitnose - South			25,000 lb/2 months			
Pacific ocean perch - North ^{b/}	2,000 lb/month		4,000 lb/month			2,000 lb/month
Sablefish						
North of 36° N. lat.		300 lb/day, or 1 landing per week of up to 800 lb, not to exceed 2,400 lb/2 months				
South of 36° N. lat.		350 lb/day, or 1 landing per week of up to 1,050 lb				
Longspine thornyhead			9,000 lb/2 months			
Shortspine thornyhead			2,000 lb/2 months			
Dover sole						
Arrowtooth flounder						
Petrale sole			5,000 lb/month (all flatfish)			
Flex sole						
All other flatfish ^{c/}						
Whiting ^{d/}			20,000 lb/trip			
Shelf rockfish, including minor shelf rockfish, widow and yellowtail rockfish ^{b/}						
North			200 lb/month			
South						
40°10' - 34°27' N. lat.	200 lb/month	CLOSED ^{e/}		200 lb/month	CLOSED ^{e/}	
South of 34°27' N. lat.	CLOSED ^{e/}		1,000 lb/month			CLOSED ^{e/}
Canary rockfish			CLOSED ^{e/}			
Yelloweye rockfish			CLOSED ^{e/}			
Cowcod			CLOSED ^{e/}			
Bocaccio - South ^{b/}						
40°10' - 34°27' N. lat.	200 lb/month	CLOSED ^{e/}		200 lb/month		CLOSED ^{e/}

TABLE 60b. Council-adopted 2002 trip limits ^{a/} for limited entry fixed gear.

Species/groups	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
South of 34°27' N. lat.	CLOSED ^{e/}		200 lb/month			CLOSED ^{e/}
Chilipepper - South ^{b/}						
40°10' - 34°27' N. lat.	500 lb/month	CLOSED ^{e/}		500 lb/month	CLOSED ^{e/}	
South of 34°27' N. lat.	CLOSED ^{e/}		2,500 lb/month			CLOSED ^{e/}
Minor nearshore rockfish						
North	5,000 lb/month, no more than 2,000 lb of which may be species other than black or blue rockfish ^{f/}					
South						
40°10' - 34°27' N. lat.	1,600 lb/2 months	CLOSED ^{e/}	Shoreward of 20 fms depth, 1,600 lb/2 months, otherwise CLOSED ^{e/}	1,600 lb/2 months	Shoreward of 20 fms depth, 1,600 lb/2 months, otherwise CLOSED ^{e/}	CLOSED ^{e/}
South of 34°27' N. lat.	CLOSED ^{e/}		2,000 lb/2 months			CLOSED ^{e/}
Lingcod ^{g/}						
North	CLOSED ^{e/}			400 lb/month		CLOSED ^{e/}
South						
40°10' - 34°27' N. lat.	CLOSED ^{e/}		Shoreward of 20 fms depth, 400 lb/month, otherwise CLOSED ^{e/}	400 lb/month	Shoreward of 20 fms depth, 400 lb/month, otherwise CLOSED ^{e/}	CLOSED ^{e/}
South of 34°27' N. lat.	CLOSED ^{e/}		400 lb/month			CLOSED ^{e/}

a/ Trip limits apply coastwide unless otherwise specified. "North" means 40°10' N. lat. to the U.S.-Canada border. "South" means 40°10' N. lat. to the U.S.-Mexico border. 40°10' N. lat is about 20 nm south of Cape Mendocino, CA.

b/ Yellowtail rockfish and widow rockfish coastwide, POP in the south, and bocaccio and chilipepper rockfishes in the north are included in the trip limits for shelf rockfish in the appropriate area.

c/ "Other flatfish" means all flatfish at 50 CFR 660.302 except those in this Table 4 with a trip limit.

d/ The whiting "per trip" limit in the Eureka area inside 100 fm is 10,000 lb/trip throughout the year.

e/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated. See IV.A.(7).

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

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

TABLE 60c. Council-adopted 2002 trip limits ^{a/} for open access gears.

Species/groups	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
Minor slope rockfish						
North	Per trip, no more than 25% of weight of the sablefish landed					
South	10,000 lb/2 months					
Splitnose - South	200 lb/month					
Pacific ocean perch - North ^{b/}	100 lb/month					
Sablefish						
North of 36° N. lat.	300 lb/day, or 1 landing per week of up to 800 lb, not to exceed 2,400 lb/2 months					
South of 36° N. lat.	350 lb/day, or 1 landing per week of up to 1,050 lb					
Thornyheads						
North of 34° 27' N. lat.	CLOSED ^{d/}					
South of 34° 27' N. lat.	50 lb/day, no more than 2,000 lb/2 months					
Dover sole						
Arrowtooth flounder	3,000 lb/month, no more than 300 lb of which may be species other than Pacific sanddabs					
Petrale sole						
Rex sole						
All other flatfish ^{d/}						
Whiting	300 lb/month					
Shelf rockfish, including minor shelf rockfish, widow and yellowtail rockfish ^{b/}						
North	200 lb/month					
South						
40°10' - 34°27' N. lat.	200 lb/month	CLOSED ^{d/}	Shoreward of 20 fms depth, 200 lb/month, otherwise CLOSED ^{d/}	200 lb/month	Shoreward of 20 fms depth, 200 lb/month, otherwise CLOSED ^{d/}	CLOSED ^{d/}
South of 34°27' N. lat.	CLOSED ^{d/}		500 lb/month			CLOSED ^{d/}
Canary rockfish	CLOSED ^{d/}					
Yelloweye rockfish	CLOSED ^{d/}					
Cowcod	CLOSED ^{d/}					

TABLE 60c. Council-adopted 2002 trip limits ^{a/} for open access gears.

Species/groups	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
Bocaccio - South ^{b/}						
40°10' - 34°27' N. lat.	200 lb/month	CLOSED ^{c/}	CLOSED ^{c/}	200 lb/month	CLOSED ^{c/}	CLOSED ^{c/}
South of 34°27' N. lat.	CLOSED ^{c/}		200 lb/month			CLOSED ^{c/}
Chilipepper - South ^{b/}						
40°10' - 34°27' N. lat.	500 lb/month	CLOSED ^{c/}	CLOSED ^{c/}	500 lb/month	CLOSED ^{c/}	CLOSED ^{c/}
South of 34°27' N. lat.	CLOSED ^{c/}		2,500 lb/month			CLOSED ^{c/}
Minor nearshore rockfish						
North	3,000 lb/2 months, no more than 1,200 lb of which may be species other than black or blue rockfish ^{e/}	4,000 lb/2 months, no more than 1,600 lb of which may be species other than black or blue rockfish ^{e/}				3,000 lb/2 months, no more than 1,200 lb of which may be species other than black or blue rockfish ^{e/}
South						
40°10' - 34°27' N. lat.	1,200 lb/2 months	CLOSED ^{c/}	Shoreward of 20 ftn depth, 1,200 lb/2 months, otherwise CLOSED ^{c/}	1,200 lb/2 months	Shoreward of 20 ftn depth, 1,200 lb/2 months, otherwise CLOSED ^{c/}	CLOSED ^{c/}
South of 34°27' N. lat.	CLOSED ^{c/}		1,200 lb/2 months			CLOSED ^{c/}
Lingcod ^{f/}						
North		CLOSED ^{c/}		300 lb/month		CLOSED ^{c/}
South						
40°10' - 34°27' N. lat.	CLOSED ^{c/}		Shoreward of 20 ftn depth, 400 lb/month, otherwise CLOSED ^{c/}	300 lb/month	Shoreward of 20 ftn depth, 400 lb/month, otherwise CLOSED ^{c/}	CLOSED ^{c/}
South of 34°27' N. lat.	CLOSED ^{c/}			300 lb/month		CLOSED ^{c/}

a/ Trip limits apply coastwide unless otherwise specified. "North" means 40°10' N. lat. To the U.S.-Canada border. "South" means 40°10' N. lat. To the U.S.-Mexico border. 40°10' N. lat is about 20 nm south of Cape Mendocino, CA.

b/ Yellowtail rockfish and POP in the south, and bocaccio, and chilipepper rockfishes in the north are included in the trip limits for minor shelf rockfish in the appropriate area.

c/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated. See IV.A.(7).

d/ "Other flatfish" means all flatfish at 50 CFR 660.302 except those in this Table 5 with a trip limit.

TABLE 60c. Council-adopted 2002 trip limits ^{a/} for open access gears.

Species/groups	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
----------------	---------	---------	---------	---------	---------	---------

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

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

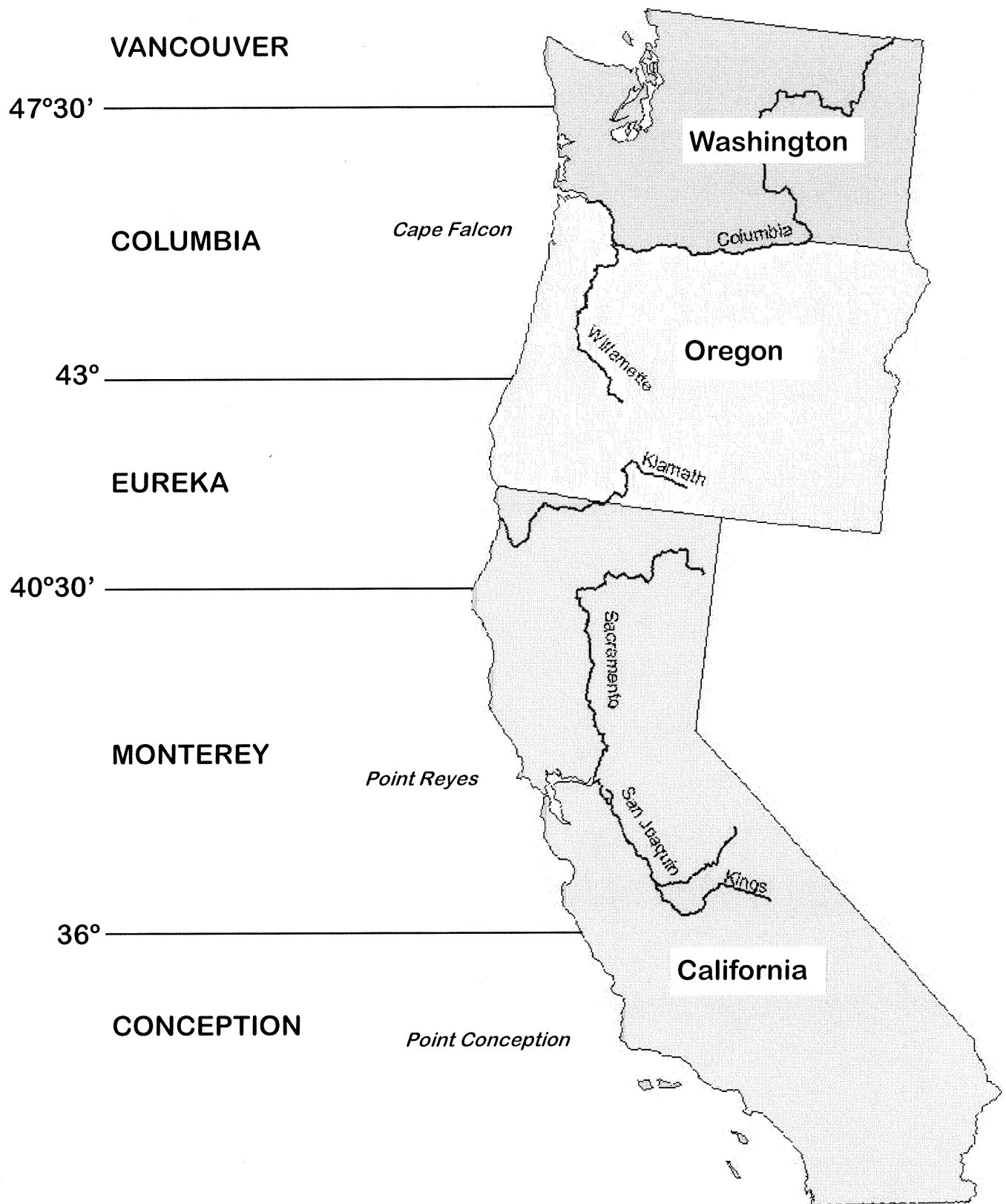


FIGURE 1. International North Pacific Fishery Commission (INPFC) management statistical areas in the U.S. exclusive economic zone seaward of Washington, Oregon, and California.

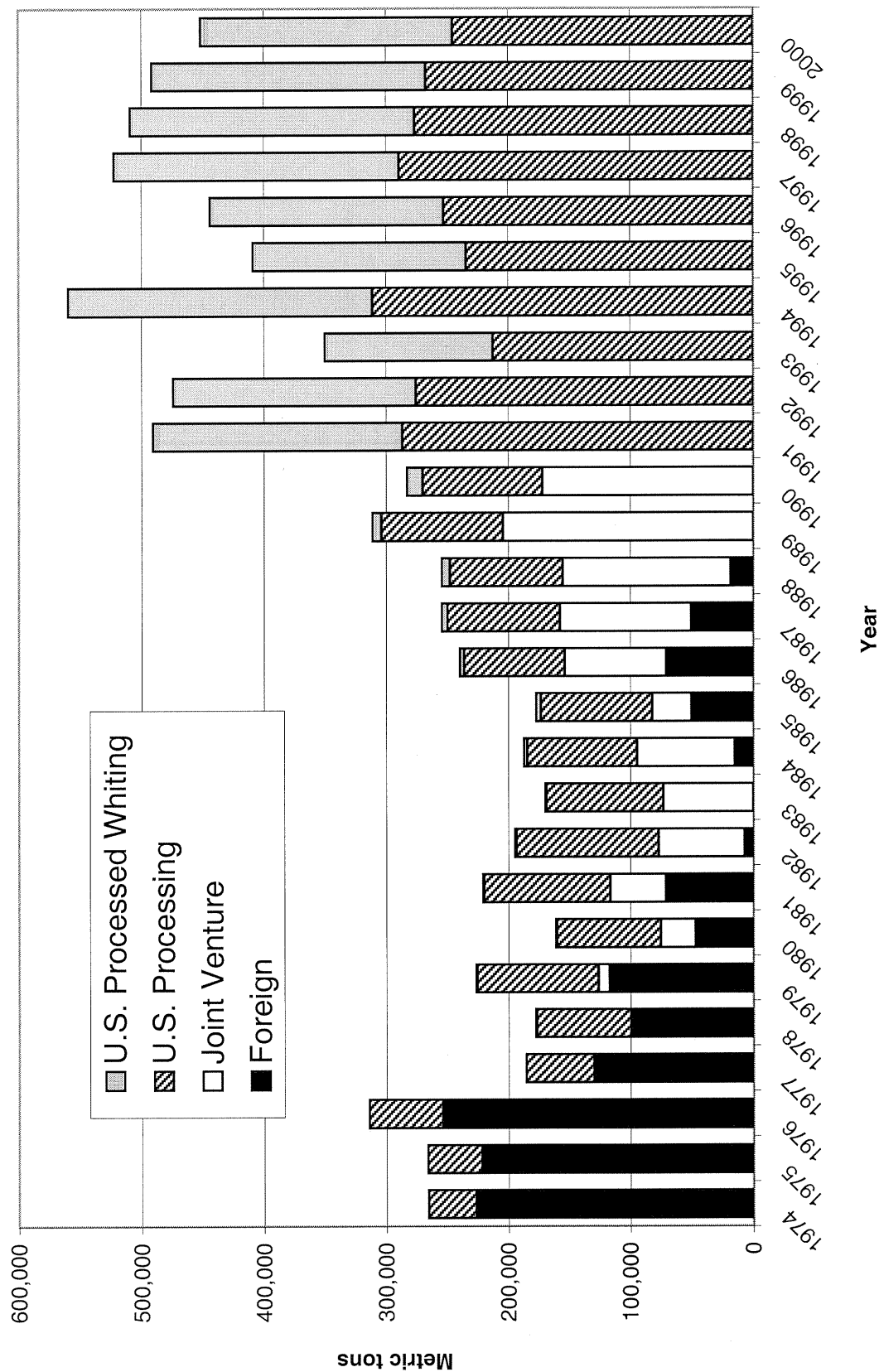


Figure 2. Estimated domestic commercial groundfish landings (mt) for all management areas, 1974-1999. Includes foreign and joint-venture catches. Source: NMFS, NWR, September 2001.

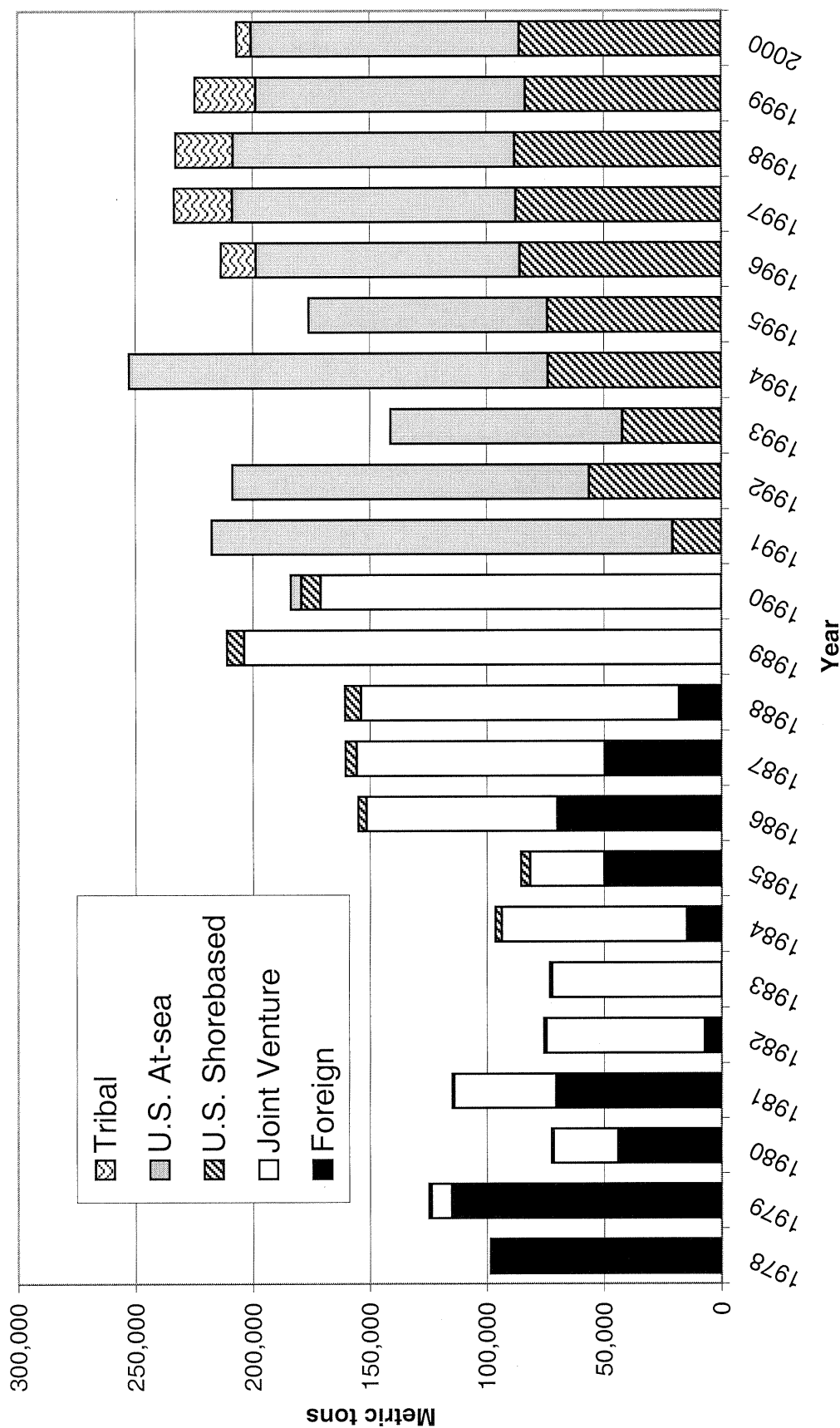


Figure 3. Landings of Pacific whiting, including discards from the foreign, joint venture, and U.S. at-sea processing sectors. Source: NMFS, NWR, September 2001. U.S. shorebased, at-sea, and Tribal landings are preliminary.

ECONOMIC STATUS OF THE WASHINGTON, OREGON, AND CALIFORNIA GROUND FISH FISHERIES

TABLE 1. Shoreside, at-sea, and total groundfish landings (mts) and real revenue^{a/} (1000s of 1999 dollars) for West Coast groundfish 1984 - 2000.

Year	Shoreside		At-sea		Total	
	MTS	\$/1000	MTS	\$/1000	MTS	\$/1000
1984	89,414	\$72,806	0	\$0	89,414	\$72,806
1985	90,724	\$81,334	0	\$0	90,724	\$81,334
1986	82,226	\$79,854	0	\$0	82,226	\$79,854
1987	91,309	\$98,016	0	\$0	91,309	\$98,016
1988	92,149	\$90,607	0	\$0	92,149	\$90,607
1989	99,177	\$87,638	0	\$0	99,177	\$87,638
1990	92,690	\$77,459	4,735	\$965	97,425	\$78,424
1991	101,648	\$82,576	184,150	\$25,542	285,798	\$108,118
1992	132,026	\$80,408	142,866	\$20,022	274,892	\$100,430
1993	115,896	\$70,302	95,826	\$8,238	211,722	\$78,540
1994	135,161	\$72,926	175,204	\$15,357	310,365	\$88,283
1995	134,474	\$89,334	99,803	\$11,022	234,277	\$100,356
1996	145,060	\$82,577	106,213	\$12,150	251,273	\$94,727
1997	140,229	\$78,448	143,064	\$19,768	283,293	\$98,216
1998	129,306	\$52,176	143,321	\$13,892	272,627	\$66,068
1999	123,478	\$54,707	140,600	\$12,468	264,078	\$67,175
2000	120,319	\$57,293	121,043	\$10,842	241,362	\$68,135

^{a/} Real values are historical values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing historical values by the GDP implicit price deflator using 1999 as the base year.

TABLE 2. Average annual real^{a/} ex-vessel prices^{b/} (\$/lb 1999) paid for certain commercially important species, 1984-2000^{c/}.

Species	Year																
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Roundfish																	
Lingcod	\$0.369	\$0.382	\$0.450	\$0.521	\$0.487	\$0.448	\$0.434	\$0.415	\$0.447	\$0.425	\$0.451	\$0.490	\$0.489	\$0.494	\$0.752	\$0.795	1.063
Pacific Cod	\$0.351	\$0.357	\$0.390	\$0.453	\$0.352	\$0.331	\$0.331	\$0.354	\$0.373	\$0.360	\$0.363	\$0.415	\$0.414	\$0.401	\$0.445	\$0.428	0.463
Pacific Whiting	\$0.102	\$0.099	\$0.083	\$0.087	\$0.100	\$0.084	\$0.079	\$0.062	\$0.061	\$0.037	\$0.038	\$0.050	\$0.041	\$0.055	\$0.037	\$0.038	0.04
Sablefish	\$0.331	\$0.487	\$0.532	\$0.657	\$0.694	\$0.599	\$0.585	\$0.806	\$0.757	\$0.623	\$0.899	\$1.435	\$1.474	\$1.634	\$1.189	\$1.164	1.44
Total Roundfish	\$0.310	\$0.399	\$0.439	\$0.498	\$0.451	\$0.390	\$0.308	\$0.102	\$0.098	\$0.078	\$0.067	\$0.115	\$0.107	\$0.113	\$0.063	\$0.074	0.086
Rockfish																	
Canary	\$0.351	\$0.381	\$0.409	\$0.469	\$0.381	\$0.379	\$0.378	\$0.379	\$0.389	\$0.387	\$0.458	\$0.543	\$0.491	\$0.526	\$0.543	\$0.527	0.589
Pacific Ocean Perch	\$0.341	\$0.368	\$0.397	\$0.452	\$0.383	\$0.348	\$0.330	\$0.353	\$0.346	\$0.335	\$0.363	\$0.379	\$0.350	\$0.336	\$0.391	\$0.382	0.427
Shortbelly	\$0.211	\$0.138	\$0.435	\$0.430	\$0.386	\$0.334	\$0.312	\$0.344	\$0.404	\$0.266	\$0.225	\$0.216	\$0.144	\$0.220	\$0.218	\$0.084	0.16
Widow	\$0.342	\$0.367	\$0.396	\$0.445	\$0.385	\$0.336	\$0.332	\$0.334	\$0.332	\$0.322	\$0.344	\$0.358	\$0.326	\$0.328	\$0.378	\$0.390	0.438
Thornyheads	\$0.365	\$0.366	\$0.396	\$0.447	\$0.468	\$0.473	\$0.471	\$0.534	\$0.526	\$0.524	\$0.791	\$1.074	\$0.914	\$0.808	\$0.733	\$0.870	0.991
Other Rockfish																	
Bocaccio	\$0.394	\$0.430	\$0.483	\$0.519	\$0.501	\$0.443	\$0.433	\$0.410	\$0.461	\$0.471	\$0.458	\$0.451	\$0.434	\$0.426	\$0.460	\$0.574	0.69
Chilipepper	\$0.380	\$0.450	\$0.464	\$0.489	\$0.457	\$0.445	\$0.416	\$0.428	\$0.438	\$0.502	\$0.452	\$0.454	\$0.421	\$0.410	\$0.426	\$0.470	0.597
Yellowtail	\$0.344	\$0.374	\$0.411	\$0.462	\$0.383	\$0.371	\$0.367	\$0.376	\$0.375	\$0.365	\$0.376	\$0.397	\$0.361	\$0.398	\$0.395	\$0.387	0.442
Remaining Rockfish	\$0.443	\$0.462	\$0.525	\$0.554	\$0.500	\$0.484	\$0.492	\$0.511	\$0.542	\$0.485	\$0.557	\$0.623	\$0.592	\$0.569	\$0.548	\$0.890	1.101
Unspecified Rockfish	\$0.400	\$0.481	\$0.489	\$0.515	\$0.429	\$0.471	\$0.511	\$0.500	\$0.407	\$0.434	\$0.474	\$0.499	\$0.580	\$0.540	\$0.544	\$0.576	0.907
Total Rockfish	\$0.379	\$0.412	\$0.448	\$0.483	\$0.432	\$0.411	\$0.417	\$0.437	\$0.444	\$0.430	\$0.520	\$0.611	\$0.540	\$0.516	\$0.509	\$0.568	0.643
Flatfish																	
Arrowtooth Flounder	\$0.145	\$0.143	\$0.145	\$0.202	\$0.157	\$0.126	\$0.128	\$0.135	\$0.121	\$0.109	\$0.106	\$0.118	\$0.107	\$0.101	\$0.104	\$0.099	0.114
Dover Sole	\$0.348	\$0.350	\$0.365	\$0.420	\$0.405	\$0.351	\$0.327	\$0.354	\$0.323	\$0.304	\$0.321	\$0.347	\$0.323	\$0.302	\$0.346	\$0.329	0.348
English Sole	\$0.484	\$0.483	\$0.508	\$0.553	\$0.522	\$0.466	\$0.401	\$0.405	\$0.378	\$0.355	\$0.372	\$0.393	\$0.375	\$0.334	\$0.356	\$0.336	0.35
Petrale Sole	\$1.069	\$1.072	\$1.102	\$1.124	\$1.085	\$1.043	\$1.010	\$0.973	\$0.924	\$0.876	\$0.912	\$1.014	\$0.959	\$0.926	\$0.961	\$0.950	0.998
Other Flatfish	\$0.557	\$0.542	\$0.587	\$0.607	\$0.547	\$0.498	\$0.461	\$0.454	\$0.445	\$0.457	\$0.419	\$0.395	\$0.400	\$0.363	\$0.361	\$0.353	0.403
Total Flatfish	\$0.405	\$0.406	\$0.430	\$0.483	\$0.464	\$0.398	\$0.346	\$0.372	\$0.345	\$0.336	\$0.345	\$0.388	\$0.370	\$0.353	\$0.357	\$0.317	0.382
Other Fish																	
	\$0.424	\$0.350	\$0.490	\$0.465	\$0.395	\$0.356	\$0.252	\$0.227	\$0.184	\$0.160	\$0.163	\$0.183	\$0.172	\$0.173	\$0.176	\$0.153	0.175
Grand Total																	
	\$0.371	\$0.406	\$0.440	\$0.487	\$0.446	\$0.402	\$0.367	\$0.173	\$0.167	\$0.170	\$0.130	\$0.200	\$0.176	\$0.163	\$0.113	\$0.118	0.133

^{a/} Real values are historical values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing historical values by the GDP implicit price deflator using 1999 as the base year.^{b/} Exvessel prices for the at-sea component of landings have been estimated.^{c/} This report includes only data for Council Areas: Vancouver, Columbia, Eureka, Monterey, and Concepcion.

TABLE 3. Washington, Oregon, and California shoreside commercial groundfish landings^{a/} (mt) and real^{b/} exvessel value (thousands of 1999 dollars) 1984-2000.

Year	California		Oregon		Washington	
	mt	\$/1000	mt	\$/1000	mt	\$/1000
1984	40,469	\$34,504	28,119	\$22,692	20,826	\$15,610
1985	42,646	\$38,288	28,962	\$24,956	19,116	\$18,090
1986	41,419	\$40,776	24,878	\$23,877	15,929	\$15,201
1987	40,741	\$41,851	30,510	\$33,335	20,058	\$22,830
1988	39,743	\$37,945	32,113	\$31,835	20,293	\$20,827
1989	42,487	\$38,387	36,827	\$32,221	19,863	\$17,030
1990	39,153	\$35,481	35,481	\$28,432	18,056	\$13,546
1991	35,775	\$32,008	49,269	\$34,959	16,604	\$15,609
1992	34,775	\$32,745	81,903	\$35,573	15,348	\$12,090
1993	28,050	\$26,502	71,199	\$32,390	16,647	\$11,410
1994	24,703	\$26,735	94,112	\$35,581	16,346	\$10,610
1995	28,508	\$36,490	92,174	\$40,333	13,792	\$12,511
1996	27,954	\$35,237	96,340	\$35,683	20,766	\$11,657
1997	29,152	\$32,264	95,864	\$34,693	15,213	\$11,491
1998	22,472	\$22,113	89,847	\$23,140	16,987	\$6,923
1999	14,566	\$19,352	92,134	\$27,529	16,778	\$7,826
2000	15,822	\$19,434	85,671	\$29,350	18,826	\$8,509

^{a/} This report includes only data for PacFIN Areas: Vancouver, Columbia, Eureka, Monterey, and Conception

^{b/} Real values are historical values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing historical values by the GDP implicit price deflator using 1999 as the base year.

TABLE 4. Commercial shoreside landings^{a/} (mt) of individual groundfish species by state 1999-2000.

Table 4. Commercial and/or recreational landings (in thousands of pounds) of state fish, 1999-2000.									
Species	California		% CHG	Oregon		% CHG	Washington		% CHG
	1999	2000		1999	2000		1999	2000	
Roundfish									
Lingcod	142	54	-62%	174	64	-63%	42	26	-38%
Pacific Cod	0	0	0%	38	11	-71%	242	268	11%
Pacific Whiting	1,308	4,986	281%	72,954	68,702	-6%	9,099	12,141	33%
Sablefish	1,974	1,859	-6%	2,971	2,808	-5%	1,700	1,577	-7%
Total Roundfish	3,560	7,035	98%	76,164	71,617	-6%	11,083	14,012	26%
Rockfish									
Canary	115	13	-89%	424	33	-92%	123	10	-92%
Pacific Ocean Perch	2	3	50%	324	99	-69%	151	33	-78%
Shortbelly	9	4	-56%	0	15	#DIV/0!			0%
Widow	668	705	6%	2,770	2,710	-2%	514	374	-27%
Thornyheads	1,495	1,240	-17%	1,062	1,050	-1%	88	63	-28%
Other Rockfish									
Bocaccio	113	27	-76%	30	0	-100%	10	2	-80%
Chilipepper	929	444	-52%	2	0	-100%	0	0	0%
Yellowtail	118	54	-54%	1,613	2,003	24%	563	854	52%
Remaining Rockfish	955	734	-23%	828	525	-37%	115	123	7%
Unspecified Rockfish	18	14	-22%	177			253	35	-86%
Total Rockfish	4,423	3,238	-27%	7,231	6,435	-11%	1,818	1,495	-18%
Flatfish									
Arrowtooth Flounder	43	26	-40%	2,278	1,170	-49%	2,964	2,079	-30%
Dover Sole	3,818	3,267	-14%	4,513	4,714	4%	806	758	-6%
English Sole	385	299	-22%	349	246	-30%	178	217	22%
Petrale Sole	567	628	11%	674	860	28%	257	395	54%
Other Flatfish	1,314	1,039	-21%	667	491	-26%	33	70	112%
Total Flatfish	6,128	5,259	-14%	8,481	7,482	-12%	4,239	3,519	-17%
Other Fish									
	1,301	853	-34%	804	939	17%	527	833	58%
Grand Total	15,411	16,385	6%	92,680	86,473	-7%	17,666	19,858	12%

^{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 5. Commercial shoreside landings^{a/} (thousands of dollars) of individual groundfish species by state 1999-2000.

Species	California			Oregon			Washington		
	1999	2000	% CHG	1999	2000	% CHG	1999	2000	% CHG
Roundfish									
Lingcod	\$285	\$145	-49%	\$290	\$156	-46%	\$53	\$37	-30%
Pacific Cod	\$0	\$0	0%	\$37	\$14	-62%	\$227	\$270	19%
Pacific Whiting	\$116	\$753	549%	\$5,913	\$5,980	1%	\$802	\$1,102	37%
Sablefish	\$4,304	\$5,079	18%	\$7,695	\$8,376	17%	\$5,060	\$5,767	14%
Total Roundfish	\$5,810	\$7,270	25%	\$14,033	\$15,305	9%	\$6,142	\$7,176	17%
Rockfish									
Canary	\$149	\$22	-85%	\$517	\$40	-92%	\$105	\$10	-90%
Pacific Ocean Perch	\$1	\$3	200%	\$271	\$92	-66%	\$129	\$33	-74%
Shortbelly	\$2	\$2	0%	\$0	\$5	#DIV/0!			0%
Widow	\$637	\$737	16%	\$2,336	\$2,565	10%	\$429	\$356	-17%
Thornyheads	\$3,132	\$2,983	-5%	\$1,794	\$2,042	14%	\$149	\$112	-25%
Other Rockfish									
Bocaccio	\$148	\$42	-72%	\$39	\$0	-100%	\$9	\$2	-78%
Chilipepper	\$963	\$586	-39%	\$2	\$0	-100%	\$0	\$0	0%
Yellowtail	\$153	\$75	-51%	\$1,370	\$1,941	42%	\$447	\$817	83%
Remaining Rockfish	\$2,603	\$2,531	-3%	\$1,034	\$770	-26%	\$98	\$137	40%
Unspecified Rockfish	\$43	\$55	28%	\$208		#VALUE!	\$319	\$44	-86%
Total Rockfish	\$7,831	\$7,036	-10%	\$7,571	\$7,455	-2%	\$1,685	\$1,511	-10%
Flatfish									
Arrowtooth Flounder	\$10	\$7	-30%	\$483	\$302	-37%	\$655	\$515	-21%
Dover Sole	\$2,788	\$2,409	-14%	\$3,258	\$3,733	15%	\$578	\$572	-1%
English Sole	\$294	\$237	-19%	\$241	\$192	-20%	\$140	\$159	14%
Petrale Sole	\$1,167	\$1,395	20%	\$1,419	\$1,881	33%	\$553	\$867	57%
Other Flatfish	\$1,042	\$932	-11%	\$501	\$437	-13%	\$26	\$52	100%
Total Flatfish	\$5,300	\$4,980	-6%	\$5,902	\$6,545	11%	\$1,952	\$2,165	11%
Other Fish									
	\$519	\$398	-23%	\$190	\$347	83%	\$165	\$261	58%
Grand Total	\$19,461	\$19,684	1%	\$27,696	\$29,652	7%	\$9,945	\$11,113	12%

^{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 6. Real ex-vessel value^{a/} of Pacific Coast commercial fish landings^{b/} for various species groups and their percentage contribution to the total ex-vessel value of all Pacific Coast commercial fish landings, 1984-2000.

Year	Groundfish		Salmon		Tuna		Crab		Coastal Pelagics ^{c/}		Shrimp		Other		Total Value
	Revenue	% total	Revenue	% total	Revenue	% total	Revenue	% total	Revenue	% total	Revenue	% total	Revenue	% total	
1984	\$ 72,806,545	23%	\$ 15,245,666	5%	\$ 121,426,105	38%	\$ 35,039,337	11%	\$ 19,816,720	6%	\$ 8,162,426	3%	\$ 45,200,616	14%	\$ 317,697,416
1985	\$ 81,333,653	29%	\$ 28,761,173	10%	\$ 38,728,447	14%	\$ 38,000,932	14%	\$ 27,381,610	10%	\$ 15,742,879	6%	\$ 49,795,549	18%	\$ 279,744,242
1986	\$ 79,853,904	28%	\$ 34,457,937	11%	\$ 40,014,994	13%	\$ 34,832,525	11%	\$ 27,571,728	9%	\$ 45,941,972	15%	\$ 50,410,757	16%	\$ 313,083,817
1987	\$ 98,015,783	25%	\$ 61,389,266	16%	\$ 49,891,139	13%	\$ 37,582,350	10%	\$ 28,596,416	7%	\$ 65,612,048	17%	\$ 50,869,500	13%	\$ 391,956,501
1988	\$ 90,607,293	21%	\$ 87,664,051	20%	\$ 62,457,371	14%	\$ 59,455,532	14%	\$ 33,637,351	8%	\$ 41,403,046	10%	\$ 55,843,102	13%	\$ 431,067,746
1989	\$ 87,638,540	26%	\$ 32,188,028	10%	\$ 34,479,105	10%	\$ 52,560,232	16%	\$ 28,427,925	9%	\$ 38,741,395	12%	\$ 59,752,921	18%	\$ 333,788,145
1990	\$ 77,458,939	26%	\$ 24,962,012	8%	\$ 18,711,677	6%	\$ 58,000,558	19%	\$ 27,298,350	9%	\$ 35,779,793	12%	\$ 59,991,523	20%	\$ 302,202,851
1991	\$ 82,576,358	32%	\$ 15,727,749	6%	\$ 10,669,233	4%	\$ 27,245,465	10%	\$ 27,137,500	10%	\$ 30,876,233	12%	\$ 67,005,404	26%	\$ 261,237,942
1992	\$ 80,407,988	30%	\$ 9,741,831	4%	\$ 20,354,078	7%	\$ 46,230,014	17%	\$ 21,190,662	8%	\$ 34,342,525	13%	\$ 60,100,420	22%	\$ 272,367,518
1993	\$ 70,301,747	28%	\$ 9,156,737	4%	\$ 23,898,339	10%	\$ 48,901,145	20%	\$ 18,625,107	7%	\$ 21,942,722	9%	\$ 57,432,642	23%	\$ 250,258,439
1994	\$ 72,926,471	27%	\$ 7,788,750	3%	\$ 29,564,358	11%	\$ 58,262,342	21%	\$ 27,444,927	10%	\$ 25,564,867	9%	\$ 53,594,704	19%	\$ 275,146,419
1995	\$ 89,333,614	29%	\$ 16,137,289	5%	\$ 21,028,604	7%	\$ 68,462,877	22%	\$ 40,411,982	13%	\$ 23,869,647	8%	\$ 46,817,880	15%	\$ 306,061,894
1996	\$ 82,576,122	25%	\$ 9,492,596	3%	\$ 40,327,737	12%	\$ 77,594,365	24%	\$ 50,028,234	15%	\$ 25,068,211	8%	\$ 41,222,378	13%	\$ 326,309,642
1997	\$ 78,448,264	28%	\$ 10,194,349	4%	\$ 34,150,906	12%	\$ 52,767,093	19%	\$ 46,568,379	16%	\$ 23,540,514	8%	\$ 37,988,356	13%	\$ 283,657,861
1998	\$ 52,176,390	26%	\$ 5,567,818	3%	\$ 33,801,459	18%	\$ 47,442,066	25%	\$ 10,243,677	5%	\$ 13,936,557	7%	\$ 25,832,635	14%	\$ 189,000,601
1999	\$ 54,707,487	22%	\$ 9,201,644	4%	\$ 23,644,964	9%	\$ 66,041,350	27%	\$ 42,991,581	17%	\$ 20,045,114	8%	\$ 32,553,838	13%	\$ 249,185,977
2000	\$ 57,293,351	23%	\$ 13,283,363	5%	\$ 19,699,650	8%	\$ 59,951,303	24%	\$ 40,237,385	16%	\$ 20,223,859	8%	\$ 37,076,471	15%	\$ 247,765,382

^{a/} Real values are historical values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing historical values by the GDP implicit price deflator using 1999 as the base year.

^{b/} Does not include landings of fish caught in Puget Sound, Alaska, Mexico, or other waters not in the EEZ of Washington, Oregon, or California.

^{c/} Coastal Pelagics include chub, jack and other mackerel; northern and other anchovy; market squid; Pacific and round herring; and Pacific bonito.

Table 7. Landings^{av} (mts) and real^{bv} ex-vessel value (1999 dollars) for all groundfish, all rockfish, and sablefish stratified by gear type and percentages each gear contributed to the total landed catch and ex-vessel value for each species group in 1999 and 2000.

Species Group	Gear Type	1999				2000				% change 1999-2000	
		mts	% of total	value	% of total	mts	% of total	value	% of total	mts	value
All Groundfish	Groundfish Trawl	118,147	96%	39,344,034	72%	115,659	96%	40,884,771	71%	-2%	4%
	Shrimp Trawl	417	0%	457,260	1%	307	0%	461,120	1%	-26%	1%
	Hook and Line	3,869	3%	11,777,161	22%	3,364	3%	12,082,689	21%	-13%	3%
	Fish Pot	823	1%	2,823,644	5%	880	1%	3,684,127	6%	7%	30%
	Other Net	125	0%	167,393	0%	78	0%	108,928	0%	-38%	-35%
	Other	98	0%	137,994	0%	31	0%	71,716	0%	-68%	-48%
	Total	123,478		54,707,487		120,319		57,293,351		-3%	5%
All Rockfish	Groundfish Trawl	11,687	87%	12,138,373	71%	10,164	92%	12,161,994	76%	-13%	0%
	Shrimp Trawl	173	1%	178,578	1%	143	1%	172,260	1%	-17%	-4%
	Hook and Line	1,406	10%	4,288,476	25%	726	7%	3,264,917	21%	-48%	-24%
	Fish Pot	30	0%	205,645	1%	31	0%	225,778	1%	3%	10%
	Other Net	44	0%	72,358	0%	17	0%	37,400	0%	-61%	-48%
	Other	71	1%	97,717	1%	15	0%	36,537	0%	-79%	-63%
	Total	13,411		16,981,146		11,097		15,898,886		-17%	-6%
Sablefish Only	Groundfish Trawl	3,123	53%	6,651,414	44%	2,632	47%	6,750,782	39%	-16%	1%
	Shrimp Trawl	46	1%	88,401	1%	61	1%	175,424	1%	33%	98%
	Hook and Line	2,020	34%	6,083,352	41%	2,048	37%	7,428,839	43%	1%	22%
	Fish Pot	744	13%	2,186,697	15%	796	14%	2,965,488	17%	7%	36%
	Other Net	1	0%	2,067	0%	1	0%	4,448	0%	0%	113%
	Other	3	0%	5,797	0%	4	0%	10,796	0%	33%	86%
	Total	5,936		15,017,748		5,542		17,335,777		-7%	15%

^{av} Does not include fish landed by domestic at-sea processors or landings of fish caught in Puget Sound, Alaska, Mexico, or other waters not in the EEZ of Washington, Oregon, or California.

^{bv} Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 1999.

Table 8. Landings^{a/} (mts) and real ex-vessel^{b/} value (thousands of 1999 dollars) for groundfish landed to West Coast ports stratified by gear type (1984 - 2000).

Year	Groundfish Trawl		Shrimp Trawl		Hook and Line		Fish Pot		Other Net		Other		Total	
	mts	value	mts	value	mts	value	mts	value	mts	value	mts	value	mts	value
1984	76,498	\$58,646,175	495	\$370,561	2,395	\$3,453,298	3,856	\$3,354,230	2,181	\$2,966,186	3,989	\$4,016,096	89,414	\$72,806,545
1985	74,891	\$59,964,276	520	\$400,919	4,944	\$8,070,943	3,713	\$4,625,122	3,913	\$4,302,816	2,741	\$3,369,577	90,723	\$81,333,653
1986	61,540	\$52,897,768	1,598	\$1,330,635	6,226	\$10,101,117	2,250	\$3,160,434	4,162	\$5,056,454	6,450	\$7,307,497	82,227	\$79,853,904
1987	73,895	\$71,189,243	1,618	\$1,578,688	7,518	\$13,898,352	2,130	\$3,368,729	3,826	\$4,945,989	2,321	\$3,034,783	91,309	\$98,015,783
1988	73,741	\$65,593,412	1,310	\$891,603	6,317	\$12,350,509	2,159	\$3,588,942	2,876	\$3,615,998	5,746	\$4,566,829	92,149	\$90,607,293
1989	84,483	\$67,358,273	1,232	\$842,982	6,379	\$10,830,187	2,112	\$3,020,689	2,906	\$3,434,282	2,065	\$2,152,127	99,176	\$87,638,540
1990	78,651	\$58,106,058	965	\$663,922	6,163	\$10,564,311	1,528	\$2,015,122	2,862	\$3,453,588	2,521	\$2,655,937	92,690	\$77,458,939
1991	88,837	\$60,476,333	873	\$667,694	7,779	\$16,048,578	1,086	\$1,994,446	1,780	\$2,015,499	1,294	\$1,373,807	101,648	\$82,576,358
1992	118,464	\$59,591,394	925	\$715,801	8,557	\$15,059,182	794	\$1,431,528	1,710	\$1,892,653	1,576	\$1,717,431	132,026	\$80,407,988
1993	104,674	\$54,016,638	1,596	\$1,125,910	7,130	\$11,899,342	872	\$1,355,607	1,232	\$1,446,366	393	\$457,884	115,896	\$70,301,747
1994	125,512	\$55,574,342	885	\$834,324	5,988	\$11,614,158	1,381	\$3,157,910	748	\$887,075	648	\$858,662	135,160	\$72,926,471
1995	126,018	\$68,821,961	744	\$793,299	5,565	\$14,687,144	1,050	\$3,620,629	782	\$951,260	315	\$459,320	134,474	\$89,333,614
1996	136,186	\$60,450,126	879	\$875,437	6,586	\$17,274,255	821	\$3,210,232	321	\$432,252	267	\$333,819	145,059	\$82,576,122
1997	132,294	\$55,078,103	368	\$404,755	6,231	\$19,338,101	609	\$2,756,037	310	\$391,627	418	\$479,641	140,230	\$78,448,264
1998	123,591	\$39,118,436	375	\$425,686	4,145	\$10,128,897	525	\$1,744,440	373	\$424,804	297	\$334,128	129,306	\$52,176,390
1999	118,147	\$39,344,034	417	\$457,260	3,869	\$11,777,161	823	\$2,823,644	125	\$167,393	98	\$137,994	123,478	\$54,707,487
2000	115,659	\$40,884,771	307	\$461,120	3,364	\$12,082,689	880	\$3,684,127	78	\$108,928	31	\$71,716	120,319	\$57,293,351

^{a/} Does not include fish landed by domestic at-sea processors or landings of fish caught in Puget Sound, Alaska, Mexico, or other waters not in the EEZ of Washington, Oregon, or California.

^{b/} Real values are historical values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing historical values by the GDP implicit price deflator using 1999 as the base year.

Table 9. Coastwide landings^{a/} (mts) for various groundfish species groups, stratified by gear group, 1985-2000.

Gear Group/ Species Group	Year															
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GF Trawl																
Sablefish	7,164	6,062	6,342	5,275	5,658	5,037	4,858	5,209	4,805	3,749	3,814	4,171	3,739	2,144	3,123	2,632
Pacific Whiting	3,891	3,371	4,741	5,032	6,862	7,864	20,549	56,126	42,107	73,615	75,716	85,593	87,410	87,827	83,419	85,829
Total Roundfish	14,352	10,995	15,142	15,458	17,177	15,954	29,816	64,466	49,914	79,628	81,109	91,406	92,919	90,597	87,027	88,801
Total Rockfish	30,081	26,325	31,099	32,641	37,674	35,293	28,181	28,637	31,230	26,619	25,592	24,519	20,339	16,537	11,687	10,165
Dover Sole	20,426	16,312	17,790	17,247	18,745	15,430	17,900	15,556	14,228	9,227	10,490	12,131	10,075	7,962	9,012	8,690
Total Flatfish	30,179	24,062	27,489	25,380	29,443	26,883	29,950	24,144	21,915	17,283	18,102	19,320	18,120	15,371	18,645	16,158
All Other GF	279	158	165	262	188	522	889	1,218	1,616	1,982	1,215	942	916	1,086	788	536
Total Trawl	74,891	61,540	73,895	73,741	84,483	78,652	88,837	118,464	104,674	125,512	126,018	136,186	132,294	123,591	118,147	115,659
Fixed Gear																
Sablefish	6,386	5,731	6,208	5,186	4,465	3,448	4,183	3,484	2,854	3,371	3,263	3,252	3,345	1,754	2,764	2,843
Total Roundfish	6,611	5,987	6,595	5,596	5,121	4,003	4,527	3,824	3,152	3,708	3,613	3,695	3,804	2,091	3,057	3,065
Total Rockfish	1,883	2,352	2,815	2,683	3,073	3,497	4,081	5,309	4,379	3,290	2,872	2,812	2,553	2,399	1,436	758
All Other GF	106	32	53	67	217	138	209	182	421	348	112	871	463	171	176	408
Total Fixed Gear	8,658	8,476	9,648	8,476	8,490	7,691	8,865	9,351	8,001	7,368	6,615	7,407	6,840	4,670	4,692	4,243
All Other Gears																
Sablefish	710	1,453	130	408	168	456	146	318	163	134	80	83	40	30	50	67
Total Roundfish	1,506	1,948	612	2,694	1,205	1,106	432	537	453	343	224	169	121	55	93	97
Total Rockfish	5,364	8,203	6,143	5,630	4,545	4,414	2,942	3,000	2,589	1,640	1,343	1,038	826	830	287	175
All Other GF	136	122	130	93	83	70	58	49	48	55	46	72	62	56	77	55
Total Other Gears	7,174	12,211	7,765	9,932	6,203	6,348	3,947	4,211	3,221	2,280	1,841	1,466	1,096	1,045	640	417
Coastwide Total	90,723	82,227	91,309	92,149	99,176	92,690	101,648	132,026	115,896	135,160	134,474	145,059	140,230	129,306	123,478	120,319

^{a/} Does not include fish landed by domestic at-sea processors or landings of fish caught in Puget Sound, Alaska, Mexico, or other waters not in the EEZ of Washington, Oregon, or California.

Table 10. Coastwide real ex-vessel value^{a/} (1999 dollars/1000) for landings^{b/} of various groundfish species groups, stratified by gear group, 1985-2000.

Gear Group/ Species Group	Year															
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GF Trawl																
Sablefish	\$ 3,453	\$ 3,594	\$ 4,596	\$ 4,212	\$ 4,576	\$ 3,999	\$ 4,439	\$ 5,584	\$ 4,466	\$ 5,706	\$ 9,860	\$ 10,686	\$ 10,167	\$ 5,179	\$ 6,651	\$ 6,866
Pacific Whiting	\$ 569	\$ 437	\$ 653	\$ 800	\$ 976	\$ 1,010	\$ 2,325	\$ 5,883	\$ 2,841	\$ 4,901	\$ 7,899	\$ 5,133	\$ 8,160	\$ 4,764	\$ 6,833	\$ 7,967
Total Roundfish	\$ 5,804	\$ 4,950	\$ 8,247	\$ 8,266	\$ 8,474	\$ 7,000	\$ 9,810	\$ 13,771	\$ 9,517	\$ 12,373	\$ 19,162	\$ 17,299	\$ 19,900	\$ 10,630	\$ 14,032	\$ 15,241
Total Rockfish	\$ 16,746	\$ 16,324	\$ 22,212	\$ 21,472	\$ 24,089	\$ 23,671	\$ 20,495	\$ 21,902	\$ 23,938	\$ 26,036	\$ 30,473	\$ 25,217	\$ 19,780	\$ 15,637	\$ 12,138	\$ 12,369
Dover Sole	\$ 10,805	\$ 9,255	\$ 11,941	\$ 11,603	\$ 11,355	\$ 9,092	\$ 11,881	\$ 9,675	\$ 8,541	\$ 5,996	\$ 7,534	\$ 8,257	\$ 6,514	\$ 5,979	\$ 6,533	\$ 6,787
Total Flatfish	\$ 18,445	\$ 15,878	\$ 21,090	\$ 19,442	\$ 20,082	\$ 16,611	\$ 20,762	\$ 15,968	\$ 14,481	\$ 11,962	\$ 14,522	\$ 14,978	\$ 13,678	\$ 11,858	\$ 12,943	\$ 13,792
All Other GF	\$ 73	\$ 47	\$ 64	\$ 94	\$ 71	\$ 170	\$ 272	\$ 352	\$ 418	\$ 589	\$ 393	\$ 257	\$ 257	\$ 340	\$ 231	\$ 179
Total Trawl	\$ 41,069	\$ 37,199	\$ 51,614	\$ 49,274	\$ 52,716	\$ 47,452	\$ 51,340	\$ 51,992	\$ 48,354	\$ 50,960	\$ 64,549	\$ 57,752	\$ 53,614	\$ 38,465	\$ 39,344	\$ 41,580
Fixed Gear																
Sablefish	\$ 6,410	\$ 6,284	\$ 8,634	\$ 7,990	\$ 5,862	\$ 4,850	\$ 8,981	\$ 6,873	\$ 4,795	\$ 7,206	\$ 10,426	\$ 12,067	\$ 14,381	\$ 4,793	\$ 8,270	\$ 10,571
Total Roundfish	\$ 6,580	\$ 6,545	\$ 9,060	\$ 8,434	\$ 6,498	\$ 5,452	\$ 9,408	\$ 7,326	\$ 5,273	\$ 7,893	\$ 11,467	\$ 13,332	\$ 15,773	\$ 6,348	\$ 9,988	\$ 12,258
Total Rockfish	\$ 2,030	\$ 2,672	\$ 3,298	\$ 3,395	\$ 4,178	\$ 4,723	\$ 5,781	\$ 6,947	\$ 6,368	\$ 5,483	\$ 5,632	\$ 5,915	\$ 5,548	\$ 5,248	\$ 4,494	\$ 3,550
All Other GF	\$ 28	\$ 12	\$ 23	\$ 26	\$ 85	\$ 47	\$ 70	\$ 61	\$ 161	\$ 127	\$ 46	\$ 284	\$ 151	\$ 59	\$ 75	\$ 184
Total Fixed Gear	\$ 8,696	\$ 9,326	\$ 12,519	\$ 11,974	\$ 10,840	\$ 10,273	\$ 15,317	\$ 14,388	\$ 11,865	\$ 13,546	\$ 17,171	\$ 19,570	\$ 21,507	\$ 11,675	\$ 14,601	\$ 16,035
All Other Gears																
Sablefish	\$ 643	\$ 1,058	\$ 94	\$ 285	\$ 112	\$ 410	\$ 126	\$ 342	\$ 91	\$ 201	\$ 182	\$ 189	\$ 91	\$ 61	\$ 96	\$ 194
Total Roundfish	\$ 1,165	\$ 1,418	\$ 480	\$ 1,015	\$ 681	\$ 788	\$ 345	\$ 541	\$ 349	\$ 403	\$ 336	\$ 288	\$ 181	\$ 99	\$ 165	\$ 256
Total Rockfish	\$ 4,415	\$ 6,573	\$ 5,425	\$ 4,430	\$ 3,832	\$ 4,044	\$ 2,578	\$ 2,718	\$ 2,169	\$ 1,686	\$ 1,471	\$ 1,046	\$ 905	\$ 894	\$ 349	\$ 250
All Other GF	\$ 228	\$ 204	\$ 197	\$ 154	\$ 149	\$ 114	\$ 97	\$ 80	\$ 72	\$ 59	\$ 57	\$ 67	\$ 77	\$ 66	\$ 83	\$ 57
Total Other Gears	\$ 5,940	\$ 9,630	\$ 6,931	\$ 6,817	\$ 5,032	\$ 5,532	\$ 3,444	\$ 3,774	\$ 2,713	\$ 2,366	\$ 2,067	\$ 1,568	\$ 1,242	\$ 1,165	\$ 763	\$ 653
Coastwide Total																
	\$ 55,705	\$ 56,155	\$ 71,064	\$ 68,085	\$ 68,587	\$ 63,256	\$ 70,101	\$ 70,154	\$ 62,932	\$ 66,872	\$ 83,787	\$ 78,890	\$ 76,364	\$ 51,304	\$ 54,707	\$ 58,267

^{a/} Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 1999.

^{b/} Does not include fish landed by domestic at-sea processors or landings of fish caught in the EEZ of Washington, Oregon, or California.

Table 11. Washington landings^{a/} (mts) for various groundfish species groups, stratified by gear group, 1985-2000.

Gear Group/ Species Group	Year															
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GF Trawl																
Sablefish	748	556	832	675	474	349	325	362	427	388	368	376	351	187	283	212
Pacific Whiting	14	60	95	89	27	296	504	2,237	3,188	4,884	4,274	11,655	7,241	10,513	9,099	12,141
Total Roundfish	2,706	1,467	3,277	3,614	2,820	2,227	2,891	4,429	5,033	6,353	5,286	12,696	8,374	11,056	9,645	12,628
Total Rockfish	5,665	7,180	7,975	8,350	7,689	6,312	4,864	4,320	4,996	4,031	4,085	3,568	2,431	1,891	1,514	1,318
Dover Sole	2,791	1,451	1,578	2,225	2,177	1,852	1,684	1,308	1,275	959	927	1,125	845	630	792	746
Total Flatfish	6,001	4,115	5,003	4,656	6,177	6,998	5,669	3,658	3,084	3,005	2,426	2,791	2,662	2,805	4,216	3,505
All Other GF	198	84	91	134	83	340	627	867	817	985	309	185	333	299	354	261
Total Trawl	14,570	12,844	16,346	16,754	16,769	15,876	14,052	13,273	13,930	14,375	12,107	19,240	13,800	16,050	15,729	17,712
Fixed Gear																
Sablefish	2,770	1,812	2,274	2,251	1,794	1,129	1,608	1,051	881	666	811	727	892	544	704	651
Total Roundfish	2,880	1,875	2,399	2,355	1,895	1,270	1,690	1,104	925	702	833	763	928	552	718	662
Total Rockfish	377	388	600	372	283	224	188	319	525	545	510	390	294	307	223	67
All Other GF	101	28	49	62	207	134	204	177	416	337	7	51	82	0	43	315
Total Fixed Gear	3,360	2,295	3,079	2,801	2,388	1,631	2,095	1,601	1,867	1,587	1,354	1,206	1,312	861	987	1,046
All Other Gears																
Sablefish	311	23	24	5	6	10	5	33	84	26	29	33	7	7	6	11
Total Roundfish	772	149	125	109	145	112	37	74	167	76	74	61	24	11	9	16
Total Rockfish	390	580	442	610	555	396	396	390	651	250	190	220	67	57	34	40
All Other GF	1	1	3	1	0	0	0	0	0	0	0	0	0	0	4	0
Total Other Gears	1,186	789	633	738	706	549	457	473	850	384	331	320	102	76	63	69
Washington Total	19,116	15,929	20,058	20,293	19,863	18,056	16,604	15,348	16,647	16,346	13,792	20,766	15,214	16,987	16,778	18,826

^{a/} Does not include fish landed by domestic at-sea processors or landings of fish caught in Puget Sound, Alaska, Mexico, or other waters not in the EEZ of Washington, Oregon, or California.

Table 12. Washington real ex-vessel value^{a/} ('1999 dollars/1000) for landings^{b/} of various groundfish species groups, stratified by gear group, 1985-2000.

Gear Group/ Species Group	Year															
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GF Trawl																
Sablefish	\$ 408	\$ 334	\$ 594	\$ 597	\$ 360	\$ 269	\$ 308	\$ 390	\$ 490	\$ 786	\$ 1,073	\$ 1,094	\$ 1,064	\$ 479	\$ 707	\$ 671
Pacific Whiting	\$ 2	\$ 8	\$ 18	\$ 19	\$ 5	\$ 45	\$ 80	\$ 209	\$ 210	\$ 253	\$ 390	\$ 721	\$ 756	\$ 618	\$ 800	\$ 1,120
Total Roundfish	\$ 1,433	\$ 837	\$ 2,335	\$ 2,296	\$ 1,722	\$ 1,295	\$ 1,764	\$ 1,912	\$ 1,711	\$ 1,847	\$ 2,026	\$ 2,410	\$ 2,491	\$ 1,441	\$ 1,760	\$ 2,077
Total Rockfish	\$ 3,110	\$ 4,413	\$ 5,696	\$ 5,284	\$ 4,491	\$ 3,744	\$ 3,175	\$ 2,957	\$ 3,389	\$ 3,358	\$ 3,947	\$ 3,023	\$ 2,075	\$ 1,574	\$ 1,307	\$ 1,329
Dover Sole	\$ 1,481	\$ 818	\$ 1,058	\$ 1,473	\$ 1,307	\$ 1,069	\$ 1,055	\$ 803	\$ 802	\$ 617	\$ 690	\$ 800	\$ 557	\$ 470	\$ 569	\$ 573
Total Flatfish	\$ 3,163	\$ 2,254	\$ 3,495	\$ 3,217	\$ 3,521	\$ 3,228	\$ 2,981	\$ 2,101	\$ 1,856	\$ 1,596	\$ 1,856	\$ 1,829	\$ 1,645	\$ 1,693	\$ 1,937	\$ 2,190
All Other GF	\$ 38	\$ 19	\$ 22	\$ 39	\$ 21	\$ 102	\$ 200	\$ 279	\$ 204	\$ 300	\$ 96	\$ 52	\$ 113	\$ 99	\$ 120	\$ 86
Total Trawl	\$ 7,745	\$ 7,522	\$ 11,548	\$ 10,836	\$ 9,755	\$ 8,369	\$ 8,121	\$ 7,249	\$ 7,159	\$ 7,101	\$ 7,925	\$ 7,313	\$ 6,324	\$ 4,806	\$ 5,123	\$ 5,682
Fixed Gear																
Sablefish	\$ 3,378	\$ 2,322	\$ 3,888	\$ 4,005	\$ 2,722	\$ 1,947	\$ 4,461	\$ 2,566	\$ 1,852	\$ 1,595	\$ 2,935	\$ 3,054	\$ 4,349	\$ 1,573	\$ 2,303	\$ 2,632
Total Roundfish	\$ 3,448	\$ 2,379	\$ 4,008	\$ 4,096	\$ 2,817	\$ 2,086	\$ 4,559	\$ 2,628	\$ 1,900	\$ 1,636	\$ 2,962	\$ 3,098	\$ 4,394	\$ 1,582	\$ 2,322	\$ 2,646
Total Rockfish	\$ 271	\$ 285	\$ 496	\$ 279	\$ 257	\$ 227	\$ 194	\$ 280	\$ 457	\$ 576	\$ 541	\$ 424	\$ 344	\$ 343	\$ 303	\$ 99
All Other GF	\$ 20	\$ 5	\$ 12	\$ 18	\$ 67	\$ 41	\$ 62	\$ 50	\$ 152	\$ 114	\$ 2	\$ 15	\$ 30	\$ 0	\$ 17	\$ 139
Total Fixed Gear	\$ 3,740	\$ 2,671	\$ 4,529	\$ 4,397	\$ 3,142	\$ 2,355	\$ 4,818	\$ 2,959	\$ 2,510	\$ 2,329	\$ 3,507	\$ 3,538	\$ 4,771	\$ 1,926	\$ 2,643	\$ 2,885
All Other Gears																
Sablefish	\$ 389	\$ 14	\$ 17	\$ 3	\$ 4	\$ 6	\$ 3	\$ 29	\$ 43	\$ 33	\$ 61	\$ 69	\$ 15	\$ 13	\$ 12	\$ 29
Total Roundfish	\$ 677	\$ 117	\$ 112	\$ 100	\$ 140	\$ 90	\$ 41	\$ 76	\$ 115	\$ 81	\$ 104	\$ 95	\$ 34	\$ 17	\$ 17	\$ 37
Total Rockfish	\$ 219	\$ 352	\$ 320	\$ 303	\$ 287	\$ 232	\$ 263	\$ 260	\$ 409	\$ 185	\$ 154	\$ 163	\$ 50	\$ 51	\$ 29	\$ 39
All Other GF	\$ 0	\$ 1	\$ 5	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 1	\$ 0
Total Other Gears	\$ 905	\$ 496	\$ 476	\$ 413	\$ 431	\$ 338	\$ 312	\$ 341	\$ 544	\$ 300	\$ 303	\$ 285	\$ 91	\$ 76	\$ 60	\$ 87
Washington Total	\$ 12,390	\$ 10,690	\$ 16,552	\$ 15,645	\$ 13,328	\$ 11,062	\$ 13,251	\$ 10,548	\$ 10,213	\$ 9,729	\$ 11,734	\$ 11,136	\$ 11,186	\$ 6,808	\$ 7,826	\$ 8,654

^{a/} Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 1999.

^{b/} Does not include fish landed by domestic at-sea processors or landings of fish caught in Puget Sound, Alaska, Mexico, or other waters not in the EEZ of Washington, Oregon, or California.

Table 13. Oregon landings^{a/} (mts) for various groundfish species groups, stratified by gear group, 1985-2000.

Table 13. Oregon landings (mt) for various groundfish species groups, stratified by gear group, 1985-2000.																
Gear Group/ Species Group	Year															
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GF Trawl																
Sablefish	2,840	2,122	2,516	2,146	2,601	2,517	2,440	2,461	2,458	1,980	1,843	2,044	1,831	1,040	1,635	1,457
Pacific Whiting	884	419	176	246	89	2,294	13,204	48,959	35,821	65,119	67,353	71,083	73,837	71,619	73,013	68,702
Total Roundfish	4,707	3,055	3,900	4,281	4,461	5,765	17,565	52,446	39,482	67,959	69,835	73,812	76,336	72,849	74,783	70,197
Total Rockfish	12,459	10,477	12,992	14,140	17,344	15,910	14,865	16,104	17,688	15,167	12,685	12,511	9,936	7,842	6,643	6,178
Dover Sole	5,691	4,772	6,017	7,648	8,886	7,488	8,793	6,056	6,463	3,846	3,507	4,630	3,938	3,769	4,431	4,678
Total Flatfish	8,595	7,292	9,010	10,529	12,353	11,295	14,014	10,390	10,456	7,529	7,028	7,359	7,157	7,042	8,360	7,423
All Other GF	3	2	4	21	53	95	183	197	407	469	528	441	309	435	213	134
Total Trawl	25,764	20,826	25,906	28,971	34,212	33,064	46,627	79,138	68,033	91,125	90,076	94,122	93,737	88,168	89,999	83,932
Fixed Gear																
Sablefish	2,412	2,503	2,688	1,909	1,320	1,178	1,445	1,301	1,319	2,005	1,278	1,096	1,076	696	1,298	1,305
Total Roundfish	2,474	2,581	2,807	2,020	1,443	1,305	1,511	1,386	1,396	2,144	1,352	1,189	1,222	762	1,366	1,356
Total Rockfish	365	441	637	340	380	500	656	811	847	527	487	550	673	684	455	168
All Other GF	1	1	2	2	0	0	0	0	0	0	0	0	1	1	1	0
Total Fixed Gear	2,841	3,027	3,452	2,363	1,824	1,806	2,168	2,198	2,244	2,673	1,841	1,741	1,898	1,448	1,823	1,528
All Other Gears																
Sablefish	19	28	28	28	23	9	12	89	59	20	14	35	18	14	39	47
Total Roundfish	68	129	99	81	91	38	33	112	105	58	36	63	46	27	72	66
Total Rockfish	260	825	993	663	672	542	415	427	789	225	176	339	145	155	120	89
All Other GF	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	1
Total Other Gears	357	1,025	1,152	780	791	610	474	567	923	314	258	477	229	231	312	211
Oregon Total	28,962	24,878	30,510	32,114	36,827	35,481	49,269	81,903	71,199	94,112	92,174	96,340	95,864	89,847	92,134	85,671

^{a/} Does not include fish landed by domestic at-sea processors or landings of fish caught in Puget Sound, Alaska, Mexico, or other waters not in the EEZ of Washington, Oregon, or California.

Table 14. Oregon real ex-vessel value^{a/} (1999 dollars/1000) for landings^{b/} of various groundfish species groups, stratified by gear group, 1985-2000.

Gear Group/ Species Group	Year															
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GF Trawl																
Sablefish	\$ 1,405	\$ 1,288	\$ 1,866	\$ 1,744	\$ 2,124	\$ 1,991	\$ 2,307	\$ 2,790	\$ 2,329	\$ 3,114	\$ 4,946	\$ 5,391	\$ 5,063	\$ 2,652	\$ 3,555	\$ 3,945
Pacific Whiting	\$ 173	\$ 60	\$ 32	\$ 41	\$ 15	\$ 219	\$ 1,373	\$ 5,078	\$ 2,289	\$ 4,298	\$ 7,056	\$ 4,177	\$ 6,823	\$ 3,756	\$ 5,918	\$ 6,081
Total Roundfish	\$ 2,122	\$ 1,649	\$ 2,789	\$ 3,047	\$ 3,283	\$ 2,833	\$ 5,020	\$ 8,630	\$ 5,508	\$ 8,083	\$ 12,565	\$ 10,176	\$ 12,478	\$ 6,639	\$ 9,642	\$ 10,091
Total Rockfish	\$ 6,886	\$ 6,406	\$ 9,216	\$ 8,962	\$ 10,608	\$ 10,483	\$ 10,752	\$ 11,753	\$ 12,895	\$ 14,072	\$ 14,263	\$ 12,121	\$ 9,150	\$ 7,245	\$ 6,464	\$ 7,017
Dover Sole	\$ 3,151	\$ 2,800	\$ 4,155	\$ 5,198	\$ 5,460	\$ 4,522	\$ 5,961	\$ 3,726	\$ 3,867	\$ 2,519	\$ 2,578	\$ 3,234	\$ 2,625	\$ 2,855	\$ 3,197	\$ 3,767
Total Flatfish	\$ 5,533	\$ 5,293	\$ 7,328	\$ 8,280	\$ 8,622	\$ 7,339	\$ 10,005	\$ 6,725	\$ 6,740	\$ 5,068	\$ 5,592	\$ 5,726	\$ 5,429	\$ 5,371	\$ 5,808	\$ 6,612
All Other GF	\$ 3	\$ 3	\$ 4	\$ 9	\$ 21	\$ 28	\$ 43	\$ 30	\$ 100	\$ 125	\$ 163	\$ 109	\$ 68	\$ 116	\$ 42	\$ 40
Total Trawl	\$ 14,545	\$ 13,351	\$ 19,336	\$ 20,297	\$ 22,533	\$ 20,683	\$ 25,820	\$ 27,138	\$ 25,244	\$ 27,349	\$ 32,583	\$ 28,132	\$ 27,125	\$ 19,371	\$ 21,955	\$ 23,761
Fixed Gear																
Sablefish	\$ 2,038	\$ 2,325	\$ 3,189	\$ 2,699	\$ 1,706	\$ 1,495	\$ 2,760	\$ 2,539	\$ 2,121	\$ 4,226	\$ 4,156	\$ 4,565	\$ 5,097	\$ 1,920	\$ 4,065	\$ 5,048
Total Roundfish	\$ 2,088	\$ 2,406	\$ 3,327	\$ 2,826	\$ 1,833	\$ 1,637	\$ 2,839	\$ 2,649	\$ 2,219	\$ 4,412	\$ 4,258	\$ 4,698	\$ 5,345	\$ 2,076	\$ 4,276	\$ 5,299
Total Rockfish	\$ 252	\$ 388	\$ 662	\$ 344	\$ 376	\$ 521	\$ 700	\$ 859	\$ 917	\$ 614	\$ 752	\$ 829	\$ 1,077	\$ 1,083	\$ 977	\$ 471
All Other GF	\$ 1	\$ 2	\$ 3	\$ 1	\$ 1	\$ 0	\$ 0	\$ 1	\$ 0	\$ 0	\$ 0	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1
Total Fixed Gear	\$ 2,342	\$ 2,798	\$ 3,996	\$ 3,172	\$ 2,210	\$ 2,159	\$ 3,540	\$ 3,510	\$ 3,137	\$ 5,027	\$ 5,011	\$ 5,528	\$ 6,424	\$ 3,160	\$ 5,255	\$ 5,772
All Other Gears																
Sablefish	\$ 9	\$ 17	\$ 21	\$ 16	\$ 14	\$ 6	\$ 8	\$ 72	\$ 29	\$ 27	\$ 35	\$ 85	\$ 47	\$ 30	\$ 73	\$ 140
Total Roundfish	\$ 43	\$ 98	\$ 77	\$ 58	\$ 66	\$ 29	\$ 24	\$ 89	\$ 66	\$ 60	\$ 56	\$ 113	\$ 76	\$ 44	\$ 119	\$ 180
Total Rockfish	\$ 149	\$ 507	\$ 713	\$ 366	\$ 393	\$ 333	\$ 278	\$ 281	\$ 527	\$ 169	\$ 147	\$ 262	\$ 119	\$ 137	\$ 107	\$ 93
All Other GF	\$ 0	\$ 0	\$ 5	\$ 1	\$ 0	\$ 1	\$ 0	\$ 1	\$ 1	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 1
Total Other Gears	\$ 206	\$ 642	\$ 837	\$ 446	\$ 474	\$ 378	\$ 318	\$ 368	\$ 614	\$ 251	\$ 235	\$ 430	\$ 223	\$ 223	\$ 320	\$ 316
Oregon Total	\$ 17,092	\$ 16,791	\$ 24,169	\$ 23,914	\$ 25,217	\$ 23,219	\$ 29,677	\$ 31,037	\$ 28,995	\$ 32,627	\$ 37,828	\$ 34,090	\$ 33,771	\$ 22,754	\$ 27,529	\$ 29,849

^{a/} Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 1999.

^{b/} Does not include fish landed by domestic at-sea processors or landings of fish caught in Puget Sound, Alaska, Mexico, or other waters not in the EEZ of Washington, Oregon, or California.

Table 15. California landings^{a/} (mts) for various groundfish species groups, stratified by gear group, 1985-2000.

Gear Group/ Species Group	Year															
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GF Trawl																
Sablefish	3,576	3,384	2,994	2,454	2,583	2,171	2,093	2,386	1,921	1,381	1,603	1,750	1,557	918	1,205	963
Pacific Whiting	2,993	2,892	4,470	4,698	6,747	5,273	6,842	4,929	3,099	3,611	4,090	2,855	6,332	5,695	1,307	4,986
Total Roundfish	6,939	6,474	7,965	7,563	9,896	7,962	9,359	7,591	5,398	5,316	5,998	4,898	8,210	6,692	2,599	5,976
Total Rockfish	11,956	8,669	10,131	10,151	12,640	13,071	8,452	8,214	8,547	7,421	8,822	8,440	7,972	6,804	3,530	2,668
Dover Sole	11,944	10,089	10,195	7,375	7,682	6,090	7,424	8,192	6,489	4,421	6,056	6,376	5,292	3,563	3,789	3,266
Total Flatfish	15,584	12,655	13,477	10,195	10,913	8,591	10,268	10,096	8,374	6,749	8,647	9,171	8,301	5,525	6,069	5,230
All Other GF	79	72	70	107	53	87	79	153	392	527	379	317	274	352	221	142
Total Trawl	34,557	27,870	31,643	28,017	33,502	29,712	28,158	26,053	22,711	20,013	23,836	22,824	24,757	19,372	12,419	14,015
Fixed Gear																
Sablefish	1,204	1,416	1,247	1,026	1,351	1,141	1,131	1,132	654	701	1,174	1,429	1,378	515	763	888
Total Roundfish	1,257	1,531	1,389	1,221	1,783	1,428	1,326	1,334	832	862	1,428	1,744	1,653	777	972	1,047
Total Rockfish	1,141	1,523	1,578	1,972	2,410	2,772	3,237	4,179	3,007	2,217	1,874	1,872	1,585	1,409	758	523
All Other GF	4	3	3	4	10	4	5	5	5	11	105	820	381	170	132	92
Total Fixed Gear	2,458	3,154	3,118	3,312	4,279	4,253	4,601	5,552	3,891	3,108	3,421	4,460	3,630	2,362	1,882	1,670
All Other Gears																
Sablefish	381	1,402	79	375	139	438	129	196	21	88	37	15	15	9	5	9
Total Roundfish	666	1,670	388	2,503	969	955	362	352	181	210	114	45	51	18	12	15
Total Rockfish	4,714	6,798	4,709	4,356	3,318	3,477	2,131	2,183	1,150	1,165	976	479	614	619	134	47
All Other GF	135	121	124	92	82	69	57	48	48	55	46	71	61	56	73	55
Total Other Gears	5,631	10,396	5,980	8,414	4,706	5,188	3,016	3,171	1,448	1,582	1,251	669	766	738	265	137
California Total	42,646	41,419	40,741	39,743	42,487	39,153	35,775	34,775	28,050	24,703	28,508	27,954	29,152	22,472	14,566	15,822

^{a/} Does not include fish landed by domestic at-sea processors or landings of fish caught in Puget Sound, Alaska, Mexico, or other waters not in the EEZ of Washington, Oregon, or California.

Table 16. California real ex-vessel value^{a/} (1999 dollars/1000) for landings^{b/} of various groundfish species groups, stratified by gear group, 1985-2000.

Gear Group/ Species Group	Year															
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GF Trawl																
Sablefish	\$ 1,640	\$ 1,972	\$ 2,137	\$ 1,871	\$ 2,092	\$ 1,740	\$ 1,823	\$ 2,404	\$ 1,647	\$ 1,806	\$ 3,841	\$ 4,201	\$ 4,040	\$ 2,048	\$ 2,390	\$ 2,249
Pacific Whiting	\$ 394	\$ 370	\$ 602	\$ 741	\$ 957	\$ 746	\$ 872	\$ 596	\$ 342	\$ 351	\$ 453	\$ 235	\$ 581	\$ 390	\$ 115	\$ 765
Total Roundfish	\$ 2,249	\$ 2,464	\$ 3,123	\$ 2,923	\$ 3,470	\$ 2,872	\$ 3,027	\$ 3,229	\$ 2,298	\$ 2,443	\$ 4,570	\$ 4,714	\$ 4,931	\$ 2,550	\$ 2,631	\$ 3,072
Total Rockfish	\$ 6,750	\$ 5,505	\$ 7,301	\$ 7,226	\$ 8,990	\$ 9,444	\$ 6,568	\$ 7,192	\$ 7,654	\$ 8,606	\$ 12,263	\$ 10,073	\$ 8,555	\$ 6,818	\$ 4,367	\$ 4,023
Dover Sole	\$ 6,173	\$ 5,638	\$ 6,728	\$ 4,931	\$ 4,588	\$ 3,501	\$ 4,865	\$ 5,146	\$ 3,872	\$ 2,860	\$ 4,266	\$ 4,223	\$ 3,333	\$ 2,654	\$ 2,766	\$ 2,447
Total Flatfish	\$ 9,749	\$ 8,331	\$ 10,268	\$ 7,946	\$ 7,939	\$ 6,044	\$ 7,775	\$ 7,142	\$ 5,885	\$ 5,298	\$ 7,074	\$ 7,423	\$ 6,604	\$ 4,794	\$ 5,199	\$ 4,990
All Other GF	\$ 32	\$ 25	\$ 38	\$ 46	\$ 29	\$ 40	\$ 30	\$ 43	\$ 114	\$ 164	\$ 134	\$ 96	\$ 76	\$ 126	\$ 69	\$ 53
Total Trawl	\$ 18,780	\$ 16,325	\$ 20,730	\$ 18,141	\$ 20,428	\$ 18,400	\$ 17,399	\$ 17,605	\$ 15,951	\$ 16,510	\$ 24,042	\$ 22,306	\$ 20,166	\$ 14,288	\$ 12,266	\$ 12,138
Fixed Gear																
Sablefish	\$ 994	\$ 1,637	\$ 1,558	\$ 1,286	\$ 1,435	\$ 1,408	\$ 1,760	\$ 1,769	\$ 811	\$ 1,385	\$ 3,335	\$ 4,449	\$ 4,935	\$ 1,300	\$ 1,902	\$ 2,891
Total Roundfish	\$ 1,044	\$ 1,760	\$ 1,725	\$ 1,512	\$ 1,848	\$ 1,729	\$ 2,010	\$ 2,049	\$ 1,154	\$ 1,845	\$ 4,247	\$ 5,537	\$ 6,034	\$ 2,690	\$ 3,390	\$ 4,313
Total Rockfish	\$ 1,506	\$ 1,999	\$ 2,141	\$ 2,772	\$ 3,544	\$ 3,975	\$ 4,888	\$ 5,808	\$ 4,994	\$ 4,293	\$ 4,339	\$ 4,662	\$ 4,127	\$ 3,822	\$ 3,214	\$ 2,980
All Other GF	\$ 6	\$ 6	\$ 8	\$ 7	\$ 18	\$ 6	\$ 8	\$ 10	\$ 8	\$ 12	\$ 44	\$ 269	\$ 121	\$ 58	\$ 57	\$ 45
Total Fixed Gear	\$ 2,613	\$ 3,856	\$ 3,995	\$ 4,405	\$ 5,488	\$ 5,759	\$ 6,959	\$ 7,919	\$ 6,218	\$ 6,190	\$ 8,654	\$ 10,504	\$ 10,313	\$ 6,589	\$ 6,703	\$ 7,378
All Other Gears																
Sablefish	\$ 246	\$ 1,027	\$ 56	\$ 266	\$ 94	\$ 398	\$ 115	\$ 240	\$ 19	\$ 140	\$ 86	\$ 35	\$ 29	\$ 19	\$ 11	\$ 26
Total Roundfish	\$ 446	\$ 1,204	\$ 291	\$ 857	\$ 474	\$ 669	\$ 280	\$ 376	\$ 168	\$ 263	\$ 175	\$ 80	\$ 72	\$ 38	\$ 30	\$ 39
Total Rockfish	\$ 4,047	\$ 5,714	\$ 4,391	\$ 3,760	\$ 3,153	\$ 3,479	\$ 2,037	\$ 2,177	\$ 1,233	\$ 1,331	\$ 1,170	\$ 621	\$ 737	\$ 706	\$ 212	\$ 119
All Other GF	\$ 228	\$ 203	\$ 187	\$ 152	\$ 148	\$ 113	\$ 96	\$ 79	\$ 72	\$ 58	\$ 56	\$ 67	\$ 76	\$ 66	\$ 82	\$ 57
Total Other Gears	\$ 4,830	\$ 8,493	\$ 5,619	\$ 5,959	\$ 4,126	\$ 4,816	\$ 2,815	\$ 3,045	\$ 1,555	\$ 1,816	\$ 1,529	\$ 853	\$ 928	\$ 866	\$ 384	\$ 249
California Total	\$ 26,223	\$ 28,674	\$ 30,343	\$ 28,505	\$ 30,042	\$ 28,975	\$ 27,173	\$ 28,569	\$ 23,724	\$ 24,516	\$ 34,225	\$ 33,664	\$ 31,407	\$ 21,743	\$ 19,352	\$ 19,765

^{a/} Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 1999.

^{b/} Does not include fish landed by domestic at-sea processors or landings of fish caught in Puget Sound, Alaska, Mexico, or other waters not in the EEZ of Washington, Oregon, or California.

Figure 1.--Distribution of shoreside groundfish tonnage, by state, 1984-2000

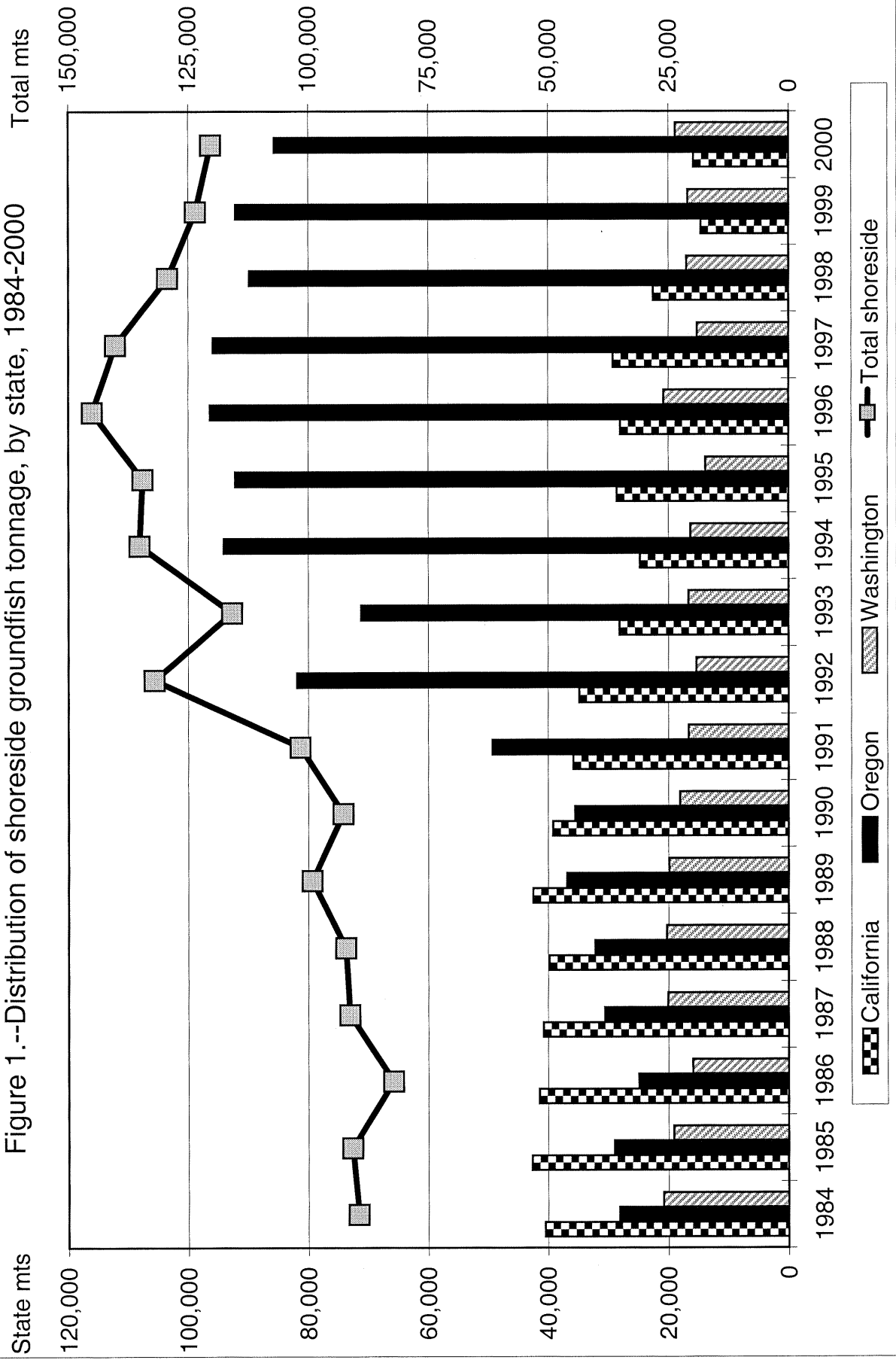
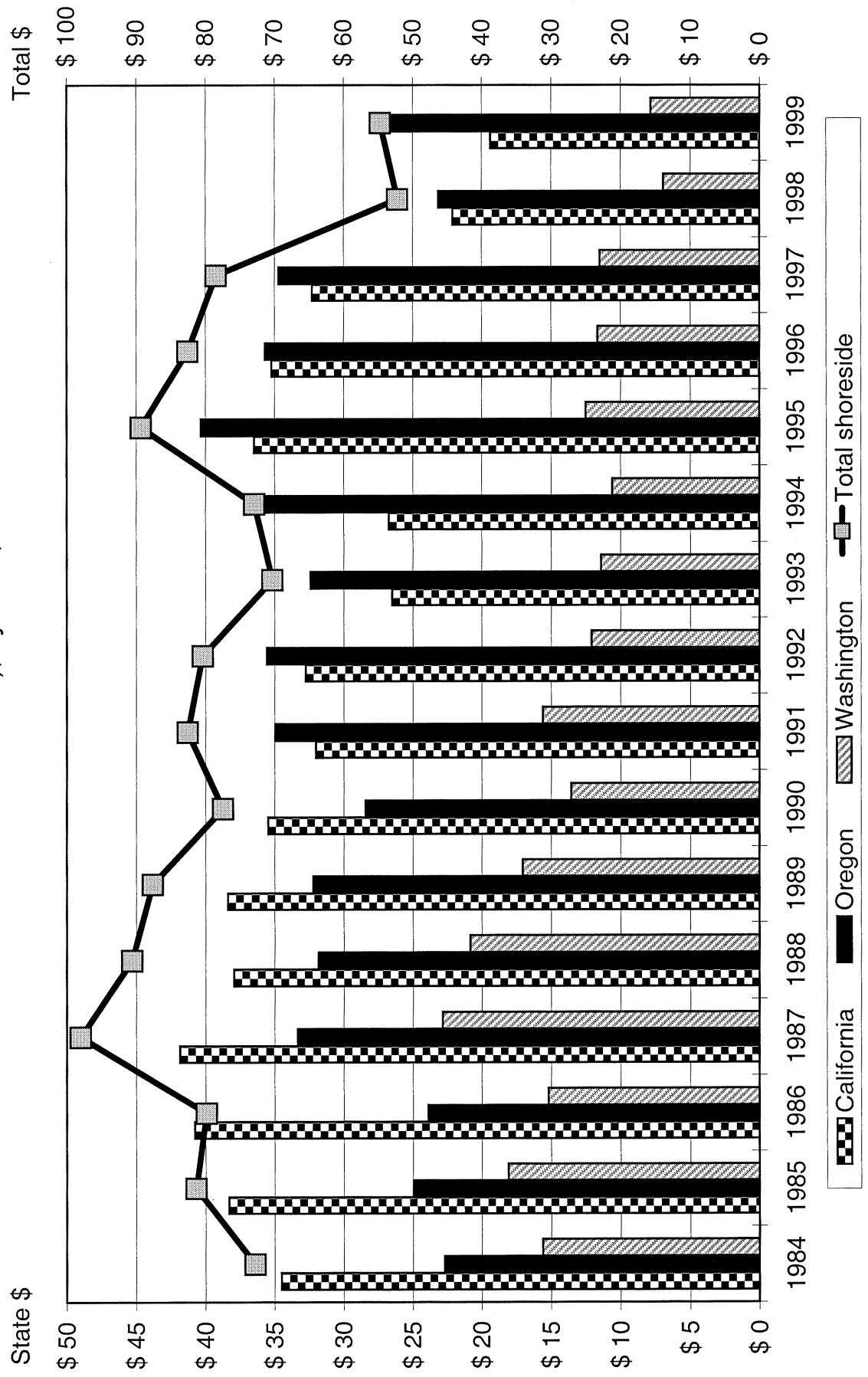


Figure 2.--Distribution of shoreside groundfish real ex-vessel revenue (\$ millions, base=1999), by state, 1984-2000



STOCK ASSESSMENT AND REVIEW PROCESS DURING 2001

GROUND FISH STOCK ASSESSMENT AND REVIEW PROCESS DURING 2001

Goals and Objectives	2
Shared Responsibilities	2
History	3
Federal Advisory Committee Act	5
Statement of Shared Responsibilities	5
Stock Assessment Priorities	6
Terms of Reference for Groundfish STAR Panels and Review Meetings	7
Suggested Template for STAR Panel Report	8
Terms of Reference for Groundfish STAT Teams	9
GMT Responsibilities	10
GAP Responsibilities	10
SSC and Council Staff Responsibilities	10
2001 Stock Assessment Review Calendar	12
Outline for Groundfish Stock Assessment Documents	13
Template for Executive Summary of Stock Status Prepared by STAT Teams	16

Goals and Objectives

The goals and objectives for the **2001** groundfish assessment and review process[†] are:

- a) Ensure that groundfish stock assessments provide the kinds and quality of information required by all members of the Council family.
- b) Satisfy the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and other legal requirements.
- c) Provide a well defined Council oriented process that helps make groundfish stock assessments the "best available" scientific information and facilitates use of the information by the Council. In this context, "well defined" means with a detailed calendar, explicit responsibilities for all participants, and specified outcomes and reports.
- d) Emphasize external, independent review of groundfish stock assessment work.
- e) Increase understanding and acceptance of groundfish stock assessment and review work by all members of the Council family.
- f) Identify research needed to improve assessments, reviews and fishery management in the future.
- g) Use assessment and review resources effectively and efficiently.

Shared Responsibilities

The purpose of this discussion document is to help planners and the Council family understand responsibilities for the groundfish stock assessment review process during **2001**. Parties involved are the National Marine Fisheries Service (NMFS); state agencies; the Council and its advisors, including the Scientific and Statistical Committee (SSC), Groundfish Management Team (GMT), Groundfish Advisory Subpanel (GAP), Council staff; and interested persons.

Leadership, in the context of the stock assessment review process for groundfish, means consulting with all interested parties to plan, prepare terms of reference, and develop a calendar of events and a list of deliverables. Coordination means organizing and carrying out review meetings, distributing documents in a timely fashion, and making sure that assessments and reviews are completed according to plan. Leadership and coordination both involve costs, both monetary and time, which have not been calculated, but are likely substantial.

All parties have a stake in assuring adequate technical review. NMFS must determine that the best scientific advice has been used when it approves fishery management recommendations made by the Council. The Council uses advice from the SSC to determine whether the information on which it will base its recommendation is technically sound. Fishery managers and scientists providing technical documents to the Council for use in management need to assure that the work is technically correct. Program reviews, in-depth external reviews, and peer-reviewed scientific publications are used by federal and state agencies to provide quality assurance for the basic scientific methods used to produce stock assessments. However, the time-frame for this sort of review is not suited to the routine examination of assessments that are, generally, the primary basis for a harvest recommendation. The review of current stock assessments requires a routine, dedicated effort that simultaneously meets the needs of NMFS, the Council, and others.

[†] In this document, the term "stock assessment" includes activities, analyses, and management recommendations, beginning with data collection and continuing through to the development of management recommendations by the Groundfish Management Team and information presented to the Council as a basis for management decisions.

History

In 1995 and earlier years, stock assessments were examined at a very early stage during ad-hoc stock assessment review meetings (one per year). SSC and GMT members often participated in these ad-hoc meetings and provided additional review of completed stock assessments during regular Council meetings. There were no terms of reference or meeting reports from the ad-hoc meetings. NMFS provided leadership and coordination by setting up meetings. Each agency or Council paid their own travel costs. Council staff distributed meeting announcements and some background documents. The Council paid for publication of assessments as appendices to the annual Stock Assessment and Fishery Evaluation (SAFE) document.

A key event occurred in July 1995 when NMFS convened an independent, external review of West Coast groundfish assessments.¹ The report concluded that: 1) uncertainties associated with assessment advice were understated; 2) technical review of groundfish assessments should be more structured and involve more outside peers; and 3) the distinction between scientific advice and management decisions was blurred. Work to develop a process to review groundfish stock assessments was aimed at resolving these problems.

For 1996, the groundfish stock assessment review process was expanded to include: 1) terms of reference for the review meeting; 2) an outline for the contents of stock assessments; 3) external anonymous reviews of previous assessments; and 4) a review meeting report.² Plans were developed during March and April Council meetings and NMFS convened a week long review meeting in Newport, Oregon where preliminary groundfish stock assessments were discussed. The expanded process itself was reviewed by the Council family at an evaluation meeting at the end of the year. Leadership and planning responsibilities were shared by the SSC Groundfish Subcommittee, NMFS, GMT, GAP, and persons who participated in planning discussions during the March and April Council meetings. There was no formal coordination except for the review meeting terms of reference, organization of the review meeting by NMFS, and as provided by Council staff for publication of documents. Costs were shared as in previous years.

The review process for 1997 was further expanded based on a planning meeting in December 1996.³ It was agreed that agencies (including NMFS and state agencies) conducting stock assessments were responsible for making sure assessments were technically sound and adequately reviewed. A Council-oriented review process was developed that included agencies, the GMT, GAP, and other interested members of the Council family. The process was jointly funded by the Council and NMFS, with NMFS hosting the Stock Assessment Review (STAR) Panel meetings and paying the travel expenses of the external reviewers, and the Council paying for travel expenses of the GAP representative and non-federal GMT and SSC members.

The process for 1997 included: 1) goals and objectives; 2) three STAR Panels, including external membership; 3) terms of reference for STAR Panels; 4) terms of reference for Stock Assessment (STAT) Teams; 5) a refined outline for stock assessments; 6) external anonymous reviews; 7) a clearer distinction between science and management; and 8) a calendar of events with clear deliverables, dates and well defined responsibilities. For the first time, STAR Panels and STAT Teams were asked to provide "decision table" analyses of the effects of uncertain management actions and to provide information required by the GMT in choosing harvest strategies. In addition, STAR Panels were asked to prepare "Stock Summaries" that described the essential elements of stock assessment results in a concise, simple format.

¹Anon. 1995. West coast groundfish assessments review, August 4, 1995. Pacific Fishery Management Council. Portland, OR.

²Brodziak, J., R. Conser, L. Jacobson, T. Jagielo, and G. Sylvia. 1996. Groundfish stock assessment review meeting - June 3-7, 1996 in Newport, Oregon. *In*: Status of the Pacific coast groundfish fishery through 1996 and recommended acceptable biological catches for 1997. Pacific Fisheries Management Council. Portland, OR.

³Meeting Report, Proposals and Plans for Groundfish Stock Assessment and Reviews During 1997 (May 8, 1997). Pacific Fishery Management Council, 2130 SW Fifth Avenue, Suite 224, Portland, OR 97201.

At the end of 1997, participants met to discuss events and make recommendations for 1998.⁴ Participants concluded that objectives were, to varying degrees, achieved during 1997. A notable shortfall was in "increasing acceptance and understanding by all members of the Council family." The most significant issues seemed to be the nature of the STAR Panels' responsibilities, communicating uncertainty to decision makers, workload, and inexperience in conducting the review process.

In retrospect, there was no formal coordination and leadership except for the terms of reference and the calendar. As in previous years, Council staff coordinated distribution of meeting announcements and distribution of documents. Costs increased substantially due to travel for external experts, increased number of review meetings (three instead of one), and distribution of larger and additional reports. NMFS paid travel and other costs for external members of STAR Panels. Other costs were distributed as in 1996. It was not possible for the Council to copy and distribute all of the stock assessments because of limited funds.

In 1998, the stock assessment process was similar to 1997, including the 8 elements listed above. In November, a joint session of the SSC, GMT, and GAP was held to review events in 1998 and make recommendations for 1999. Several topics were discussed, including policy issues related to the 1998 terms of reference and operational issues related to how the terms of reference were implemented in 1998. This meeting produced a list of recommended changes for 1999, including:

- increasing the SSC's involvement in the process;
- clarify/modify the participant roles;
- limit the number of assessments, especially the difficulty caused by the late addition of assessments (e.g., sablefish and shortspine thornyhead in 1998);
- increase the involvement of external participants;
- timeliness in completing and submitting assessments; and
- duration of STAR Panel meetings, and the time required to adequately review assessments.

Accordingly, the terms of reference were amended to include a cut-off date of November by which anyone proposing to present an assessment for review in the following year must notify the stock assessment coordinator. This change will ensure there is adequate time for formation and planning of STAR Panel meetings. The terms of reference were also changed to clarify the SSC's role in the process as "editor" and "arbiter;" the SSC will hear reports from all STAR Panels at its September meeting and will be involved in any unresolved issues between the STAT Teams, STAR Panels, or the GMT. Other issues were raised that had no quick solutions, such as how to incorporate socioeconomic information into the process, and how to present the decision tables to GMT and Council members.

Other than the changes noted above, the 1999 STAR process was similar to 1997 and 1998. As in previous years, a joint meeting of the SSC, GAP, and GMT was convened to review and evaluate the stock assessment process and to recommend modifications for 2000. There were relatively few concerns about the process in 1999, and they centered mainly around the difficulty of recruiting sufficient (external and internal) reviewers. Participants did not recommend departing from the current terms of reference regarding STAR panel composition, although they seemed to regard it more as a goal than a strict requirement. A notable continuing concern was the timeliness of STAT team reports prior to the STAR panel meetings.

Requirements for stock rebuilding analyses and monitoring of rebuilding progress and their relationship to the STAR process were also discussed. The group agreed that the terms of reference should be modified to require additional values (e.g., B_{msy}) be tabulated and included in STAT Team report related to an overfished species. There was general agreement that the STAR process should be used to review assessments of overfished species, which are still likely to be on a 3-year cycle. However, the STAR process is not the appropriate process for the "monitoring" reports (required every 2 years), when they are out of phase with the assessment cycle.

⁴Jacobson, L.D. (ed.). 1997. Comments, issues and suggestions arising from the groundfish stock assessment and review process during 1997. Report to the Pacific Fishery Management Council (Revised Supplemental Attachment B.9.b, November 1997).

Additionally, it was agreed that certain additional values should be consistently tabulated in the STAT team report in order to build a long-term computerized database of key parameters. The group noted that this would not impose additional work for the STAT team, but would simply require these values to be reported consistently.

The 2000 STAR process was reviewed during a joint meeting of the GAP, GMT, and SSC at the November 2000 meeting. There were relatively few recommendations for improvement to the terms of reference for 2001, although concerns about the long-term future for the STAR process were raised. It was agreed that the future of the STAR process would be evaluated during 2001, but the STAR process in 2001 would proceed similarly to past years. For the 2001 STAR process, participants at the review meeting recommended that greater efforts be made to produce and distribute documents in a timely manner and to assure their completeness and consistency with the terms of reference. In addition, the SSC agreed that its groundfish subcommittee would meet in concert with the GMT during the August 2001 meeting to identify issues, if any, with the assessments or STAR panel reviews that may require additional consideration by the SSC.

At the March 2001 PFMC meeting, the SSC also expects to provide recommendations for integrating rebuilding analyses and reviews into the STAR process for 2001. Pending the outcome of those recommendations, additional requirements and guidance may be incorporated in the terms of reference for 2001 and implemented during the 2001 STAR process.

Federal Advisory Committee Act

Sponsorship of the review process will remain with the Council in **2001** because the Federal Advisory Committee Act (FACA) constrains the ability of NMFS to establish advisory committees. FACA specifies a procedure for convening advisory committees, particularly when the committee will provide consensus recommendations to the federal government. Under FACA, advisory committees must be chartered by the Department of Commerce through a rather cumbersome process. The intent of FACA was to limit the number of advisory committees; ensure that advisory committees fairly represent affected parties; and insure that advisory committee meetings, discussions, and reports are carried out and prepared in full public view.

Under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), the Council is exempt from FACA. The Magnuson-Stevens Act does, however, specify requirements for public notice, and open meetings similar to those under FACA.

Statement of Shared Responsibilities

All parties share responsibilities in the STAR process for **2001**. The Council will continue to sponsor the process and involve its standing advisory committees, but it has little additional resources to contribute to coordination or costs. Therefore, costs for the STAR process will be shared by NMFS and the Council.

The Council has responsibility to make decisions and make policy choices about groundfish management based on the Fishery Management Plan for Pacific Coast Groundfish, the Magnuson-Stevens Act and other applicable law.

The Pacific Fishery Management Council will sponsor a review of groundfish stock assessments prepared in **2001** according to the interim protocols identified below. Sponsorship will involve consulting with all interested parties to plan, prepare terms of reference, and develop a calendar of events and a list of deliverables. NMFS and the Council will share fiscal and logistical responsibilities.

NMFS will work with the Council, other agencies, groups or interested persons that carry out assessment work to organize STAT Teams and STAR Panels, and make sure that work is carried out in a timely fashion according to the calendar and terms of reference. NMFS will provide a senior scientist to coordinate these

tasks with assistance from Council staff. NMFS will convene a pre-assessment meeting for STAT Teams, GAP representatives, and interested parties to discuss upcoming stock assessments, external reviews, and data.

The Stock Assessment coordinator, in consultation with the SSC, will select STAR Panel chairs, and will coordinate the selection of external reviewers following criteria for reviewer qualifications, nomination, and selection. The public is welcome to nominate qualified reviewers. **Following any modifications to the stock assessments resulting from STAR panel reviews and prior to distribution to the stock assessment documents and STAR panel reports for the August GMT meeting, the coordinator will review the stock assessments and panel reports for consistency with the terms of reference, especially completeness. Inconsistencies will be identified and the authors requested to make appropriate revisions in time to meet the deadline for distributing documents for the August GMT meeting.**

Individuals (employed by NMFS, state agencies, or other entities) that conduct assessments or technical work in connection with groundfish stock assessments are responsible for ensuring their work is technically sound and complete. The Council's review process is the principal means for review of complete stock assessments, although additional in-depth technical review of methods and data is desirable. **Stock assessments conducted by NMFS, state agencies, or other entities must be completed and reviewed in full accordance with the terms of reference, including completion and submission of all documents at times specified in the calendar.**

Council staff will publish and distribute meeting notices, stock assessment documents, stock summaries, meeting minutes, and other appropriate documents. Council staff will help NMFS and agencies coordinate meetings and events.

The SSC will participate in the STAR process and provide the Council with technical advice related to the stock assessments and the review process.

The GMT will appoint representatives to track each stock assessment. These representatives will attend STAR Panel meetings, and participate in review discussions. The GMT will provide the Council with advice on management of groundfish stocks based on stock assessments and other available information.

The GAP will appoint representatives to track each stock assessment. These representatives will attend STAR Panel meetings and participate in review discussions.

Stock Assessment Priorities

Stock assessments for West Coast groundfish are conducted periodically to determine appropriate harvest levels. Assessments rely upon a combination of NMFS survey data and state fishery monitoring data. To the extent possible, other fishery dependent data are also used.

Under the stock assessment process initiated in 1997, the time involved in soliciting data and preparing and reviewing stock assessments has increased substantially. Using STAT Teams and STAR Panels has also required participation by a larger number of people. Annually, the Council establishes priorities for conducting stock assessments. These priorities should be discussed at the Council's June meeting to allow sufficient time for collection of assessment data. The principles used to set priorities are:

- 1) At the November Council meeting, the species to be assessed will be finalized, which should provide adequate time for Panel arrangements. Any assessment identified after that time may not be included in the STAR process.
- 2) Generally, no more than 2 assessments will be reviewed by a STAR Panel.
- 3) Until greater fiscal and personnel support is obtained, assessments (except for Pacific whiting and overfished species), generally will be conducted only once every three years.

- 4) Assessments will be scheduled to take advantage of new data, especially survey data.
- 5) Assessments may be conducted more frequently than once every three years if –
 - A) new data, including fishery dependent and anecdotal data indicating unforeseen increases or decreases in stock size, are brought to the attention of the Council;
 - B) the Council believes that the results of a stock assessment are sufficiently in dispute to warrant a re-assessment the following year; or
 - C) a fishery for a species, stock, or stock complex has rapidly developed and that species, stock, or stock complex has not been assessed recently.
- 6) An update or report that falls short of a full assessment may be prepared for a species, stock, or stock complex to provide information helpful to the Council in making management decisions.
- 7) Any stock assessment submitted by the public should be submitted through normal Council channels and reviewed at STAR Panel meetings.

Based on the preceding principles, and taking into account testimony presented at the June, September, and November 1999 Council meetings, the following list of stock assessments are planned for 2001:

Stocks to be Assessed in 2001

Sablefish

Shortspine Thornyhead

Dover Sole

Remaining Rockfishes, including yelloweye and black rockfish (in the south).

Terms of Reference for Groundfish STAR Panels and Review Meetings

Composition: STAR Panels normally include a chair, at least one “external” member (i.e.; outside the Council family and not involved in management or assessment of West Coast groundfish), and one SSC member. The total number of STAR members should be at least “n+2” where n is the number of stock assessments and “2” counts the chair and external reviewer. In addition to Panel members, STAR meetings will include GMT and GAP advisory representatives with responsibilities laid out in their terms of reference. STAR Panels normally meet for one week. The number of assessments reviewed per Panel should not exceed two.

The principal responsibility of the STAR Panel is to carry out these terms of reference according to the calendar for groundfish assessments.

The goal of the STAR Panel meeting is to review assessments for stocks according to these terms of reference. This work (described in detail below) includes:

- reviewing draft stock assessment documents and any other pertinent information (e.g.; STAR Panel reviews of previous assessments and previous assessments, if available);
- working with STAT Teams to ensure assessments are reviewed as needed;
- documenting meeting discussions; and
- reviewing summaries of stock status (prepared by STAT Teams) for in the SAFE document.

Most groundfish stocks are assessed infrequently (every three years) and each assessment and review should result in useful advice to the Council. It is the STAR Panel's responsibility to identify assessments that cannot be reviewed or completed for any reason.

The STAR Panel's terms of reference concern technical aspects of stock assessment work. The STAR Panel should strive for a risk neutral approach in its reports and deliberations. The full range of uncertainty should be reflected in complete stock assessments and the reports prepared by STAR Panels. The STAR Panel should identify scenarios that are unlikely or have a flawed technical basis.

The STAR Panel, STAT Team, and all interested parties are legitimate meeting participants that must be accommodated in discussions. It is the STAR Panel chair's responsibility to manage discussions and public comment so that work can be completed.

Panel members are responsible for determining if a stock assessment document is sufficiently complete according to the "Outline for Groundfish Stock Assessments."

STAT Teams and STAR Panels may disagree on technical issues. If the STAR Panel and STAT Team disagree, the STAR Panel must document the areas of disagreement in its report. The STAR Panel may request additional analysis based on alternative approaches. It is expected that the STAT Team will make a good faith effort to complete these analyses.

The STAR Panel's decision that an assessment is complete should be made by consensus. If a Panel cannot reach agreement, then the nature of the disagreement must be described in the Panel's report.

Recommendations and requests to the STAT Team for additional or revised analyses must be clear, explicit and in writing. A written summary of discussion on significant technical points and a lists of all STAR Panel recommendations and requests to the STAT Team are required in the STAR Panel's report. This should be completed (at least in draft form) prior to the end of the meeting. It is the chair and Panel's responsibility to carry out any follow-up review work that is required.

Additional analyses required in the stock assessment should be completed during the STAR Panel meeting. If follow-up work by the STAT Team is required after the review meeting, then it is the Panel's responsibility to track STAT Team progress. In particular, the chair is responsible for meeting with all Panel members (by phone, e-mail, or any convenient means) to determine if the revised stock assessment and documents are complete and ready to be used by managers in the Council family. If stock assessments and reviews are not complete at the end of the STAR Panel meeting, then the work must be completed prior to the GMT meeting where the assessments and preliminary ABC levels are discussed.

The SSC representative on the STAR Panel is expected to attend GMT and Council meetings where stock assessments and harvest projections are discussed to explain the reviews and provide other technical information and advice.

The chair is responsible for providing Council staff with a camera ready and suitable electronic version of the Panel's report for inclusion in the annual SAFE report.

The STAT Team and the STAR Panel may disagree on technical issues regarding an assessment, but a complete stock assessment must include a point-by-point response by the STAT Team to each of the STAR Panel recommendations. Estimates and projections representing all sides of the disagreement need to be presented, reviewed, and commented on by the SSC.

Suggested Template for STAR Panel Report

- 1) Minutes of the STAR Panel meeting containing:
 - Name and affiliation of STAR Panel members; and
 - List of analyses requested by the STAR Panel.
- 2) Comments on the technical merits and/or deficiencies in the assessment and recommendations for remedies.
- 3) Explanation of areas of disagreement regarding STAR Panel recommendations 1) among STAR Panel members (majority and minority reports), and 2) between the STAR Panel and STAT Team
- 4) Unresolved problems and major uncertainties, e.g.; any special issues that complicate scientific assessment, questions about the best model scenario.

- 5) Prioritized recommendations for future research and data collection

Terms of Reference for Groundfish STAT Teams

The STAT Team will carry out its work according to these terms of reference and the calendar for groundfish stock assessments.

Each STAT Team will appoint a representative who will attend the pre-assessment planning meeting, if one is held. STAT Teams are encouraged to also organize independent meetings with industry and interested parties to discuss issues, questions, and data.

Each STAT Team will appoint a representative to coordinate work with the STAR Panel and attend the STAR Panel meeting.

Each STAT Team will appoint a representative who will attend the GMT meeting (usually in August) and Council meeting (usually in September) where preliminary acceptable biological catch (ABC) and optimum yield (OY) levels are discussed. In addition, a representative of the STAT Team should attend the GMT (usually September or October) and Council meeting (usually November) where final ABC and OY levels are discussed, if requested or necessary. At these meetings, the STAT Team member shall be available to answer questions about the STAT Team report.

The STAT Team is responsible for preparing three versions of the stock assessment document: 1) a “draft” for discussion at the stock assessment review meeting; 2) a revised “complete draft” for distribution to the GMT, SSC, GAP, and Council for discussions about preliminary ABC and OY levels; 3) a “final” version published in the SAFE report. Other than authorized changes, only editorial and other minor changes should be made between the “complete draft” and “final” versions. The STAT Team will distribute “draft” assessment documents to the STAR Panel, Council, and GMT and GAP representatives at least two weeks prior to the STAR Panel meeting.

The STAT Team is responsible for bringing computerized data and working assessment models to the review meeting in a form that can be analyzed on site. STAT Teams should take the initiative in building and selecting candidate models. If possible, the STAT Team should have several complete models and be prepared to justify model recommendations.

The STAT Team is responsible for producing the complete draft by the end of the STAR Panel meeting. In the event that the complete draft is not completed, the Team is responsible for completing the work as soon as possible and to the satisfaction of the STAR Panel at least one week before the GMT meeting.

The STAT Team and the STAR Panel may disagree on technical issues regarding an assessment, but a complete stock assessment must include a point-by-point response by the STAT Team to each of the STAR Panel recommendations. Estimates and projections representing all sides of the disagreement need to be presented, reviewed, and commented on by the SSC.

For new stocks which are projected by the STAT Team to fall below overfishing thresholds, the STAT Teams need to estimate the baseline rebuilding parameters, specifically:

- determine B_0 as the product of SPR in unfished state multiplied by the average recruitment during early years of fishery;
- recruitment during the earliest part of the record for the stock;
- $B_{msy} = 0.4 B_0$;
- mean generation time; and
- a forward projection using recruitment based on Monte Carlo sampling from a recent time series of recruitment estimates.

According to 1999 SAFE report (PFMC 1999, p. 24)⁵, the values for unfished biomass size are preferably measured as unfished spawning potential.

In addition to providing the baseline calculations, authors are encouraged to present alternative approaches (where appropriate), along with clear justification for why the alternatives may be an improvement over the baseline approach.

GMT Responsibilities

The GMT is responsible for identifying and evaluating potential management actions based on the best available scientific information. In particular, the GMT makes ABC recommendations to the Council based on estimated stock status, uncertainty about stock status, and socioeconomic and ecological factors. The GMT will use stock assessments, STAR Panel reports, and other information in making their ABC recommendations. The GMT's preliminary ABC recommendation will be developed at a meeting that includes representatives from the SSC, STAT Teams, STAR Panels, and GAP. A representative(s) of the GMT will serve as a liaison to each STAR Panel, but will not serve as a member of the Panel. The GMT will not seek revision or additional review of the stock assessments after they have been reviewed by the STAR Panel. The GMT chair will communicate any unresolved issues to the SSC for consideration at its September meeting. Successful separation of scientific (i.e.; STAT Team and STAR Panels) from management (i.e.; GMT) work depends on stock assessment documents and STAR reviews being completed by the time the GMT meets to discuss preliminary ABC and OY levels. However, the GMT can request additional model projections, based on reviewed model scenarios, in order to develop a full evaluation of potential management actions.

GAP Responsibilities

The chair of the GAP will appoint a representative to track each stock assessment. GAP representatives will be appointed at the GAP meeting in March.

The GAP representative will attend the STAR Panel meeting where the assessment of his / her species is reviewed. The GAP representative will participate in review discussions as an advisor to the STAR Panel, in the same capacity as the GMT advisor.

The GAP representative will attend the August GMT meeting along with STAR, STAT, and SSC representatives and will attend subsequent GMT, Council, and other necessary meetings where the assessment of his / her species is discussed.

The GAP representative will provide appropriate data and advice to the STAR Panel and GMT and will report to the GAP on STAR Panel and GMT meeting proceedings.

SSC and Council Staff Responsibilities

Scientific and Statistical Committee

The SSC will participate in the stock assessment review process and provide the GMT and Council with technical advice related to the stock assessments and the review process. The SSC will assign one member from its Groundfish Subcommittee to each STAR Panel. This member is expected to attend the assigned STAR Panel meeting, the August and October GMT meeting, and the September and November Council

⁵Pacific Fishery Management Council. 1999. Status of the Pacific Coast Groundfish Fishery Through 1998 and Recommended Biological Catches for 2000: Stock Assessment and Fishery Evaluation. (Document prepared for the Council and its advisory entities.) Pacific Fishery Management Council, 2130 SW Fifth Avenue, Suite, 224, Portland, Oregon 97201.

meetings when groundfish stock assessment agenda items are discussed. As in previous years, the SSC representative on the STAR Panel will present the STAR Panel report at GMT and Council meetings. The SSC representative will also present the STAR Panel report to the SSC at its September meeting and communicate SSC comments or questions to the GMT and STAR Panel chair. The SSC, during their normally scheduled meetings, will also serve as arbitrator to resolve disagreements between the STAT Team, STAR Panel, or GMT. The SSC will review any additional analytical work on any of the stock assessments required or carried out by the GMT after the stock assessments have been reviewed by the STAR Panels. In addition, the SSC will review and advise the GMT and Council on projected ABCs and OYs.

The STAT Team and the STAR Panel may disagree on technical issues regarding an assessment, but a complete stock assessment must include a point-by-point response by the STAT Team to each of the STAR Panel recommendations. Estimates and projections representing all sides of the disagreement need to be presented, reviewed, and commented on by the SSC.

Council Staff

Council Staff will prepare meeting notices and distribute stock assessment documents, stock summaries, meeting minutes, and other appropriate documents. Council Staff will help NMFS and the state agencies in coordinating stock assessment meetings and events. Staff will also publish or maintain file copies of reports from each STAR Panel (containing items specified in the STAR Panel's term of reference), the outline for groundfish stock assessment documents, comments from external reviewers, SSC, GMT, and GAP, letters from the public, and any other relevant information. At a minimum, the stock assessments (STAT Team reports, STAR Panel reports, and stock summaries) should be published and distributed in the Council's annual SAFE document. Once the Council's final ABCs, OYs, and management measures have been implemented, the Staff will publish an addendum to the SAFE documenting these final values.

2001 Stock Assessment Review Calendar

Mar. 5-9	PFMC Meeting (Portland)
Mar 21-22	Pre-Assessment Workshop (Portland)
Apr 2-6	PFMC Meeting (Sacramento)
May 8	Stock assessment documents for remaining rockfish due at PFMC office for distribution
Jun 4-7	GMT meeting (Seattle)
Jun 11	Stock assessment documents for black rockfish (southern area), yelloweye rockfish, and the new method for data poor species due at NWFSC office for distribution.
Jun 11-15	PFMC Meeting (San Francisco)
Jun 25	Stock assessment documents for Dover sole, sablefish, & shortspine thornyhead due at PFMC office for distribution
June 25-29	STAR Panel meeting for rockfish (Santa Cruz)
July 9-16	STAR Panel meeting for Dover sole and shortspine thornyhead (considered on July 9-12) and sablefish (considered on July 13-16) (Newport)
Jul 27	Final stock assessment documents due at PFMC office
Aug 3	PFMC distributes final stock assessment documents
Aug. 6-10	GMT meeting. SSC groundfish subcommittee will also meet to review assessments and panel reports. (Location to be determined)
Sep 10-14	PFMC meeting (Portland)
Sep. 24-28	GMT meeting (Santa Cruz)
Oct 29-Nov 2	PFMC meeting (San Francisco)

Outline for Groundfish Stock Assessment Documents

This is an outline of items that should be included in stock assessment and fishery evaluation (SAFE) reports for groundfish managed by the Pacific Fishery Management Council. The outline is a working document meant to provide assessment authors with flexible guidelines about how to organize and communicate their work. All items listed in the outline may not be appropriate or available for each assessment. In the interest of clarity and uniformity of presentation, stock assessment authors and reviewers are encouraged (but not required) to use the same organization and section names as in the outline.

This outline for 2000 includes suggestions from many parties and is based on a similar outline used for groundfish stock assessment cycles in previous years.

OUTLINE FOR GROUNDFISH STOCK ASSESSMENT DOCUMENTS

- 1) Title page and list of preparers – the names and affiliations of the stock assessment team (STAT) either alphabetically or as first and secondary authors
- 2) Executive Summary (see attached template)
- 3) Introduction
 - Scientific name, distribution, stock structure, management units
 - Important features of life history that affect management (e.g.; migration, sexual dimorphism, bathymetric demography)
 - Important features of current fishery and relevant history of fishery
 - Management history (e.g. changes in mesh sizes, trip limits, optimum yields)
 - Management performance – a table or tables comparing acceptable biological catches, optimum yields, landings, and catch (i.e., landings plus discard) for each area and year
- 4) Assessment
 - Data
 - i) Landings by year and fishery, discards (generally specified as a percentage of total catch in weight and in units of mt), catch-at-age, weight-at-age, survey and CPUE data, data used to estimate biological parameters (e.g.; growth rates, maturity schedules, and natural mortality) with coefficients of variances (CVs) or variances if available.
 - ii) Include complete tables and figures if practical.
 - iii) Sample size information for length and age composition data by area, year, gear, market category, etc.
 - History of modeling approaches used for this stock – changes between current and previous assessment models

- Model description
 - i) Assessment program with last revision date (i.e.; date executable program file was compiled).
 - ii) List and description of all likelihood components in the model.
 - iii) Constraints on parameters, selectivity assumptions, natural mortality, assumed level of age reader agreement or assumed ageing error (if applicable), and other assumed parameters.
 - iv) Description of stock-recruitment constraint or components.
 - v) Critical assumptions and consequences of assumption failures.
 - vi) Convergence criteria.
 - vii) Treatment of discards (specified as a percentage of total catch in weight and in units of mt).
 - viii) Complete description of any new modeling approaches.
- 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).
 - ii) Residual analysis (e.g.; residual plots, time series plots of observed and predicted values, or other approach).
 - iii) Convergence status and convergence criteria for “base-run(s)” –
 - Randomization run results or other evidence of search for global best estimates.
 - iv) Do parameter estimates make sense, are they credible?
 - v) Table listing all parameters in the stock assessment model used for base runs, their purpose (e.g.; recruitment parameter, selectivity parameter) and whether or not the parameter was actually estimated in the stock assessment model.
- Base-run(s) results
 - i) Time-series of total and spawning biomass, recruitment and fishing mortality or exploitation rate estimates (table and figures).
 - ii) Selectivity estimates (if not included elsewhere).
 - iii) Stock-recruitment relationship.
- Uncertainty and sensitivity analyses
 - i) Sensitivity analyses (tables or figures) that show ending biomass levels or likelihood component values obtained while systematically varying emphasis factors for each type of data in the model.
 - Likelihood profiles for parameters or biomass levels may also be used.
 - ii) The best approach for describing uncertainty and range of probable biomass estimates in groundfish assessments may depend on the situation. Approaches used previously are:

- CVs for biomass estimated by bootstrap, implicit autodifferentiation, or the delta method;
 - Subjective appraisal of magnitude and sources of uncertainty;
 - Comparison of alternate models;
 - Comparison of alternate assumptions about recent recruitment.
- iii) If a range of model runs (e.g.; based on CV's or alternate assumptions about model structure or recruitment) is used to depict uncertainty, then it is important that some qualitative or quantitative information about relative probability be included. If no statements about relative probability can be made, then it is important to state that all scenarios (or all scenarios between the bounds depicted by the runs) are equally likely.
- iv) if possible, ranges depicting uncertainty should include at least three runs: (a) one judged most probable; (b) at least one that depicts the range of uncertainty in the direction of lower current biomass levels; and (c) one that depicts the range of uncertainty in the direction of higher current biomass levels. The entire range of uncertainty should be carried through stock projections and decision table analyses.
- v) retrospective analysis (retrospective bias in base model or models for each area).
- vi) historic analysis (plot of actual estimates from current and previous assessments for each area).
- vii) Simulation results (if available).
- 5) Rebuilding parameters –
- Determine B_0 as the product of SPR in unfished state multiplied by the average recruitment during early years of fishery;
 - Recruitment during the earliest part of the record for the stock;
 - $B_{msy} = 0.4 B_0$;
 - Mean generation time; and
 - A forward projection using recruitment based on Monte Carlo sampling from a recent time-series of recruitment estimates.
- 6) Target fishing mortality rates (if changes are proposed).
- 7) Harvest projections and decision tables –
- Harvest projections and decision tables should cover full range of uncertainty about current biomass and full range of candidate fishing mortality targets used for the stock or requested by the GMT; and
 - Information presented should include three year biomass and yield projections.
- 8) Management recommendations.
- 9) Research needs (prioritized).
- 10) Acknowledgments-include STAR Panel members and affiliations as well as names and affiliations of persons who contributed data, advice or information but were not part of the assessment team.
- 11) Literature cited.

12) Tables and figures.

13) Complete parameter files **and results** for base runs.

Template for Executive Summary of Stock Status Prepared by STAT Teams

Stock: species/area

Catches: trends and current levels-include table for last ten years and graph with long term data

Data and assessment: date of last assessment, type of assessment model, data available, new information, and information lacking

Unresolved problems and major uncertainties: any special issues that complicate scientific assessment, questions about the best model scenario, etc.

Reference points: management targets and definition of overfishing

Stock biomass: trends and current levels relative to virgin or historic levels, description of uncertainty-include table for last 10 years and graph with long term estimates

Recruitment: trends and current levels relative to virgin or historic levels-include table for last 10 years and graph with long term estimates

Exploitation status: exploitation rates (i.e., total catch divided by exploitable biomass) – include table for last 10 years and graph with long term estimates.

Management performance: ABC and OY estimates, overfishing levels, actual catch and discard

Forecasts: normally three-year forecasts of catch and biomass

Decision table: (if available)

Recommendations: research and data collection needs

Sources of additional information: cite STAR Panel report, assessment documents, and other sources

2001 STOCK ASSESSMENT EXECUTIVE SUMMARIES

- ★ Dover Sole Stock Assessment Executive Summary
- ★ Sablefish Stock Assessment Executive Summary (1)
- ★ Sablefish Stock Assessment Executive Summary (2)
- ★ Shortspine Thornyhead Stock Assessment Executive Summary
- ★ Pacific Whiting Stock Assessment Executive Summary
- ★ Yelloweye Rockfish Stock Assessment Executive Summary

Stock Status of Dover Sole off the U.S. West Coast in 2000

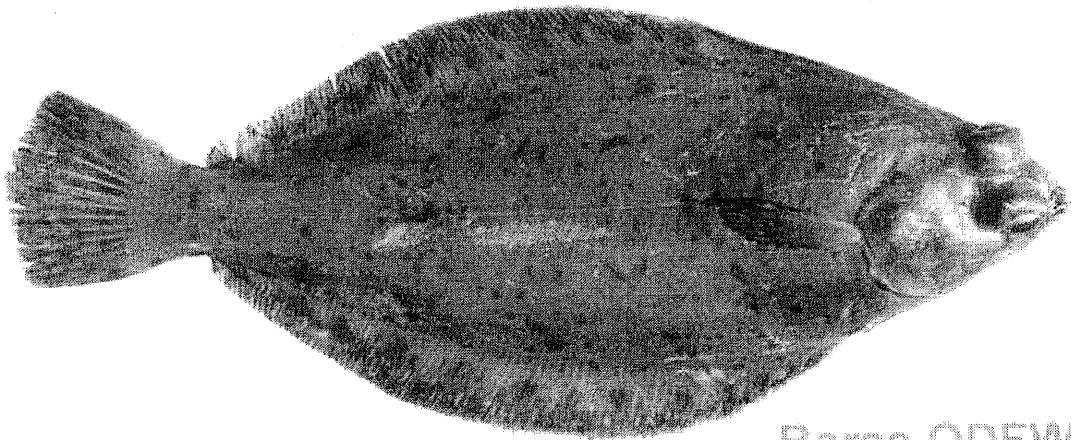
David B. Sampson
Associate Professor of Fisheries

and

Claire Wood
Research Assistant

Oregon State University
Coastal Oregon Marine Experiment Station
and Department of Fisheries and Wildlife
Hatfield Marine Science Center
Newport, OR 97365

Email: David.Sampson@hmsc.orst.edu



10 August 2001

EXECUTIVE SUMMARY

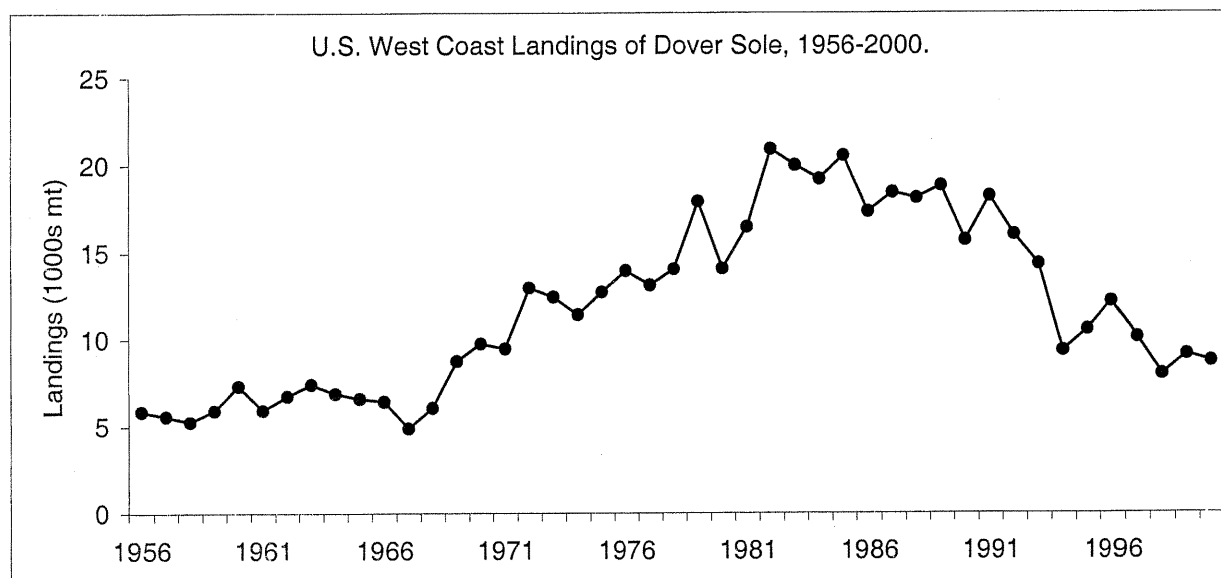
Stock

This assessment applies to the Dover sole (*Microstomus pacificus*) that reside in the waters off California, Oregon and Washington in the region bounded by the U.S. borders with Canada and Mexico. This assessment treats these fish as a unit stock. Dover sole are also harvested from the waters off British Columbia and in the Gulf of Alaska.

Catches

Dover sole have been the target of trawl operations along the west coast of North America since before World War II. Almost all of the harvests have been taken by groundfish trawl. Annual landings from U.S. waters averaged 6,708 mt during the 1960s, 12,792 mt during the 1970s, 18,393 mt during the 1980s, and 12,367 mt during the 1990s. Discarding of small, unmarketable fish (5-15% by weight) is an important, but poorly documented feature of the fishery.

Recent landings (mt) of Dover sole from U.S. waters.										
Region	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
U.S. Vanc.	2396	1771	1691	1155	1179	1459	995	897	1107	1217
Columbia	7153	4847	5029	2981	2625	3515	3145	2973	3609	3436
Eureka	3914	3978	3505	2127	2403	2648	2117	2287	2224	1920
Monterey	3285	3599	2894	2126	3226	3242	2744	1275	1748	1646
Conception	1474	1834	1218	968	1101	1322	1107	571	443	231
U.S. Total	18223	16035	14339	9359	10565	12187	10125	8010	9137	8739



Data and assessment

The U.S. west coast stock of Dover sole (exclusive of the Conception region) was last assessed in 1997 using the length-based version of the Stock Synthesis program. The current assessment also used the length-based version of Synthesis but the length and age composition data were separated into five distinct fisheries: a California fishery; shallow (< 200 fathoms) and deep fisheries in Oregon; and shallow and deep fisheries in Washington. The period modeled in the current assessment extended from 1956-2000; the initial age composition (in 1956) was assumed to conform to equilibrium conditions. The current assessment included recent fishery length and age composition data and observations from the recent NMFS shelf and slope surveys. As in previous assessments, retention and discarding were modeled using logistic functions of length.

Unresolved problems and major uncertainties

The size-sex distributions of Dover sole vary between areas and have changed over time. It is difficult to determine whether these variations are due to differences in size-related discarding or to differences in selection, related either to gear or to depth of fishing. The size-discards and size-selection effects are confounded in the fishery size-composition data. Only a few observations are available for the size-distributions of discarded fish.

The current version of Synthesis cannot accommodate size-selection curves in which peak selection occurs at different sizes for females versus males, and yet this seems to be a distinct feature in the length composition data from the trawl surveys and the fisheries.

Reference points

In June 2000 the Pacific Fishery Management Council (PFMC) endorsed the recommendation of the West Coast Groundfish Harvest Policy Workshop that F40% be used as the default target rate of fishing mortality for flatfish species. The current assessment uses F40% default as the target rate of fishing mortality for its projections of Dover sole yield.

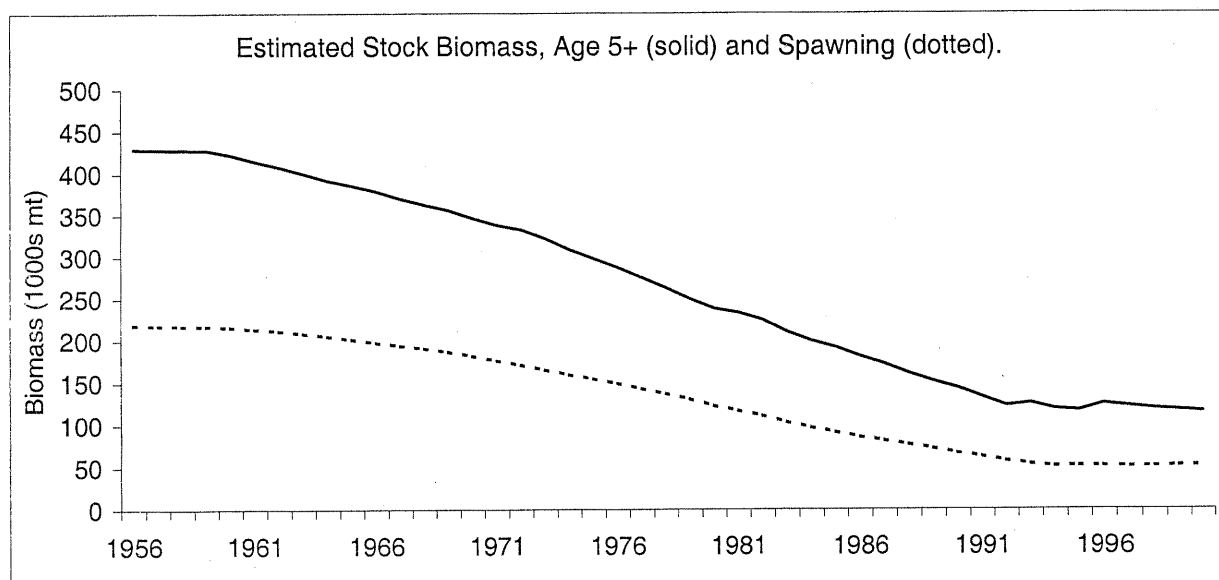
Whether the stock was overfished or not was gauged by ratio of the most recent spawning stock biomass relative to the unfished level. Spawning biomass for the unexploited stock of Dover sole was estimated by multiplying the average estimated recruitment for the period 1957-1997 times the estimated spawning biomass per recruit given no fishing. Surprisingly, this estimate of unexploited spawning stock biomass was smaller than the spawning stock biomass predicted by the Stock Synthesis model for the early years of the assessed period.

This finding, that the early exploited spawning biomass was larger than the unexploited spawning biomass, is consistent with the reduction in length at maturity that apparently has occurred since the early 1950s, when the maturity versus length relationship was first described for Dover sole. The Stock Synthesis models in this assessment (and the 1997 assessment) used 33.4 cm for the length at which 50% of females are mature. In contrast, Hagerman (1952) reported that 50% of females are mature at 35 cm and Harry (1956) reported 50% female maturity at 38 cm.

Stock biomass

Based on the preferred model scenario the estimated spawning stock biomass at the start of 2000 was about 29% of the unexploited level and the age 5+ biomass was about 27% of the biomass estimated for 1956, the first year of the modeled period. The estimates of biomass for recent years have been essentially without trend following an extended period of steady decline. Alternative scenarios examined in the assessment were not dramatically different in their estimates of stock trends.

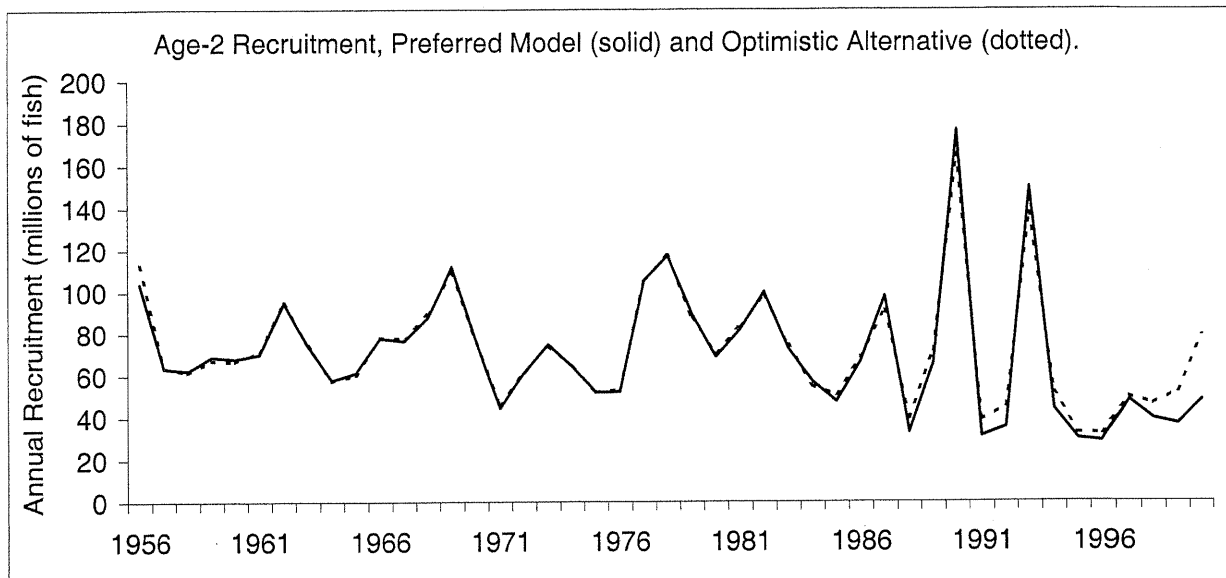
Estimates of recent stock biomass (1000s mt).										
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Age 5+ Biomass	133.0	122.6	125.9	119.1	117.1	124.8	122.0	119.2	117.4	115.5
Spawn. Biomass	62.4	57.2	53.3	50.7	50.9	50.9	50.2	50.5	51.4	51.4
% of Unexploited	35%	32%	30%	29%	29%	29%	28%	29%	29%	29%



Recruitment

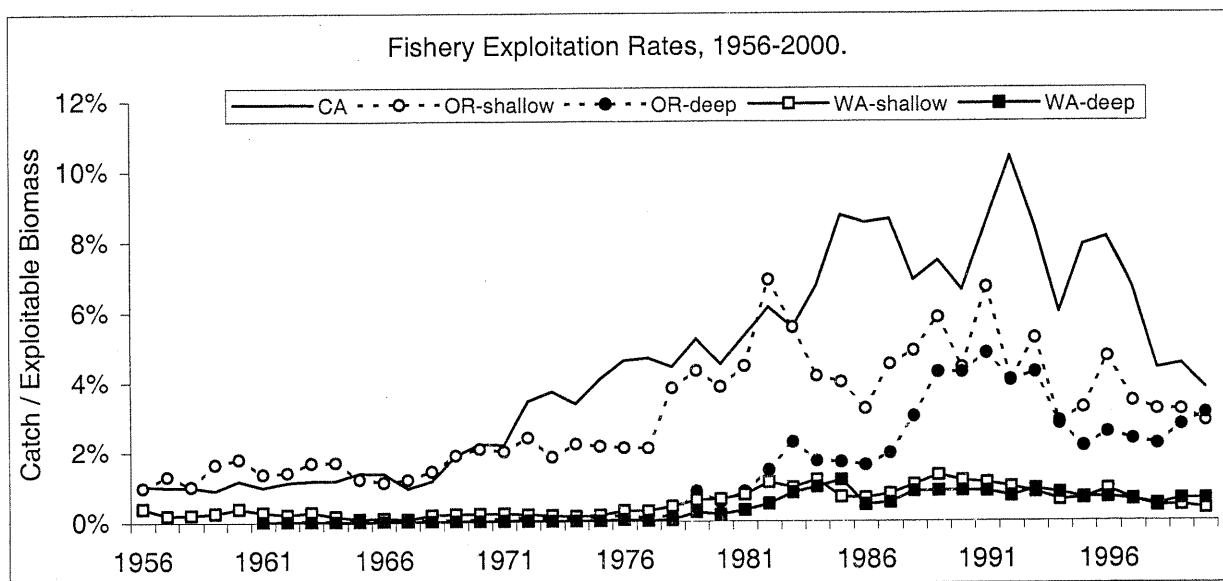
In the preferred model scenario the estimates of recruitment were lightly constrained to conform to a Beverton and Holt stock-recruitment relationship, in which average recruitment is progressively reduced as spawning biomass falls below the unexploited level. In the optimistic alternative scenario the estimates of recruitment were assumed to be entirely independent of the parental spawning stock biomass (i.e., constant average recruitment). In both scenarios (and in many others that were examined) there were unusually large estimated age-2 recruitment events in 1990 and 1993.

	Estimates of recent annual recruitment (1000s).									
Age-2 recruits	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Preferred Scenario	31.0	35.3	149.5	43.8	29.8	28.6	48.2	39.3	36.8	48.1
Optimistic Scenario	38.5	45.1	137.1	51.7	32.5	32.3	49.6	46.2	52.0	78.5



Exploitation status

The peak estimated exploitation rate for the modeled period was 10.4% in 1992 in the California fishery and there were high rates of exploitation ($> 5\%$) in the Oregon-shallow fishery during the early 1980s and again during the early 1990s. There were also high rates of exploitation in the Oregon-deep fishery during the late 1980s and early 1990s. Recent annual rates of exploitation have remained high.



Fishery	Estimates of recent exploitation rates ^a									
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CA	8.5%	10.4%	8.4%	6.0%	7.9%	8.1%	6.7%	4.4%	4.5%	3.8%
OR-shallow	6.7%	4.1%	5.2%	2.9%	3.3%	4.7%	3.4%	3.2%	3.2%	2.9%
OR-deep	4.8%	4.0%	4.3%	2.8%	2.1%	2.5%	2.3%	2.2%	2.8%	3.1%
WA-shallow	1.1%	1.0%	0.8%	0.6%	0.6%	0.9%	0.6%	0.4%	0.4%	0.4%
WA-deep	0.9%	0.7%	0.9%	0.8%	0.7%	0.7%	0.6%	0.5%	0.6%	0.6%
All fisheries ^b	19.1%	18.5%	17.1%	12.4%	14.0%	13.8%	12.2%	10.1%	10.0%	9.7%

^a The exploitation rate is the catch divided by the available stock biomass.

^b Calculated from total catch divided by age 8+ biomass.

Management performance

Based on the 12.71% discard rate assumed in this assessment for recent years, the coastwide catch of Dover sole (landings plus estimated discards) has been greater than the Acceptable Biological Catch (ABC) limits for four of ten years since 1991.

Management performance, ABCs versus landings and catch (mt).											
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	
ABC (mt)											
US Vancouver	2400	2400	2400	2400	2400	1192 ^a	1195 ^b				
Columbia	6100	6100	4000	4000	3000	3000	3000	8373	8373	8373	
Eureka	8000	4900	3500	3500	2900	2900	2900				
Monterey	5000	5000	5000	5000	5000	3764 ^c	3764 ^c				
Conception	1000	1000	1000	1000	1000	1000	1000	1053	1053	1053	
Coastwide	22500	19400	15900	15900	14300	11855	11859	9426	9426	9426	
Landings											
US Vancouver	2396	1771	1691	1155	1179	1459	995	897	1107	1217	
Columbia	7153	4847	5029	2981	2625	3515	3145	2973	3609	3436	
Eureka	3914	3978	3505	2127	2403	2648	2117	2287	2224	1920	
Monterey	3285	3599	2894	2126	3226	3242	2744	1275	1748	1646	
Conception	1474	1834	1218	968	1101	1322	1107	571	443	231	
Coastwide	18222	16029	14337	9357	10534	12186	10108	8003	9131	8449	
Catch, including estimated discards of 12.71%.											
US Vancouver	2700	1996	1906	1302	1328	1645	1122	1011	1247	1372	
Columbia	8062	5463	5668	3360	2958	3961	3545	3351	4067	3872	
Eureka	4412	4484	3951	2398	2709	2985	2386	2578	2507	2164	
Monterey	3702	4056	3262	2396	3636	3654	3093	1437	1970	1855	
Conception	1661	2067	1373	1091	1241	1490	1247	644	499	260	
Coastwide	20538	18066	16159	10546	11872	13735	11393	9020	10291	9522	

^a The ABC was specified as a range of values, 818-1565 mt.

^b The ABC was specified as a range of values, 820-1570 mt.

^c The ABC was specified as a range of values, 3164-4363 mt.

Forecasts

Five-year projections of the F40% catch and spawning biomass were derived for the preferred model scenario, an optimistic alternative, and a pessimistic alternative. The preferred model and the optimistic alternative were based on slightly different model configurations. In the preferred model the estimates of recruitment were lightly constrained to conform to a stock-recruitment relationship, whereas in the optimistic alternative the recruitment values were assumed to be entirely independent of the parental spawning stock biomass. The projections for these two scenarios were based on the average recruitment values estimated for 1980-2000 (64.6 million age-2 fish for the preferred scenario and 68.1 million fish for the optimistic scenario). The projections for the pessimistic alternative were derived from the preferred model configuration using a greatly reduced level of annual recruitment (30.0 million age-2 fish). For all three sets of projections the catch during 2001 was assumed to be 8354.9 mt, which is the landed catch that corresponds to the coastwide ABC for 2001 (7,677 mt) plus an adjustment for the 12.71% discard rate assumed in the assessment for the recent years. The coastwide catch was apportioned to the five fisheries as follows: 40% to CA, 16% to OR-shallow, 35% to OR-deep, 3% to WA-shallow, and 6% to WA-deep, equivalent to the distribution of landings during 1999-2000. These same percentages were assumed and held constant for the projections. Because the estimates of spawning biomass for 2000 were below 40% of the estimated spawning biomass of the unexploited stock, the projected catches were calculated to conform to the Council's 40-10 harvest policy.

Projections of F40% catch and spawning biomass (mt).					
	2002	2003	2004	2005	2006
Preferred Model Scenario					
Catch (40-10 Policy)	7431.0	7443.9	7444.8	7476.4	7564.2
Spawning Biomass	51142	51318	51417	51608	51999
Optimistic Alternative					
Catch (40-10 Policy)	7865.9	7979.8	8107.4	8272.2	8479.4
Spawning Biomass	53003	53559	54150	54884	55791
Pessimistic Alternative					
Catch (40-10 Policy)	7429.8	7434.6	7402.5	7346.5	7262.6
Spawning Biomass	51136	51280	51268	51166	50969

Recommendations for future research and data collection

- Re-age otoliths from the late 1980s to determine whether the apparent discrepancies in length-at-age are due to inconsistent age-readings or to shifts in Dover sole growth.
- For depth stratification of the Dover sole fisheries the boundary between shallow and deep should probably be at about 300 rather than 200 fathoms as used in this assessment.
- Depth stratification of the fishery data should be extended to the California data. To do so will require one to extract data on depth of fishing from the trawl logbooks that correspond to the fishing trips that were chosen for market sampling.

- Future discard studies should be certain to collect data on the reasons for discarding, particularly whether they are due to the small sizes of the fish or to trip limits (and independent of fish size).

Sources of additional information

Dover sole STAR Panel Meeting Report. Hatfield Marine Science Center, Newport, Oregon, July 9-12, 2001. Final STAR Report, July 27, 2001.

Brodziak, J.L. Jacobson, R. Lauth, and M. Wilkins. 1997. Assessment of the Dover sole stock for 1997. Appendix in: Status of the Pacific Coast groundfish fishery through 1997 and recommended biological catches for 1998: stock assessment and fishery evaluation. Pacific Fishery Management Council, Portland, OR.

**Status of the Sablefish Resource off
the U.S. Pacific Coast in 2001**

Ray Hilborn

Juan L. Valero

Mark Maunder

School of Aquatic and Fishery Sciences

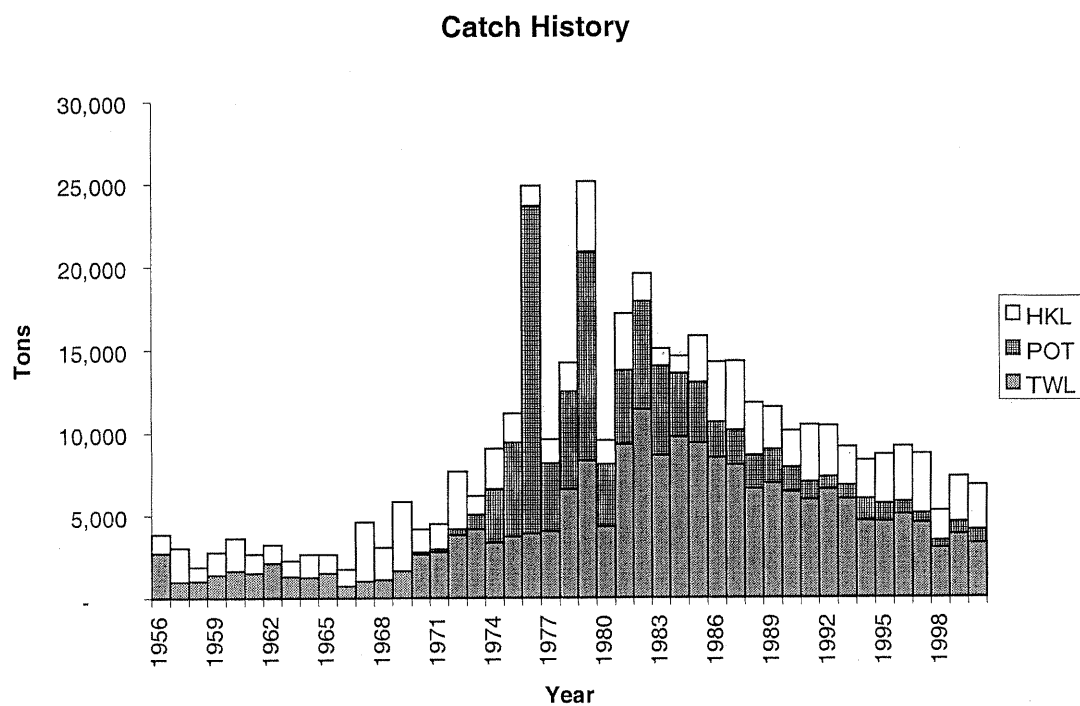
Box 355020

University of Washington, Seattle WA 98195

Executive Summary

Stock: sablefish/ U.S. Pacific coast (Washington, Oregon, California)

Catches: The catch history is shown below:



<i>Year</i>	<i>HKL</i>	<i>TWL</i>	<i>POT</i>
1990	2,201	6,681	1,491
1991	3,422	6,198	1,067
1992	3,071	6,829	764
1993	2,324	6,209	848
1994	2,332	4,828	1,346
1995	2,976	5,281	1,061
1996	3,359	6,288	752
1997	3,592	5,246	582
1998	1,769	3,559	449
1999	2,738	4,016	745
2000	2,708	3,420	831

Data and Assessment: Last assessment 1998. This assessment uses a surplus production analysis from survey and total catch data, and an age-structured statistical catch-at-age model (Coleraine). Primary data used are slope and shelf survey index and catch-at-age, and commercial catch-at-age from hook and line, trawl and pot gear. The major new data available are coastwide slope surveys conducted since 1997.

Unresolved problems and major uncertainties: The data provide little information on current stock size, with very flat likelihood profiles across current stock size. Conclusions are strongly dependent upon relative weighting of survey index and catch-at-age data, with the survey index indicating large stock sizes while the catch-at-age data indicate smaller stock sizes..

Reference points: see NMFS assessment

Stock biomass: over the period of surveys it appears the stock has been declining by a few percent each year. We have no idea of the historical level of biomass as the first survey data became available in the late 1980s or early 1990s although it is clear that at shallower depths the stock is almost certainly well below historical levels. The fishery has not yet moved deep enough to encompass the entire stocks.

Recruitment trends: aging for sablefish is very unreliable thus we are unable to estimate individual age class strengths. The shelf survey, conducted every 3 years catches primarily young fish and indications are that recruitment in the 1990s has been lower than previously.

Exploitation status: reasonably unknown because of uncertainty in current biomass.

Management performance: unable to say due to difficulty in estimating current stock size. Continued presence of many old individuals reduces possible concern about overfishing. Average size and age in survey has remained stable for 10 years, again indicating low levels of concern.

Forecast: our most credible runs indicate the stock will likely decline in the next three years even with major reductions in removals.

Decision tables: Given below is our best estimate of the spawning biomass in 10 years in relation to the virgin spawning biomass.

Annual Catch	Ratio of spawning Stock in 2011 to virgin spawning stock
0	0.72
1000	0.68
2000	0.64
3000	0.60
4000	0.56
5000	0.52
6000	0.48
7000	0.44
8000	0.41
9000	0.37
10000	0.33

Recommendations: continue annual slope survey, integrate it with shelf survey so there is an annual survey of the entire area. Extend survey to deeper water. Institute tagging program.

Status of the Sablefish Resource off the U.S. Pacific Coast in 2001

Michael J. Schirripa
National Marine Fisheries Service
Northwest Fisheries Science Center
Fishery Resource Analysis and Monitoring Division
Hatfield Marine Science Center
2030 S. Marine Science Drive
Newport, OR 97365

and

Richard Methot
National Marine Fisheries Service
Northwest Fisheries Science Center
Fishery Resource Analysis and Monitoring Division
2725 Montlake Boulevard East
Seattle, Washington 98112-2097

Version 1.6

August 10, 2001

EXECUTIVE SUMMARY

Sablefish, or blackcod, (*Anoplopoma fimbria*) are distributed in the Northeastern Pacific Ocean from the southern tip of Baja California, northward to the north-central Bering Sea and in the Northwestern Pacific Ocean from Kamchatka, southward to the northeastern coast of Japan. Although few studies have critically evaluated issues regarding the stock structure of this species, it appears there may exist at least three different stocks of sablefish along the west coast of North America: (1) a stock that exhibits relatively slow growth and small maximum size that is found south of Monterey Bay (Phillips and Imamura 1954; Cailliet et al. 1988); (2) a stock that is characterized by moderately fast growth and large maximum size that occurs from northern California to Washington (Fujiwara and Hankin 1988a; Methot 1994, 1995) the stock addressed in this assessment; and (3) a stock that grows very quickly and contains individuals that reach the largest maximum size of all sablefish in the Northeastern Pacific Ocean, distributed off British Columbia, Canada and in the Gulf of Alaska (Mason et al. 1983; McFarlane and Beamish 1990; Methot 1995). In this assessment, we assumed a single sablefish population extends from the Conception INPFC area through the U.S. Vancouver INPFC area. Including the INPFC area of Conception is new to this year's assessment and was made possible by the more geographically extensive survey data (Helsler et al. 2001).

The historical catch by year and gear are shown in Figure ES-1 and Table ES- 1. For 2001 fisheries, the Council recommended first allocating the total catch Optimum Yield (OY) between fishery sectors, and then applying sector-appropriate discard rates to each sector. Tribal sablefish longline fisheries were allocated 10% of the total catch OY (690 mt), and then were discounted 3% of that allocation for discard mortality, for a landed catch allocation of 669 mt. Tribal sablefish fisheries occur primarily in the spring, separate from the non-tribal fisheries for sablefish. The remaining 90% (6,205 mt) of the total catch OY was discounted 24 mt for research, then divided between the open access (9.4% of the non-tribal OY, or 581 mt) and limited entry fisheries (90.6% of the non-tribal OY, or 5,600 mt). There is little to no recreational fisheries interest in sablefish. Open access sablefish fisheries are primarily hook-and-line daily trip limit fisheries, with an estimated discard rate of 8%, making the open access landed catch allocation 535 mt. The limited entry allocation is divided between the trawl sector (58%, or 3,248 mt) and the fixed gear sector (42% or 2,352 mt). Data from the 1995-1998 Oregon Department of Fish and Wildlife Enhanced Data Collection Program (EDCP) provided a trawl sector discard estimate of 22%, reducing the trawl landed catch allocation to 2,533 mt. Historically, the limited entry, fixed gear fishery has landed most of its sablefish in a brief derby with few sablefish discard opportunities, similar to the tribal sablefish fisheries. Thus, the limited entry, fixed gear sablefish discard estimate is also 3%, reducing the

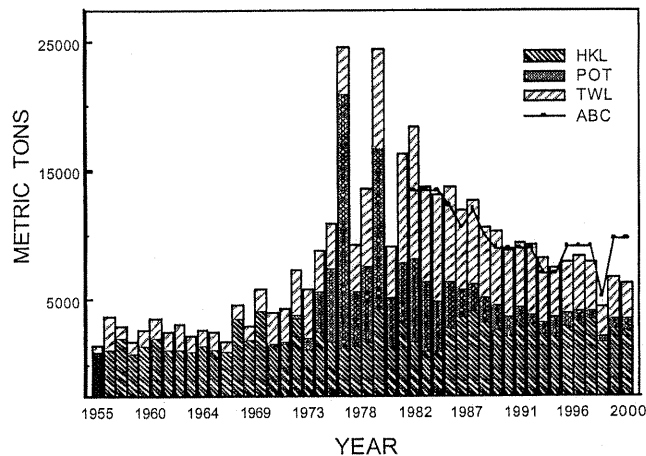


Figure ES-1. Landings, including foreign catch, by year, of west coast sablefish, 1955-2000, and associated Allowable Biological Catch (ABC line), 1982-2000.

allocation for that sector to 2,281 mt. Within the limited entry fixed gear catch allocation (2,281 mt), 85% of the allocation is reserved for the primary fishery (regular derby + mop-up) and 15% is reserved for the daily trip limit fisheries. There is no allocation between open-access, limited entry trawl, and limited entry non-trawl gear in the Conception area.

Two STAT teams participated in the 2001 STAR Panel process; the National Marine Fisheries Service STAT team (NMFS STAT, or STAT1) and the University of Washington STAT team (UW STAT, or STAT2). Both teams used as nearly identical data sets as possible. Major differences between the two teams approaches were: STAT1 used landings data starting in 1971 while STAT2 started in 1980; STAT1 used Stock Synthesis, a length/age based model written in FORTRAN while STAT2 used COLERAINE, an age structured model written for AD Model Builder. Other differences between the two team's approaches were either rectified during the STAR process, negligible, or unavoidable based on the model structures.

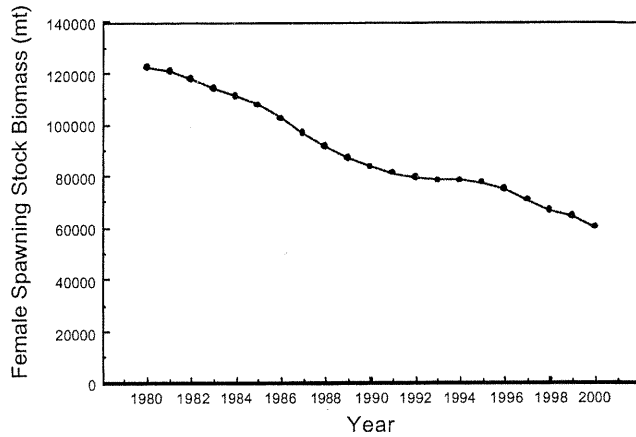


Figure ES-2. *Estimated sablefish female spawning stock biomass (metric tons), 1980-2000.*

In this year's assessment (2001) STAT1 focused on evaluating the sensitivity of the model and the outcomes to changes in the survey data. These changes include the combining of the AFSC slope survey data and the NWFSC Industry Co-operative Survey data. These two data sources were combined using a GLM procedure, the details of which can be found in Helser et al. (2001). Another source of variation concerning the survey information is that of the shelf survey. It has recently been brought to light that certain tows, especially in the early years of the survey, may have not been on the bottom for the entire time of the tow. These tows were termed "water hauls" because of the lack of benthic animals that were brought up. "Water hauls" were classified as though tows with less than 1 kilogram of benthic animals in the tow. Excluding these tows, generally speaking, would tend to increase the biomass estimates for those early years. For details on this analysis see Zimmerman et al. (2001).

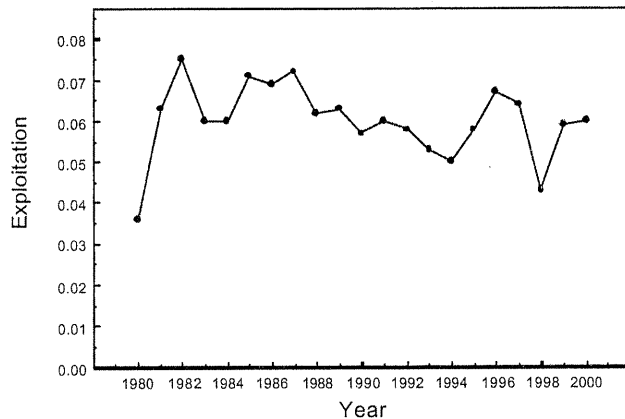


Figure ES-4. *Estimated exploitation rate for sablefish, 1980-2000.*

Sablefish spawning stock biomass (SSB) has continued to decline from a high of approximately 122,000 metric tons in 1980 to a low of approximately 60,000 metric tons in 2000 (Figure ES-2, Table ES-1). Concurrent with the decline in biomass was a slow decline in the exploitation rate. This was a factor of both the declining ABC as well the decreasing stock size.

Notable in the trend in recruitment is the apparent drop that occurred throughout the 1990's (Figure ES-4, Table ES-1). King et al. (2000) noted a similar trend in sablefish recruitment off the coast of Canada's Vancouver Island. King et al. (2000) expanded on work by McFarlane and Beamish (1992) which suggested that strong year-class strength in sablefish was related to years of above average copepod production. Periods of exception copepod production were shown to be linked to climate and ocean conditions. King et al. (2000) goes on to conclude that the ocean conditions that were present at the time of high copepod production (and subsequent sablefish recruitment) were no longer present after 1990, which resulted in the decline in sablefish recruitment observed at the time. A 15-year zooplankton time series collected off southern Vancouver Island showed large interannual anomalies of biomass for most major zooplankton species (Mackas et al. 2001). A significant relation was found between the estimates of sablefish recruitment and the copepod anomalies reported by Mackas et al (2001). Consequently, it is not clear from the data presented here how much of the recent decline in recruitment is due to decreases in spawning stock biomass and how much to environmental conditions.

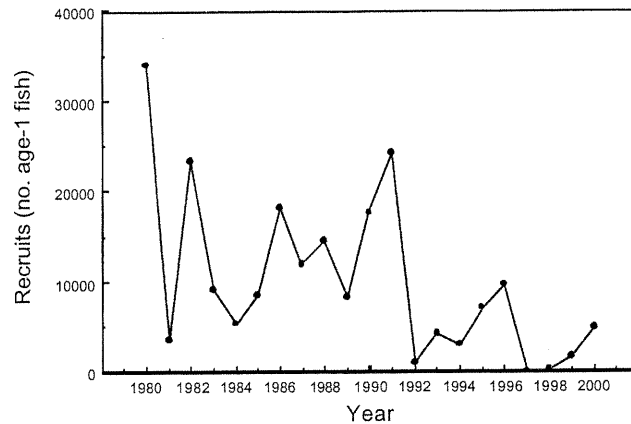


Figure ES-4. Estimated number of age-1 sablefish, 1980-2000.

Final projection runs were made allowing Q to be estimated within the model and with no penalty for deviating from a stock-recruitment relationship (i.e. the steepness parameter was made a non-issue). The estimated Q for STAT1 was 0.60 and for STAT2 was 0.47. Based on the competing recruitment hypotheses mentioned above, two states-of-nature were modeled by each of the two STAT teams (Table ES-1). State-of-nature one ("Density Dependent") assumed that recruitment was driven primarily by spawning stock biomass. For this model STAT1 used the years 1975-1991 to calculate mean virgin recruitment (15,171 age-1 fish) and STAT2 used the year 1978-1989 (144,673 age-1 fish). These values were then multiplied by the virgin spawning stock biomass-per-recruit (SPR=13.35 for STAT1 and 13.10 for STAT2) to arrive at the "Density Dependent" virgin spawning stock biomass (202,541 for STAT1 and 144,673 for STAT2). State-of-nature two ("Regime Shift") assumed that recruitment was driven more by an environmental/oceanic conditions. For this model STAT1 used the years 1975-2000 to calculate mean virgin recruitment (11,121 age-1 fish) and STAT2 used the years 1978-1999

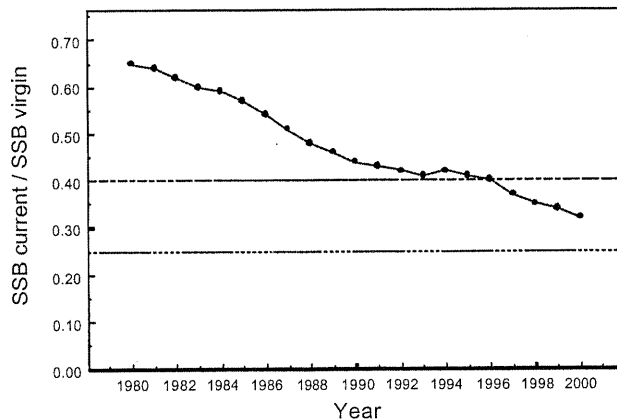


Figure ES-5. Spawning stock biomass ratio for sablefish, 1980-2000.

(118,099 age-1 fish). These values were then also multiplied by each teams respective SPR to arrive at the "Regime Shift" virgin spawning stock biomass (148,469 for STAT1 and 118,099 for STAT2). The ratio of current spawning stock biomass was estimated by STAT1 to be between 27% ("Density-Dependent" model) and 37% ("Regime Shift" model) and by STAT2 to be between 31% ("Density-Dependent" model) and 38% ("Regime Shift" model), qualifying the stock for the "precautionary zone" (Figure ES-5).

Projections of the possible future condition of the sablefish stock assuming management via the "40:10" rule and constant catch were made by both STAT teams (Table ES-2). Spawning output is projected to decline due to the poor 1996 and 1997 year classes now recruiting into the population. Depending upon which recruitment hypothesis is more correct (the "Density-Dependent" model or the "Regime Shift" model), recruitment may or may not improve over the short term. If recruitment is driven more by spawning stock biomass, as depicted by the "Density-Dependent" model, then improvements are not likely in the near future. If however recruitment is more environmentally driven, as depicted by the "Regime Shift" model, then improvement in the near term may be more of a possibility. Regardless of which hypothesis is more true, recruitment must increase substantially in the very near future for the condition of the stock to improve significantly.

Table ES-1. Population parameters from STAT1 for sablefish, 1980-2000.

YEAR	LANDED CATCH	BEGINNING BIOMASS	SSB	RECRUITS (AGE 1)	EXPLOIT	SSB RATIO
1980	9146	267749	122211	33980	0.036	0.65
1981	16373	275583	121102	3500	0.063	0.64
1982	18633	262698	117956	23394	0.075	0.62
1983	14704	254571	114207	9176	0.060	0.60
1984	14097	243689	111011	5321	0.060	0.59
1985	14335	229931	107764	8424	0.071	0.57
1986	13303	214505	102537	18153	0.069	0.54
1987	12803	205103	96819	11888	0.072	0.51
1988	10872	195019	91414	14468	0.062	0.48
1989	10453	187782	87021	8262	0.063	0.46
1990	9189	180780	83722	17643	0.057	0.44
1991	9498	179189	81179	24232	0.060	0.43
1992	9373	183052	79361	898	0.058	0.42
1993	8145	176248	78355	4178	0.053	0.41
1994	7580	169865	78423	2951	0.050	0.42
1995	7905	161911	77440	7058	0.058	0.41
1996	8325	154186	74722	9636	0.067	0.40
1997	7952	146404	70698	10	0.064	0.37
1998	4391	135028	66816	105	0.043	0.35
1999	6656	126310	64224	1617	0.059	0.34
2000	6244	115840	60062	4783	0.060	0.32

Table ES-2. Final parameter values and forecasts of possible condition of the sablefish stock arrived upon during the STAR process by STAT1 and STAT2.

	STAT 1				STAT 2			
	Density- Dependent	Regime Shift	Density- Dependent	Regime Shift	Density- Dependent	Regime Shift	Density- Dependent	Regime Shift
Range for mean virgin recruitment	1975-1991	1975-2000	1975-1991	1975-2000	1978-1989	1978-1999	1978-1989	1978-1999
Mean Virgin Recruitment (age 1 fish)	15171	11121	15171	11121	11044	9015	11044	9015
Virgin SpawnBiomass	202541	148469	202541	148469	144673	118099	144673	118099
2001 SpawnBiomass	55448	55448	55448	55448	44481	44481	44481	44481
2001/Virgin	0.27	0.37	0.27	0.37	0.31	0.38	0.31	0.38
Virgin SpawnStock Biomass/Recruit	13.35	13.35	13.35	13.35	13.10	13.10	13.10	13.10
Projections(¹ 1992-2000 mean; ² 1975-2000 mean; ³ 1991-1998; ⁴ 1978-1999) with 40:10 rule and F45%								
Recruitment used to Project	3470 ¹	3470 ¹	11121 ²	11121 ²	4833 ³	4833 ³	11044 ⁴	11044 ⁴
SSB/Virgin	2002	0.25	0.34	0.25	0.34	0.35	0.28	0.35
	2003	0.24	0.32	0.24	0.32	0.33	0.27	0.33
	2004	0.22	0.30	0.23	0.32	0.32	0.27	0.33
	2005	0.21	0.28	0.24	0.32	0.32		
	2006	0.20	0.27	0.24	0.32	0.32		
	2007	0.20	0.26	0.25	0.32	0.32		
	2008	0.19	0.25	0.26	0.33	0.35		
	2009	0.18	0.24	0.27	0.35			
	2010	0.18	0.23	0.27	0.36			
	2011	0.18	0.22	0.28	0.37			
	2012	0.17	0.22	0.29	0.38			
Total Catch	2002	3877	4565	3935	3922	4317	3927	4321
	2003	3573	4231	3911	3675	4043	3705	4073
	2004	3338	3976	4193	3504	3845	3613	3954
	2005	3130	3744	4619				
	2006	2931	3520	5058				
	2007	2750	3315	5458				
	2008	2591	3135	5810				
	2009	2451	2976	6125				
	2010	2336	2842	6412				
	2011	2234	2724	6668				

Table ES-2. (Continued)

STAT 1				STAT 2				
	Density- Dependent	Regime Shift	Density- Dependent	Regime Shift	Density- Dependent	Regime Shift	Density- Dependent	Regime Shift
Catch/ Age 2+ biomass								
2002	0.039	0.046	0.038	0.045	0.048	0.053	0.047	0.051
2003	0.038	0.045	0.037	0.044	0.046	0.051	0.044	0.048
2004	0.037	0.045	0.039	0.046	0.045	0.050	0.042	0.046
2005	0.036	0.044	0.041	0.049				
2006	0.035	0.043	0.043	0.051				
2007	0.034	0.042	0.045	0.052				
2008	0.033	0.041	0.046	0.053				
2009	0.032	0.040	0.047	0.054				
2010	0.031	0.039	0.048	0.054				
2011	0.030	0.039	0.048	0.055				
Projections (¹ 1992-2000 mean; ² 1975-2000 mean; ³ 1991-1998; ⁴ 1978-1999) with 40:10 rule and F45%								
Catch	SSB04/ SSB0 ¹	SSB04/ SSB01 ¹	SSB04/ SSB0 ²	SSB04/ SSB01 ²	SSB04/ SSB0 ³	SSB04/ SSB01 ³	SSB04/ SSB0 ⁴	SSB04/ SSB01 ⁴
1000	0.25	0.86	0.27	0.92	0.29	0.92	0.35	0.94
2000	0.25	0.85	0.27	0.91	0.27	0.89	0.34	0.92
3000	0.24	0.83	0.26	0.89	0.26	0.87	0.32	0.89
4000	0.24	0.81	0.26	0.87	0.25	0.85	0.31	0.85
5000	0.23	0.80	0.25	0.86	0.24	0.83	0.30	0.83
6000	0.23	0.78	0.25	0.84	0.23	0.81	0.29	0.81

**Stock Status of Shortspine Thornyhead off the
Pacific West Coast of the United States 2001.**

¹Kevin Piner
¹Richard Methot

¹Northwest Fisheries Science Center
Seattle, Washington

July 26, 2001

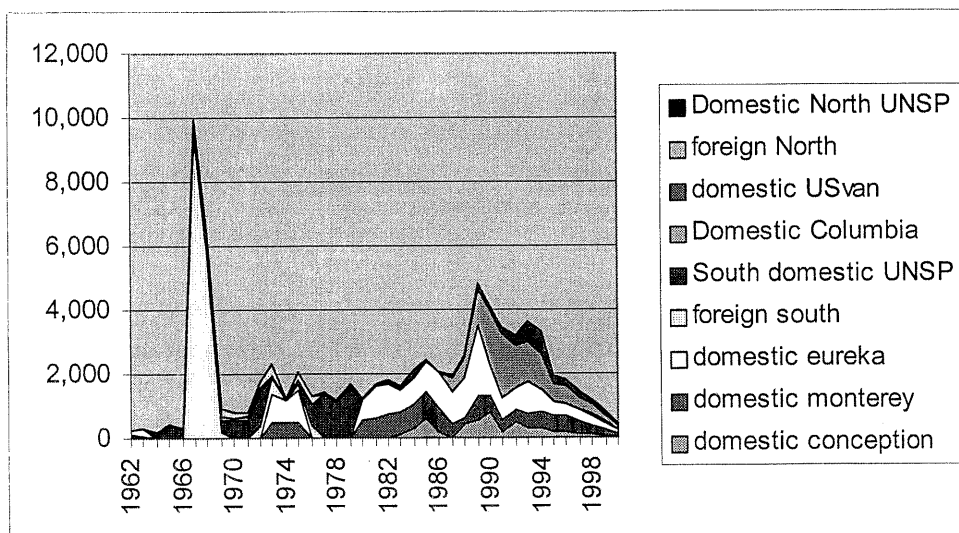
Executive Summary

Shortspine thornyhead (*Sebastolobus alascanus*) are distributed widely from the waters off Northern Mexico to the Gulf of Alaska. We considered the population off the west coast of the United States from Pt. Conception, California to the U.S.-Canadian border to be one stock. The decision included part of the Conception INPFC area that was not included in the previous assessment.

Catches: Recent catches have been a fraction of earlier peak landings and under 1000mt. The reduction in landings has primarily been the result of management measures. The total landings of shortspine are given below in metric tons:

Year	Con, Mon, Eur	Col, US Van	Total
1990	2,267	1,878	4,145
1991	1,259	2,182	3,442
1992	1,536	1,663	3,199
1993	1,741	1,870	3,611
1994	1,530	1,752	3,282
1995	1,104	842	1,946
1996	1,087	710	1,798
1997	848	606	1,453
1998	771	442	1,213
1999	521	287	808
2000	225	212	437

The following graph depicts the long-term catch history of shortspine used in the modeling:



The following table lists for the last 10 years the percent of total catch and metric tons of assumed discard used in the shortspine modeling.

Year	%discard	mt
1990	0.08	360
1991	0.04	143

1992	0.02	65
1993	0.02	74
1994	0.01	33
1995	0.13	291
1996	0.09	178
1997	0.2	363
1998	0.14	198
1999	0.25	269
2000	0.16	83

Data and Assessment. The previous stock assessment was completed in 1998. This assessment was very similar to the previous work in the modeling structure. We used a Stock Synthesis age-structured model to derive the time-series of estimated parameters. Information on the catch from 1962-present, length distributions from 1978-present, shelf survey biomass estimates from 1977-present and two slope surveys from 1988-present were available for this work.

The new information for this assessment included AFSC slope surveys from 1999-2000, NWFSC slope surveys from 1998-2000, AFSC shelf survey 1998, historical foreign catch, EDCP discard analysis 2000 and catches and associated length distributions from 1998-2000. Very little information on historical discard, growth and recruitment was available, making accurate predictions of such quantities as virgin biomass, spawning biomass, etc. very uncertain.

Unresolved problems: There was a considerable amount of important biological and fishery information lacking for this assessment. We did not have a complete understanding of growth, natural mortality or a sufficiently long time-series of abundance measures. Lengths from the fisheries were derived from limited sampling and were noisy and difficult to interpret. There was no information on fish smaller than 15-20 cm, thus leading to no ability to interpret recruitment patterns. The largest issue in the previous assessment (slope survey q) was again an unknown quantity. The overall quality and quantity of data was poor and makes definitive statements about this fishery impossible. An analysis of the historical foreign catch was also included but not yet reviewed and therefore considered uncertain. The following table shows the results of 3 different model types (different slope survey Q) that either included or did not include the historical foreign catch (we included in all base runs) in the modeling. There was virtually no difference in ending biomass and ~4% difference in estimated spawning biomass ratio to virgin. A more conclusive estimate of historical landing will be produced in the future but should have limited effects on the overall conclusions.

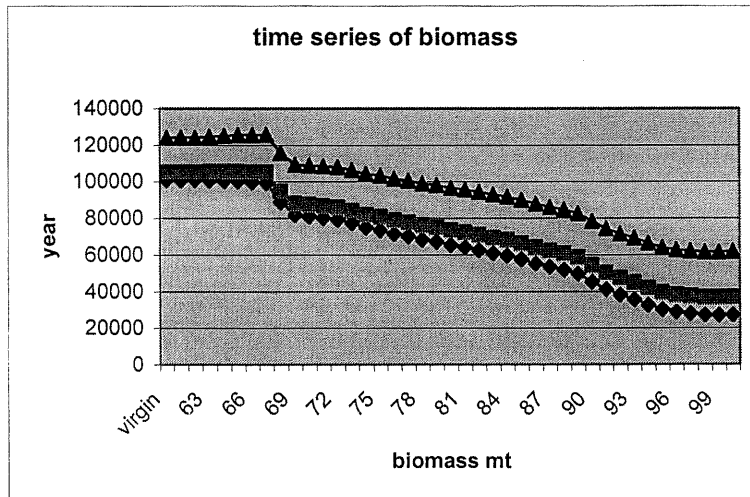
model	With foreign catch		Without foreign catch	
	Ending biomass	SB ratio to virgin	Ending biomass	SB ratio to virgin
Model B (Q=1)	29813	0.28	29878	0.32
Model D (Q=0.8)	37282	0.34	37646	0.38
Model H (Q=0.5)	61782	0.48	63259	0.53

Reference Points: The definition presented in this document of overfishing was a biological population that was estimated to have less than 25% of an estimated virgin spawning biomass in the year 2001. Spawning biomass was the total estimated weight of all fish that were mature. Given this definition, we do not consider this stock to be overfished and that the population was likely between 25% and 50% of unfished spawning biomass. The management targets were based on a level of fishing mortality equal to $F_{50\%SPR}$.

Stock Biomass. The estimated time series of biomass indicated that the stock had declined to roughly 25-50% of virgin depending upon which level of slope survey Q was assumed. The following table gives the estimated biomass for the last 10 years using 3 different slope survey Q estimates.

YEAR	Model B (Q=1)	Model D (Q=0.8)	Model H (Q=0.5)
90	47140	54300	78358
91	43179	50366	74481
92	40244	47466	71659
93	37678	44941	69223
94	34727	42028	66398
95	32217	39560	64020
96	30837	38224	62771
97	29953	37403	62094
98	29292	36807	61645
99	29102	36675	61640
2000	29275	36895	61948

The following figure depicts the long-term trend of those model runs assuming 3 levels of assumed Q.



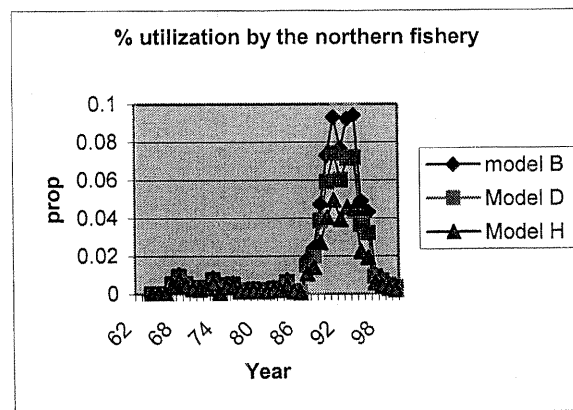
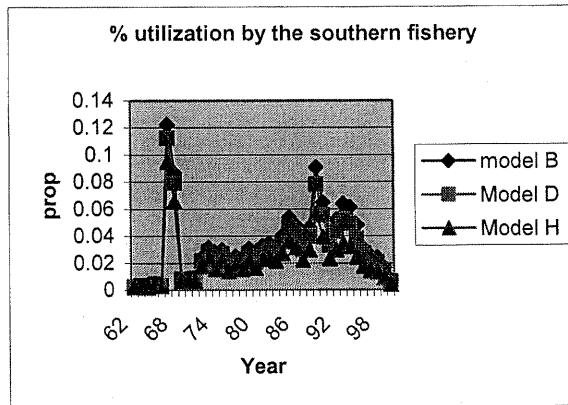
Recruitment: There was no information available to estimate recruitment. We used a constant recruitment model in which recruitment was the mean level of recruitment consistent with the survey biomass and removals. The following table lists the last 10 years of estimated recruitment for 3 model runs in which slope survey Q was 1.0, 0.8 and 0.5, respectively. All recruitment estimates are numbers of fish * 10,000

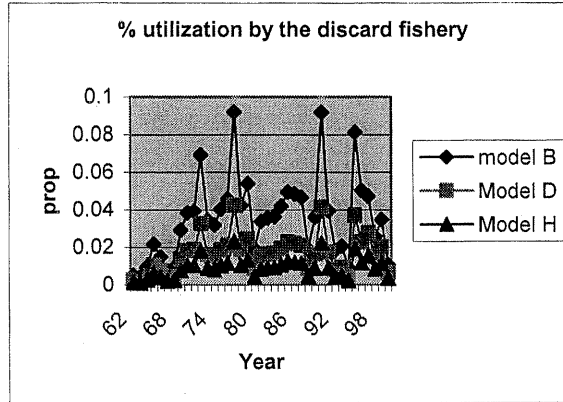
YEAR	Model B (Q=1)	Model D (Q=0.8)	Model H (Q=0.5)
90	11840	14357	25297
91	11840	14357	25297
92	11840	14357	25297
93	11840	14357	25297
94	11840	14357	25297
95	11840	14357	25297
96	11840	14357	25297
97	11840	14357	25297
98	11840	14357	25297
99	11840	14357	25297
2000	11840	14357	25297

Exploitation Status: The exploitation history of shortspine has varied from an estimated early pulse of foreign fishing to an increase in domestic exploitation in the late 1980's. Since the early 1990's the exploitation level has decreased due to management measures. The following table gives the estimated percent utilization for the South, North and Discard fisheries for the last 10 years.

	Model B (Q=1.0)			Model D (Q=0.8)			Model H (Q=0.5)		
year	South	North	Discard	South	North	Discard	South	North	Discard
90	0.065	0.073	0.092	0.055	0.059	0.042	0.039	0.04	0.022
91	0.04	0.093	0.04	0.033	0.074	0.017	0.023	0.049	0.009
92	0.052	0.077	0.018	0.043	0.06	0.008	0.03	0.039	0.004
93	0.064	0.092	0.021	0.052	0.071	0.009	0.035	0.046	0.005
94	0.061	0.094	0.009	0.049	0.072	0.004	0.032	0.045	0.002
95	0.048	0.049	0.081	0.038	0.037	0.037	0.024	0.022	0.019
96	0.031	0.043	0.05	0.027	0.032	0.023	0.018	0.019	0.012
97	0.025	0.01	0.047	0.022	0.009	0.028	0.014	0.006	0.016
98	0.024	0.008	0.026	0.021	0.007	0.015	0.013	0.004	0.008
99	0.017	0.005	0.035	0.014	0.005	0.02	0.009	0.003	0.011
2000	0.007	0.004	0.011	0.006	0.003	0.006	0.004	0.002	0.003

The following 3 figures depict the long-term trend in exploitation by the 3 fisheries used within this assessment.





Management performance: Landings have closely followed management guidelines. The lack of discard information however generates much uncertainty about the true quantity of total removals. The following table depicts the ABCs and harvest guidelines for shortspine thornyhead for the last few years.

YEAR	AREA	ABC mt	HG mt	LANDED mt
1992	Col, Eur, Mon	1,900	7,000	7,184
1993	Col, Eur, Mon	1,900	7,000	7,365
1994	Col, Eur, Mon	1,900	7,000	6,172
1995	North Pt Conc	1,000	1,500	2,006
1996	North Pt Conc	1,000	1,500	1,552
1997	North Pt Conc	1,000	1,500	1,417
1998	North Pt Conc	1,000	1177	1,213
1999	North Pt. Conc	1261	805	808
2000	North Pt. Conc	1261	970	437+

Forecasts: Models results would indicate an upward trend in biomass assuming recruitment remains constant. There exists much uncertainty in the true population dynamics because of sparse data and unknown life history traits. The forecast of estimated biomass and yield in mt based on $F_{50\%SPR}$ is given in the following table using all baseline models.

	Model A		Model B		Model C		Model D	
year	biomass	yield	biomass	yield	biomass	yield	biomass	yield
2002	28941	742	30733	706	26372	448	38207	955
2003	29756	771	31460	727	26927	462	38729	968
2004	30617	802	32219	751	27535	477	39286	983
2005	31512	834	33004	776	28191	494	39869	999
2006	32431	868	33807	802	28889	512	40473	1018
2007	33361	903	34620	829	29621	531	41089	1037
2008	34294	938	35436	858	30382	551	41713	1058
2009	35221	974	36250	886	31166	572	42340	1079
2010	36132	1009	37056	915	31966	594	42965	1101

	Model E		Model F		Model H	
year	biomass	yield	biomass	yield	biomass	yield
2002	31123	655	29084	514	62752	1718
2003	31780	677	29801	536	62667	1707
2004	32491	702	30564	560	62630	1698

2005	33248	729	31365	583	62637	1691
2006	34042	757	32195	606	62683	1686
2007	34866	787	33045	629	62766	1683
2008	35712	818	33907	651	62882	1682
2009	36572	850	34773	673	63029	1683
2010	37439	882	35634	695	63206	1686

Decision Table: A series of projections using a constant catch policy and models using 3 different levels of assumed slope survey Q were produced to provide guidance about the effects of different harvest strategies. Readers should be reminded that these projections assume constant recruitment and would be overly optimistic if recruitment in the 1990's had declined. The following table depicts the estimated ratio of spawning biomass in the terminal year to virgin spawning biomass at a constant harvest strategy (400-1600mt/yr).

Catch mt	20003			2005			2007			2009		
	Q=1	Q=.8	Q=.5	Q=1	Q=.8	Q=.5	Q=1	Q=.8	Q=.5	Q=1	Q=.8	Q=.5
400	.31	.36	.50	.33	.38	.53	.35	.41	.54	.38	.43	.56
600	.30	.36	.50	.32	.38	.52	.34	.39	.53	.36	.41	.55
800	.30	.35	.50	.31	.37	.51	.33	.38	.52	.34	.40	.53
1000	.30	.35	.49	.30	.36	.50	.31	.37	.51	.32	.38	.52
1200	.29	.35	.49	.30	.35	.50	.30	.36	.50	.30	.36	.51
1600	.28	.34	.48	.28	.33	.48	.27	.48	.33	.27	.48	.33

Recommendations: The sparse nature of the shortspine thornyhead data made estimation of many of the management parameters difficult. Research directed to formulating a different management strategy that is not dependent on thresholds or targets would greatly aid the process and provide for more consistent management. Further research into age and growth would help eliminate many of the uncertainties in this assessment. We need to concentrate on insuring that a comprehensive survey will be conducted for this and all species of management interest and that discard is accounted for accurately.

Sources of additional information:

Rogers, J.B., T. Builder, P.R.Crone, J. Brodziak, R. Methot, and R. Conser.

1997. Status of the shortspine thornyhead resource in 1998. Appendix E. in: Status of the pacific coast groundfish fishery through 1997 and recommended acceptable biological catches for 1998. PFMC, Portland, Or.

Helser, T. E., A.E. Punt, and R. D. Methot.

2001. A statistical approach to analyzing a multi-vessel fishery resource survey on the northwest continental slope. Unpublished manuscript.

Pacific Whiting Assessment Update for 2000

Thomas E. Helser¹, Martin W. Dorn², and Mark W. Saunders³

¹ Northwest Fishers Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
2725 Montlake Blvd., East
Seattle, WA 98112

² Northwest Fishers Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
4600 Sand Point Way NE, BIN C15700
Seattle, WA 98115

³ Department of Fisheries and Oceans
Pacific Biological Station
Nanaimo, BC Canada
V9R 5K6

Pacific Whiting Assessment Update for 2000

Overview

Since the last Pacific whiting assessment in 1998, limited new data are available. Fishery age composition data are available for the 1998 and 1999 U.S. and Canadian fisheries, and indices of whiting recruitment are available from the 1999 and 2000 SWFSC larval rockfish survey.

Although these data contain relatively little information concerning absolute abundance, they can provide an indication of the strength of recruiting year classes. A coastwide acoustic survey, the primary index of whiting abundance, is planned for summer of 2001. Recent fishery composition data and recruitment indices were evaluated for consistency with 1998 model projections in a preliminary assessment model run. This model used the same configuration as the 1998 assessment, but included the new fisheries age composition and recruit indices.

Fishery age composition and recruitment indices showed no indication strong recruiting year classes, and suggested a continuing pattern of weak to moderate year classes consistent with the 1998 assessment. Preliminary assessment model runs showed only minor differences in biomass and recruitment estimates. Whiting catch in 2000 will be approximately 75% of the ABC due to the scarcity of fishable aggregations of whiting off northern Washington and southeast Vancouver Island. Although an unharvested quota would tend to increase to stock size, catches in 1999 exceeded the ABC by 21,000 tons, and estimates of 1995 and 1996 year class strength are slightly lower in the preliminary model runs.

Given the time constraints to schedule a U.S. and Canadian STAR panel review of a full stock assessment and the fact that available data were available are unlikely to significantly affect assessment results, it is recommended that allowable harvest in 2001 be set to the projections based on the 1998 assessment. Projected 2001 total yield from the 1998 assessment is 238,000 t coastwide (Table below).

Year	Coastwide yield projection (from Dorn et al. 1999, Table 14, F40%, 40-10 option)	Coastwide ABC (tons)	Catch (tons)
1999	301,000	290,000	311,159
2000	275,000	290,000	218,837
2001	238,000	---	---

Assessment Model and Data

The Pacific whiting stock was last assessed in 1998 (Dorn et al. 1998). In that assessment, the age-structured model, which formerly used stock synthesis (Dorn and Methot 1991) to model the population dynamics and estimate likelihood components, was converted to AD model builder

(Fournier 1996). The 1998 assessment provided model validation using a side-by-side comparison of model results between stock synthesis and ADMB, and then extended the approach to take advantage of ADMB's post-convergence routines to estimate likelihood profiles and explore alternative treatment of process errors. This document provides an update of that assessment using the same model structure and parameter specification. Differences are limited to updated fishery catch and age compositions for 1998 and 1999, and indices of young-of-year abundance from the SWFSC Tiburon laboratory larval rockfish surveys for 1999 and 2000. Therefore, data sources inclusive to this update include:

- Total catch from the U.S. and Canadian fisheries (1972-99).
- Catch at age from the U.S. fisheries (1973-99) and Canadian fisheries (1977-99).
- Biomass and age composition from AFSC acoustic/midwater trawl surveys (1977, 1980, 1983, 1986, 1989, 1992, 1995, 1998).
- Biomass and age composition from AFSC bottom trawl surveys (1977, 1980, 1983, 1986, 1989, 1992, 1995, 1998).
- Biomass and age composition from the DFO acoustic surveys (1990-97).
- Indices of young-of-the-year abundance from the SWFSC Tiburon laboratory larval rockfish surveys (1986-2000).

Projections were performed to estimate 2001 yields and compared to the 1998 assessment using the updated fishery catches and size composition information as well as the Tiburon larval rockfish indices of recruits to age two. Preliminary catch estimates for the 2000 fishing season, used in the projections, were set at approximately 219,000 mt.

Total Catch

Total catches for 1998 and 1999 in this update were compiled from U.S. shore-based landings and at sea domestic catch data provided by Kate King (11 July, 2000; AFSC). Foreign and joint-venture catch data were provided by Mark Saunders (4 August, 2000; DFO). As in the earlier assessments, shore-based landings, which do not include discard, were taken from the Fishery Information Network (PacFIN) while all other catch data were from the North Pacific Groundfish Observer Program (NPGOP). Total catches of Pacific whiting were 319,777 and 311,159 t in 1998 and 1999, respectively (Table 1). Acceptable biological catch (ABC) was set at 290,000 t, which means the percent of the ABC harvested was 110% and 107% for 1998 and 1999, respectively. Pacific whiting catch data for 2000 are preliminary. U.S. shore-based landings and at sea domestic catch data were provided by Becky Renko (12 October, 2000; AFSC), while foreign and joint-venture catch data were provided by Barry Ackerman (13 October, 2000; DFO).

Although preliminary at this time, it appears that the 2000 TAC of 290,000 mt will not be realized. As of 13 October, 2000 only 219,000 mt were harvested (Table 1). While the U.S. shore-based and at sea domestic fisheries either met or slightly exceeded the quota, it is unlikely that the Canadian and tribal quota will be harvested.

Fishery Age Composition

A stratified random sampling design was used to estimate the age composition of the landed catch. For both the at sea domestic and shore-based fisheries strata were designated on the basis of geographic area. No seasonal strata have been used since the at sea domestic catches are taken early in the year and biological samples in the shore-based fishery are distributed evenly throughout the year. In the 1998 at sea domestic fishery only two spatial strata were used; north and south of Cape Falcon (45°46' N. lat.). These two strata reflect different areas of harvest in the 1998 at sea domestic fishery as shown by a plot of the distribution of whiting catches within 10' squares (Figure 1a). For 1999, fishery age compositions were estimated on the basis of only one strata inclusive of the entire coastline since nearly all at sea domestic whiting activity was restricted to the region north of Cape Falcon (Figure 1b). For the 2000 fishing season, distribution of at sea catches were similar to that observed in 1998, although at sea harvesting also centered on the area of the Columbia River (Figure 1c).

For the shore-based fishery in 1998 and 1999, four strata were used: 1) northern California (Eureka and Crescent City), 2) southern Oregon (Newport and Coos Bay), 3) northern Oregon (Astoria and Warrenton), and 4) Washington coastal ports (Ilwaco and Westport). Biological samples collected in these ports were used to convert landed weight into numbers which were then apportioned into numbers at age according to proportions at age based on otolith samples. Figure 2 shows the estimated age composition for the 1998 and 1999 shore-based fishery by port in the U.S. zone. Ages 3 through 5 comprise the majority of the catch in each port in 1998. In particular, age-5 fish representing the 1993 year class recruiting to the fishery are prevalent in each port. Age-2 fish not seen in 1997 were evident in the shore-based catches in 1998. In 1999, age-3 fish dominated the fishery catches in all each ports with age-4 and age-5 making secondary contributions to the catches. The size and age composition in Newport during 1992-99 show the recruitment of 1993 and 1994 year classes to the fishery (Figure 3). In particular, the 1993 year class recruited in the 1998 catches as age-5 fish. The catch at age for Pacific whiting in both the U.S. and Canadian fisheries from 1973-1999 are given in Table 2.

Preliminary Assessment Results

Updated assessment results were very similar to that of Dorn et al. (1998) from the last Pacific whiting stock assessment. In particular, estimated 3+ biomass and recruitment trajectories from 1972-1998 were nearly identical (Figure 4). Whiting 3+ biomass for 1999 and 2000 from the 1998 assessment represent projected biomasses while 3+ biomasses for 1999 and 2000 were estimated from the model for this update. Estimated biomasses for 1999 and 2000 did not differ by more than 10%. Biomass in 2001, projected for both the 1998 assessment and this update, were virtually identical at 1.21 million mt (Figure 4). In addition, total yield projected 2001 differed by no more than 5%. Figure 5 illustrates the comparison of the projected 2001 age compositions between the 2000 assessment update and 1998 assessment results. Here, the 2000 assessment update shows relatively lower numbers of ages 4-6 and higher numbers of ages 2-3 Pacific whiting compared to the 1998 assessment. Despite the slight differences in numbers of

fish at age between the 2000 update and the 1998 assessment, the updated 2000 model results in essentially the same projected yield for 2001. Since projections use Tiburon larval rockfish indices to forecast future recruitment, these were updated for this assessment (Figure 6). Recent estimates not included in the 1998 assessment show that recruitment indices in 1999 were slightly above the average, while in 2000 below the average. These data indicate that the fishery is not expected to see significant recruitment in the near future.

References

- Dorn, M.W., M.W. Saunders, C.D. Wilson, M.A. Guttormson, K. Cooke, R. Kieser, and M.E. Wilkins. 1999. Status of the coastal Pacific whiting/whiting stock in U.S. and Canada in 1998.
- Dorn, M.W., and R.D. Methot. 1991. Status of the coastal Pacific whiting resource in 1990. U.S. Dep. Commer., NOAA Tech. Memo. NMFS F/NWC-204, 97 p.
- Fournier, D. 1996. An introduction to AD model Builder for use in nonlinear modeling and statistics. Otter Research Ltd. PO Box 2040, Sidney, B.C. V8L 3S3 Canada.

Table 1. Annual catches of Pacific whiting (1,000 t) in U.S. and Canadian management zones by foreign, joint venture (JV), domestic at-sea, domestic shore-based, and tribal fisheries, 1966-2000. Catches in 2000 are preliminary.

Year	Foreign	JV	U.S. Domestic			Total	Canada			Total	U.S. and Canada total
			At-sea	Shore	Tribal		Foreign	JV	Shore		
1966	137.000	0.0	0.0	0.0	0.0	137.000	0.700	0.0	0.0	0.700	137.700
1967	168.699	0.0	0.0	8.963	0.0	177.662	36.713	0.0	0.0	36.713	214.375
1968	60.660	0.0	0.0	0.159	0.0	60.819	61.361	0.0	0.0	61.361	122.180
1969	86.187	0.0	0.0	0.093	0.0	86.280	93.851	0.0	0.0	93.851	180.131
1970	159.509	0.0	0.0	0.066	0.0	159.575	75.009	0.0	0.0	75.009	234.584
1971	126.485	0.0	0.0	1.428	0.0	127.913	26.699	0.0	0.0	26.699	154.612
1972	74.093	0.0	0.0	0.040	0.0	74.133	43.413	0.0	0.0	43.413	117.546
1973	147.441	0.0	0.0	0.072	0.0	147.513	15.125	0.0	0.001	15.126	162.639
1974	194.108	0.0	0.0	0.001	0.0	194.109	17.146	0.0	0.004	17.150	211.259
1975	205.654	0.0	0.0	0.002	0.0	205.656	15.704	0.0	0.0	15.704	221.360
1976	231.331	0.0	0.0	0.218	0.0	231.549	5.972	0.0	0.0	5.972	237.521
1977	127.013	0.0	0.0	0.489	0.0	127.502	5.191	0.0	0.0	5.191	132.693
1978	96.827	0.856	0.0	0.689	0.0	98.372	3.453	1.814	0.0	5.267	103.639
1979	114.909	8.834	0.0	0.937	0.0	124.680	7.900	4.233	0.302	12.435	137.115
1980	44.023	27.537	0.0	0.792	0.0	72.352	5.273	12.214	0.097	17.584	89.936
1981	70.365	43.556	0.0	0.839	0.0	114.760	3.919	17.159	3.283	24.361	139.121
1982	7.089	67.464	0.0	1.024	0.0	75.577	12.479	19.676	0.002	32.157	107.734
1983	0.0	72.100	0.0	1.050	0.0	73.150	13.117	27.657	0.0	40.774	113.924
1984	14.722	78.889	0.0	2.721	0.0	96.332	13.203	28.906	0.0	42.109	138.441
1985	49.853	31.692	0.0	3.894	0.0	85.439	10.533	13.237	1.192	24.962	110.401
1986	69.861	81.640	0.0	3.463	0.0	154.964	23.743	30.136	1.774	55.653	210.617
1987	49.656	105.997	0.0	4.795	0.0	160.448	21.453	48.076	4.170	73.699	234.147
1988	18.041	135.781	0.0	6.876	0.0	160.698	39.714	50.182	0.594	90.490	251.188
1989	0.0	203.578	0.0	7.418	0.0	210.996	31.589	66.256	1.687	99.532	310.528
1990	0.0	170.972	4.713	8.115	0.0	183.800	3.976	69.293	3.411	76.680	260.480
1991	0.0	0.0	196.905	20.600	0.0	217.505	6.043	76.254	22.225	104.522	322.027
1992	0.0	0.0	152.449	56.127	0.0	208.576	0.0	68.000	18.370	86.370	294.946
1993	0.0	0.0	99.103	42.119	0.0	141.222	0.0	47.172	11.611	58.783	200.005
1994	0.0	0.0	179.073	73.656	0.0	252.729	0.0	84.154	22.018	106.172	358.901
1995	0.0	0.0	102.624	74.965	0.0	177.589	0.0	26.580	43.838	70.418	248.007
1996	0.0	0.0	112.776	85.127	14.999	212.902	0.0	65.596	22.644	88.240	301.142
1997	0.0	0.0	121.173	87.410	24.840	233.423	0.0	42.565	48.065	90.630	324.053
1998	0.0	0.0	120.452	87.856	24.509	232.817	0.0	33.099	53.861	86.960	319.777
1999	0.00	0.00	115.259	83.419	25.844	224.522	0.0	17.915	68.722	86.637	311.159
2000	0.00	0.00	107.477	85.565	6.500	199.542	0.0	13.900	5.395	19.295	218.837
Average											
1966-2000						155.489				51.161	206.649

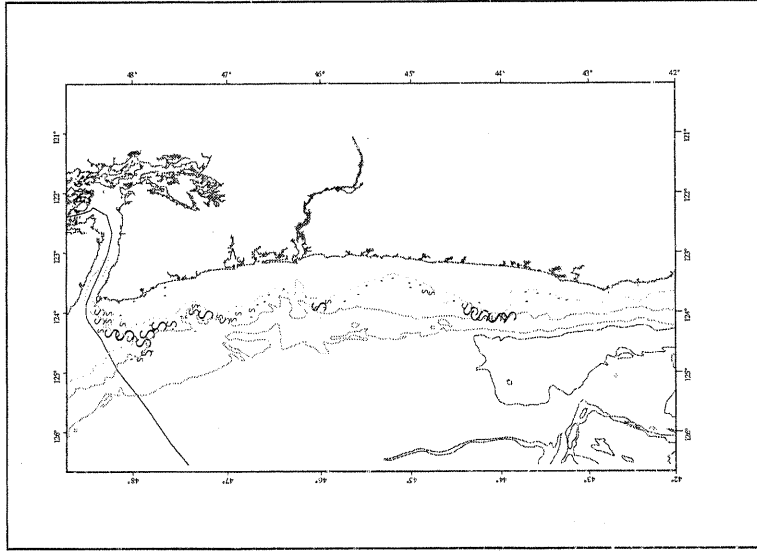
Table 2. Catch at age (millions of fish) for the Pacific whiting fisheries, 1973-99. Separate tables are given for U.S. and Canadian fisheries. The aggregate catch from all foreign, joint venture, domestic fisheries is included in these estimates.

Year	Age															Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
U.S. fisheries																
1973	0.00	0.00	55.92	9.67	21.72	40.22	25.16	23.01	21.51	10.33	4.51	1.94	1.08	0.00	0.00	215.07
1974	29.31	1.30	0.98	150.14	20.52	35.50	44.29	25.73	11.40	3.58	1.63	0.98	0.33	0.00	0.00	325.69
1975	0.00	88.43	2.69	3.70	128.11	21.86	23.54	38.00	17.15	7.40	3.70	1.35	0.34	0.00	0.00	336.27
1976	0.00	0.33	36.85	29.29	29.62	185.27	27.65	13.82	4.93	0.99	0.33	0.00	0.00	0.00	0.00	329.09
1977	0.00	1.81	3.80	54.35	11.23	19.93	68.11	11.05	5.80	2.72	1.45	0.73	0.18	0.00	0.00	181.16
1978	0.01	0.02	4.56	8.58	51.87	9.48	20.32	38.57	5.74	2.48	1.28	0.52	0.20	0.05	0.01	143.69
1979	0.00	4.34	8.74	17.41	10.15	48.01	15.47	29.48	20.82	4.25	1.70	0.50	0.22	0.05	0.03	161.17
1980	0.00	0.13	24.67	2.16	6.90	7.16	20.11	9.57	11.99	9.92	1.74	1.35	1.01	0.59	0.14	97.44
1981	13.38	1.25	2.30	97.62	6.89	9.64	6.77	23.33	6.26	7.24	7.05	0.95	0.48	0.12	0.13	183.41
1982	0.00	27.51	1.93	1.57	57.88	5.02	5.78	5.02	11.96	2.43	2.53	4.64	0.34	0.13	0.03	126.77
1983	0.00	0.00	86.60	7.22	3.63	36.79	4.68	3.72	3.32	5.24	1.62	1.00	1.00	0.16	0.14	155.12
1984	0.00	0.00	2.59	164.97	7.18	5.18	17.54	2.17	1.24	0.82	1.34	0.21	0.20	0.31	0.03	203.78
1985	2.27	0.55	1.32	12.36	113.50	9.74	4.30	6.75	0.61	0.34	0.24	0.36	0.00	0.00	0.00	152.34
1986	0.00	62.92	12.88	1.85	9.34	171.79	21.55	10.76	12.45	1.53	1.05	0.38	0.79	0.15	0.05	307.49
1987	0.00	0.00	124.20	6.58	1.68	2.72	151.56	7.89	3.09	14.87	0.57	0.15	0.15	1.25	0.00	314.71
1988	0.00	1.22	1.31	172.76	8.02	1.40	2.60	96.93	5.16	0.72	8.32	0.15	0.24	0.00	0.65	299.48
1989	0.00	8.65	9.57	3.88	257.20	7.80	2.46	2.74	106.63	6.62	0.87	5.37	0.03	0.12	0.57	412.51
1990	0.00	5.69	85.34	10.97	1.92	152.02	2.56	1.14	0.71	95.97	0.47	0.00	6.07	0.00	0.41	363.27
1991	0.00	0.95	43.96	98.32	19.35	6.00	151.49	6.63	1.31	0.93	60.10	2.11	0.00	9.74	0.65	401.54
1992	0.97	18.53	9.94	51.95	109.58	10.27	5.09	131.94	4.84	2.38	0.79	42.06	0.63	0.20	1.88	391.05
1993	0.00	1.90	70.49	9.07	42.90	59.65	3.75	3.06	81.86	1.81	0.43	0.20	20.95	0.12	2.47	298.66
1994	0.00	0.23	16.48	121.89	4.82	76.93	104.64	3.29	2.04	115.38	0.46	2.06	0.22	29.13	3.65	476.31
1995	0.20	1.02	0.41	19.96	114.38	3.32	27.40	66.22	3.09	0.53	58.19	1.09	0.91	0.10	18.55	315.36
1996	0.00	102.26	71.90	6.75	34.60	97.87	1.81	17.17	46.84	0.90	0.17	50.38	0.00	0.49	14.81	445.94
1997	0.00	2.00	173.73	163.98	3.01	27.17	48.41	3.05	10.71	18.59	0.39	0.77	17.33	0.47	8.38	477.97
1998	0.00	26.97	117.63	103.21	133.25	16.56	20.27	41.66	4.83	2.35	17.29	1.52	0.48	11.85	3.32	501.20
1999	0.00	47.58	112.329	100.72	91.74	54.50	16.20	19.69	19.86	3.94	6.16	9.99	1.34	1.68	9.92	495.66

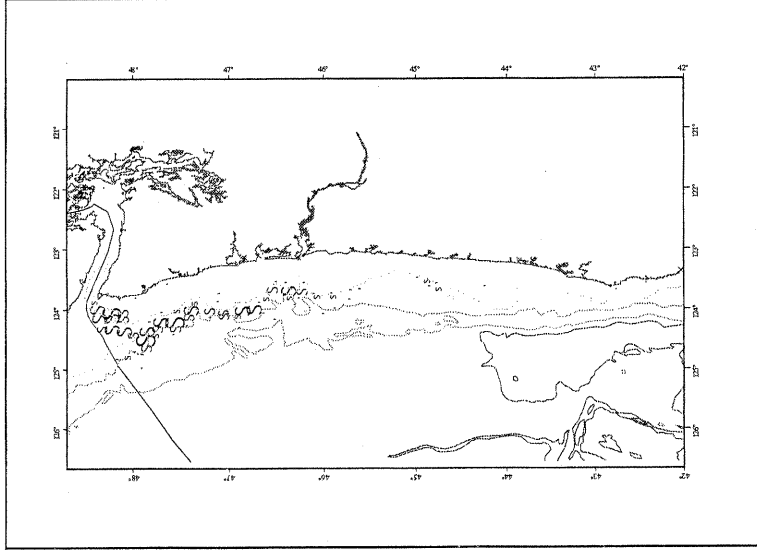
Table 2. Continued. Canadian catch at age.

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Canadian fisheries																
1977	0.00	0.01	0.01	0.25	0.09	0.30	1.83	0.53	0.50	0.42	0.40	0.35	0.16	0.00	0.00	4.85
1978	0.00	0.00	0.00	0.20	0.35	0.28	1.06	1.31	1.12	0.62	0.48	0.21	0.18	0.09	0.00	5.90
1979	0.00	0.00	0.00	0.21	0.62	1.30	1.14	2.10	3.02	1.10	0.79	0.37	0.25	0.17	0.12	11.19
1980	0.00	0.00	0.00	0.00	0.47	0.62	2.46	0.92	1.18	6.74	1.27	0.62	0.62	0.20	0.00	15.10
1981	0.00	0.00	0.00	1.01	0.27	1.41	1.38	4.28	0.85	2.36	6.18	1.49	0.60	0.85	0.00	20.68
1982	0.00	0.00	0.00	0.69	13.35	1.10	1.44	1.41	4.41	1.00	0.78	6.04	0.59	0.47	0.00	31.28
1983	0.00	0.06	14.02	1.03	1.80	32.15	1.29	1.87	1.67	5.59	0.77	0.26	3.41	0.26	0.13	64.31
1984	0.00	0.00	1.11	13.27	1.73	9.26	20.86	2.04	2.35	1.54	4.81	0.93	0.80	2.65	0.37	61.72
1985	0.00	0.06	0.06	2.45	8.03	1.65	3.25	9.62	0.49	0.55	0.55	1.65	0.37	0.00	1.59	30.32
1986	0.00	0.14	0.14	0.28	3.97	38.41	2.41	2.41	11.48	1.28	0.57	0.99	1.42	0.43	1.42	65.35
1987	0.00	0.00	0.90	0.60	0.15	2.56	70.71	2.86	2.86	10.38	0.60	0.45	1.20	0.90	1.20	95.37
1988	0.00	0.00	0.31	15.28	0.62	1.13	2.36	66.66	2.26	1.44	7.90	0.51	0.21	0.21	0.62	99.51
1989	0.00	0.00	0.20	0.59	35.55	0.20	0.39	0.59	69.34	1.76	1.37	8.59	0.39	0.20	1.17	120.34
1990	0.00	0.00	2.80	2.08	0.21	48.67	0.73	0.21	0.00	27.50	0.42	0.00	1.25	1.04	2.08	86.99
1991	0.00	0.00	0.11	6.11	2.46	0.43	70.60	0.54	0.00	0.21	47.47	0.21	0.11	2.25	0.11	130.61
1992	0.00	0.00	0.67	7.63	17.81	3.55	0.40	56.83	0.27	0.00	0.13	30.79	0.07	0.13	1.21	119.49
1993	0.00	0.07	0.77	2.52	12.91	17.54	1.89	0.21	40.62	0.21	0.14	0.14	12.49	0.21	0.21	89.93
1994	0.00	0.00	0.70	2.87	3.07	15.20	26.86	4.20	0.80	67.45	0.87	0.27	0.13	22.73	1.33	146.48
1995	4.88	0.04	0.53	6.31	5.03	3.21	10.72	15.96	3.25	0.67	33.81	0.68	0.04	0.15	9.41	94.70
1996	0.00	12.46	2.89	1.44	12.03	16.06	4.31	14.28	17.05	2.84	1.10	34.27	0.06	0.00	10.01	128.80
1997	0.00	0.81	22.17	19.19	2.52	17.21	16.22	2.25	11.08	14.42	3.24	0.54	18.65	1.35	4.06	133.73
1998	0.14	0.14	9.15	39.39	38.25	3.56	13.74	14.27	1.64	7.74	7.17	0.99	0.67	5.50	1.91	144.26
1999	1.45	26.28	9.65	18.35	40.74	25.71	1.94	8.39	8.47	2.65	3.66	4.26	0.56	0.19	4.05	156.36

1998



1999



2000

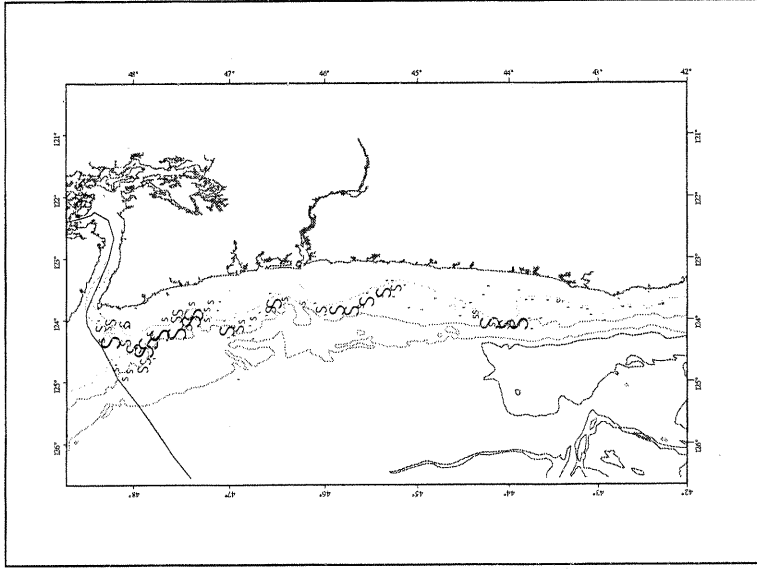


Figure 1. Distribution plots showing Pacific whiting at sea domestic catches within a 10'x10' grid. Catches within each grid are summed and symbol size illustrates the magnitude of catches.

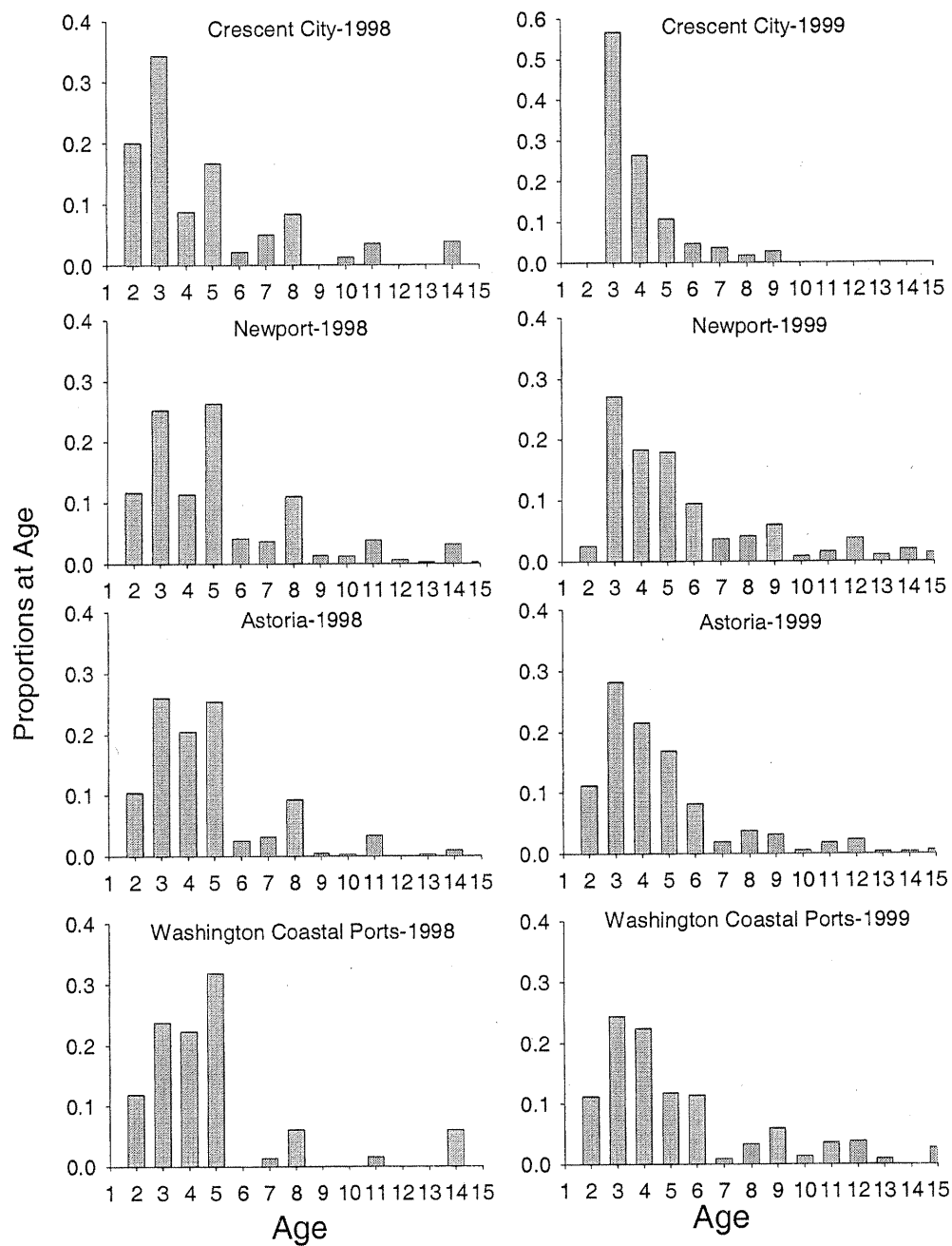


Figure 2. Pacific whiting proportion by age from shore-based landings in the U.S. zone, 1998-1999.

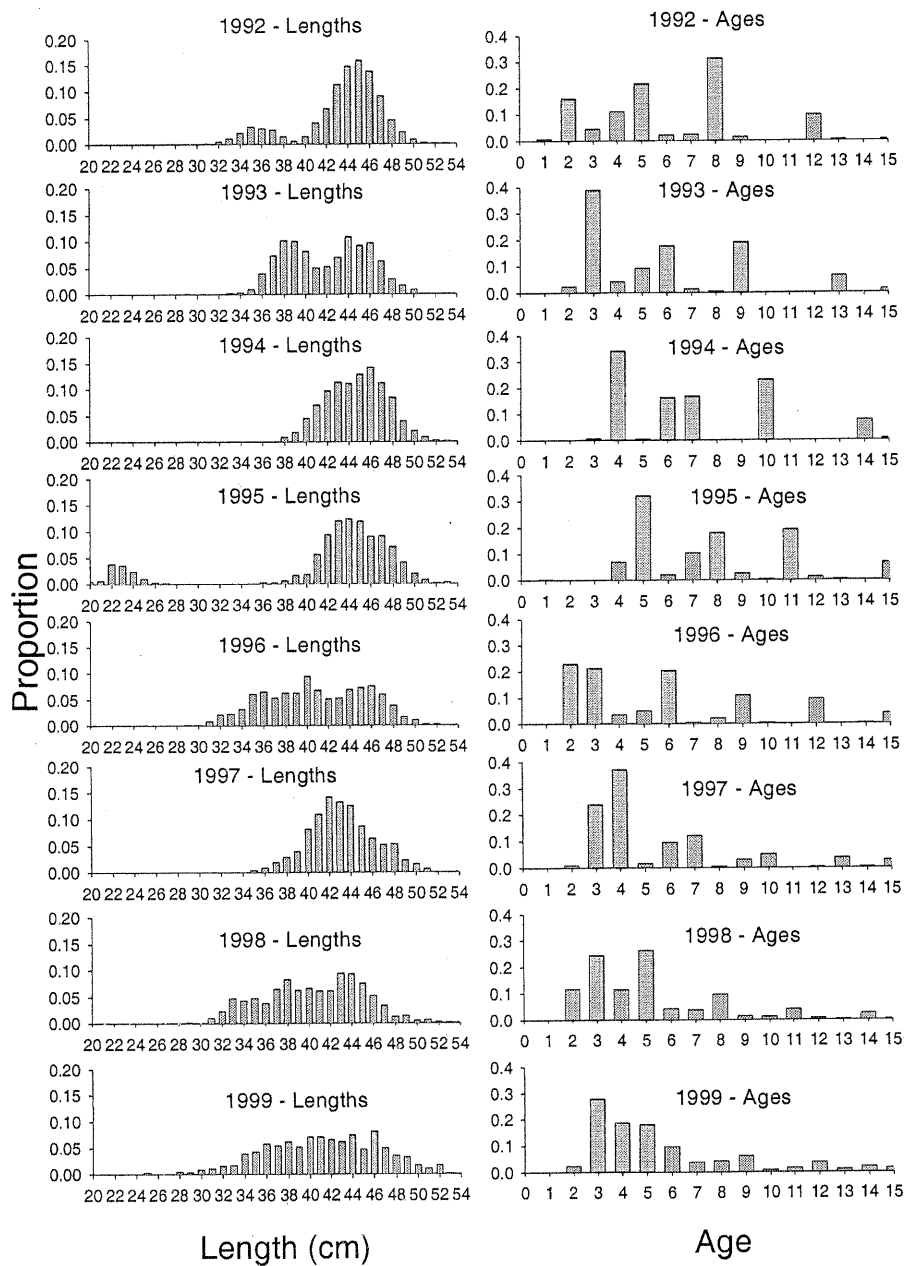


Figure 3. Pacific whiting length and age compositions from the shore-based whiting fishery sampled from Newport, 1992-1999.

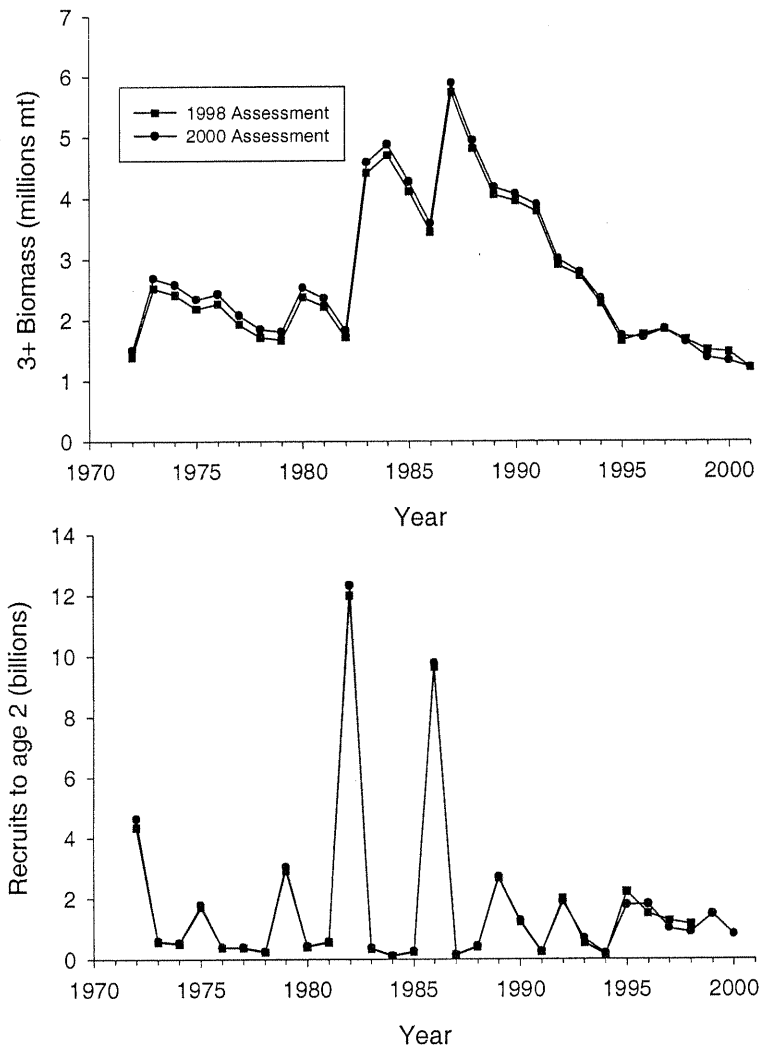


Figure 4. Pacific whiting 3+ biomass (millions mt) and recruits to age-2 (billions) comparing estimates from the 1998 assessment and 2000 assessment update. Biomasses from 1998-2001 are based on 1998 assessment projections while biomass in 2001 is based on projections from the 2000 assessment update.

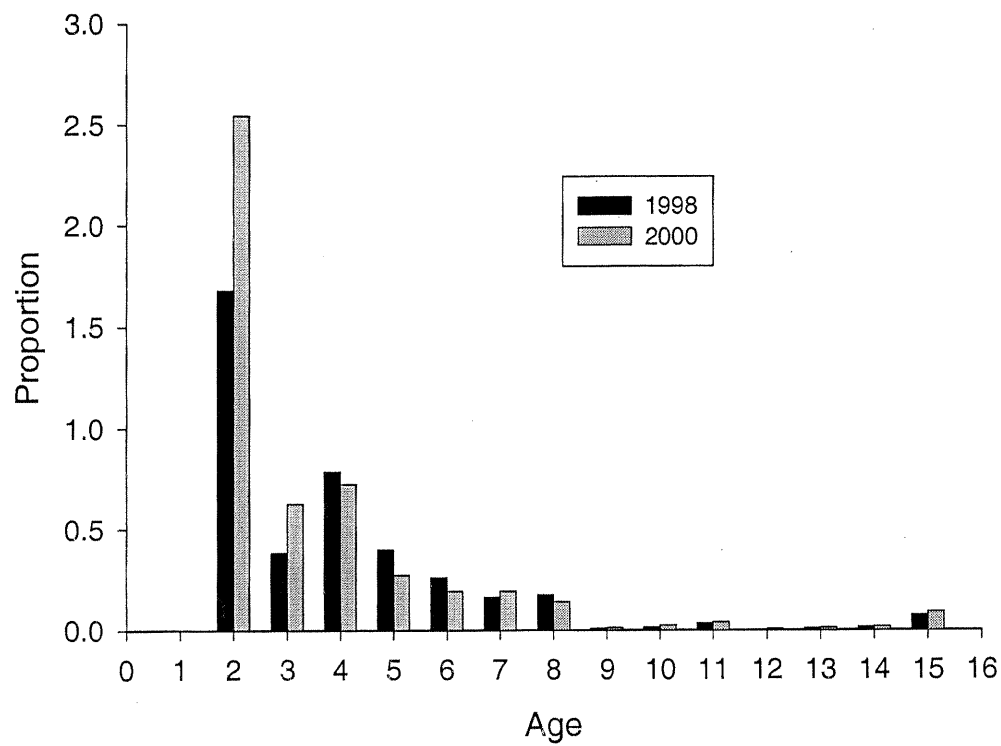


Figure 5. Comparison of projected age compositions for 2001 from 1998 assessment and from the 2000 assessment update.

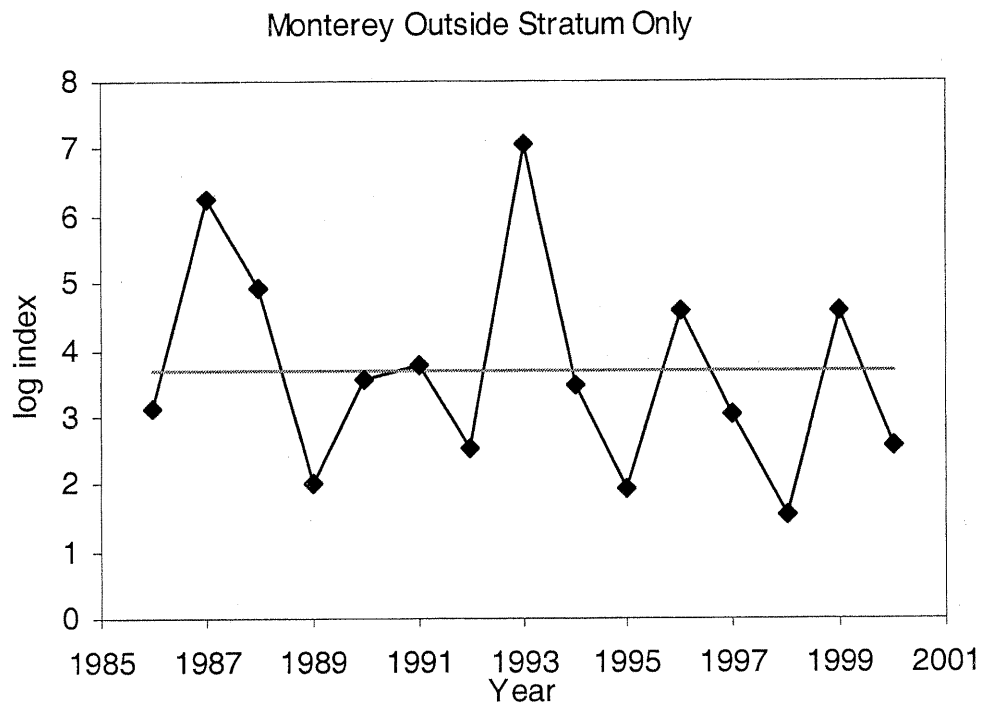


Figure 6. SWFSC Tiburon larval rockfish whiting abundance indices for Monterey outside strata only from 1986-2000.

**STATUS OF THE YELLOWEYE ROCKFISH RESOURCE IN 2001
FOR NORTHERN CALIFORNIA AND OREGON WATERS**

Farron R. Wallace

Washington Department of Fish and Wildlife
48 Devonshire Road
Montesano, Washington 98563

Appendix to:
Status of the Pacific Coast Groundfish Fishery Through 2001 and Recommended
Acceptable Catches for 2002

August 30, 2001

Executive Summary

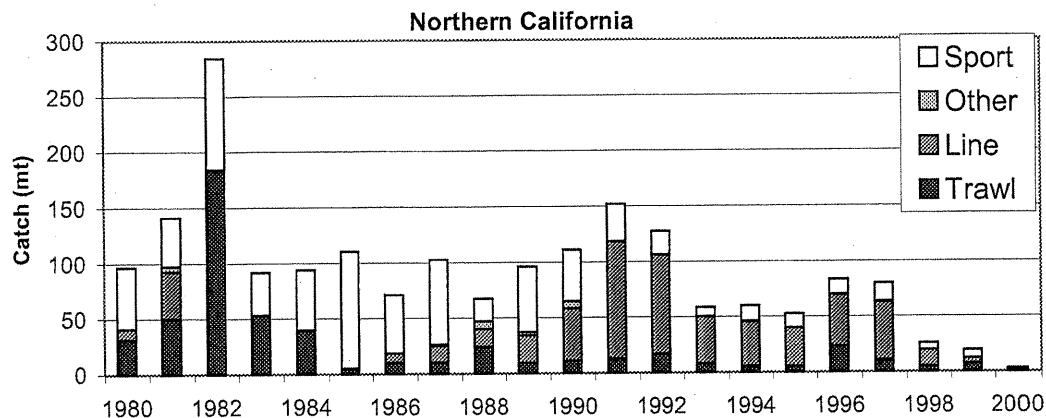
Stock

This assessment incorporates two separate assessments corresponding to yelloweye rockfish (*Sebastes ruberrimus*) found in waters off the northern California coast (PMFC areas 1B and 1C) and from waters off the Oregon coast. An assessment model was not developed for Washington due to limited length and age composition time series. Because of differing sport CPUE trends, aggregating Washington and Oregon data into a single model was not justified.

Catches

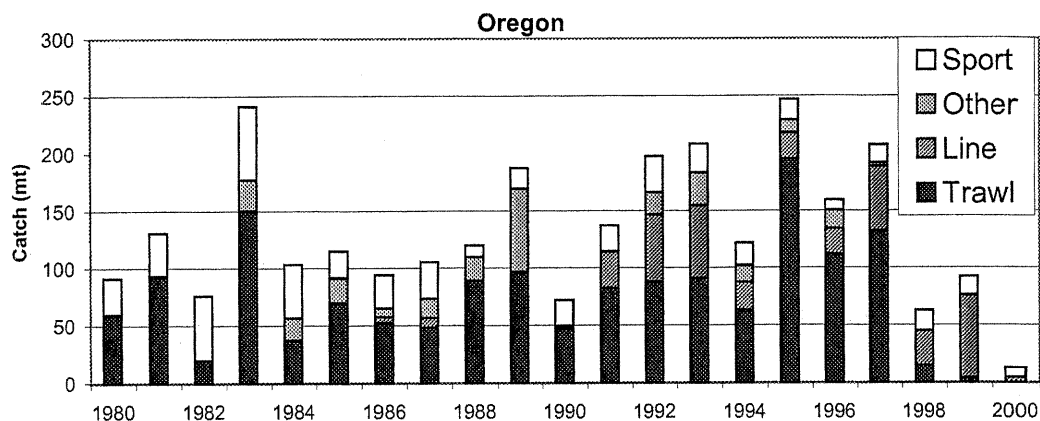
Northern California

Trawl landings of yelloweye rockfish declined from an average of 42 mt in the 1980s to less than 11 mt in the 1990s. A commercial line fishery developed in the late 1980s peaked at 100 mt in 1991 and declined to less than 10 mt by 1999. Sport catches of yelloweye rockfish averaged 60 mt during the 1980s and precipitously declined to less than 18 mt in the 1990s averaging only 5 mt 1998-2000.



Oregon

Trawl landings of yelloweye rockfish averaged over 70 mt since 1980 declining abruptly to less than 16 mt in 1998. A commercial line fishery developed in the early 1990s and has averaged 35 mt until management restrictions in 2000 reduced catches to less than 5 mt. Sport catches of yelloweye rockfish averaged 34 mt during the 1980s and declined to 20 mt in the 1990s.



Year	S. California (PFMC Area 1A)				N. California (PFMC Area's 1B&1C)				Oregon (PFMC Area 2A,2B,2C)				Washington (PFMC Area 3A,3B,3C)			
	Trawl	Line	Other	Sport	Trawl	Line	Other	Sport	Trawl	Line	Other	Sport	Trawl	Line	Other	Sport
1980				15.0	31.4	9.7	0.0	55.0	60.2			31.7	29.2	1.5	0	2.9
1981	6.1	166.4	29.9	3.0	50.3	42.4	4.4	44.0	93.7	0		36.7	2.8	0.8	0	4.2
1982	6.7	5.3	1.6	2.0	184.1	0.0	0.3	100.0	19.9	0	0.1	56.0	4.4	0.9	0	3.5
1983	0.0	3.0	0.5	12.0	52.7	0.0	0.6	38.0	150.6	0	26.8	63.8	33.2	1.2	0	5.9
1984	0.0	3.0	1.4	21.0	39.5	0.0	0.3	54.0	38.0	0	19.0	46.6	19.5	2.0	0	11.2
1985	0.0	2.7	0.5	16.0	4.7	0.5	0.0	105.0	70.2	0	21.7	23.3	31.4	6.3	0	8.4
1986	0.0	3.4	0.3	12.0	10.4	7.8	0.0	53.0	52.5	5.6	7.3	29.1	9.4	6.4	0	11.1
1987	0.0	5.3	1.2	0.0	10.2	15.0	1.3	76.0	48.6	8.6	16.9	31.5	22.9	8.1	0	12.5
1988	0.0	0.4	3.5	0.0	24.3	15.8	7.1	20.0	89.2	0	20.9	9.5	36.7	4.3	0	6.6
1989	0.0	1.2	3.2	1.0	9.3	24.6	3.1	59.0	97.3	0	72.2	17.6	99.0	2.5	0	12.7
1990	0.1	1.8	1.4	0.8	11.1	47.2	6.6	46.3	48.0	1.7	0.0	22.5	32.0	1.7	0	10.8
1991	0.0	6.2	1.2	0.5	12.8	105.8	0.0	33.5	82.6	31.8	0.0	22.8	37.7	1.8	0	14.8
1992	0.0	5.3	0.0	0.3	16.9	89.7	0.0	20.8	88.6	58	19.2	31.6	44.2	3.3	0	12.4
1993	0.7	7.7	0.0	0.0	8.1	42.5	0.1	8.0	90.9	63.7	28.7	25.0	44.7	9.0	0	11.1
1994	0.1	25.5	0.0	0.0	5.6	40.2	0.4	14.0	63.0	24.7	14.6	19.4	21.3	2.8	0	6.0
1995	0.1	19.5	0.0	0.0	5.6	34.7	0.1	12.1	194.9	23.4	10.6	18.0	16.7	0.1	0	8.1
1996	1.1	3.6	0.0	0.0	23.5	46.9	0.0	13.0	112.3	22.2	16.1	8.2	24.4	0.0	0	6.1
1997	0.0	3.1	0.0	0.0	10.9	52.4	0.4	16.0	132.4	56.6	2.5	15.7	9.0	12.2	0	7.3
1998	0.1	2.1	0.0	0.0	5.2	14.4	0.0	6.0	15.3	30.1	0.1	17.3	4.7	0.7	0	9.0
1999	0.0	0.0	0.0	2.0	7.1	5.2	0.0	7.0	4.1	71.9	0.0	16.5	9.8	23.0	0	8.6
2000	0.0	0.0	0.0	0.0	0.5	0.3	0.0	2.0	0.1	4.2	0.0	8.2	0.2	7.7	0	9.4
Mean ('81-'00)	0.8	13.3	2.2	3.5	24.6	29.3	1.2	36.4	74.6	20.1	14.6	26.0	25.2	4.7	0.0	9.0
Last 10 y	0.2	7.3	0.1	0.3	9.6	43.2	0.1	13.2	78.4	38.7	9.2	18.3	21.3	6.1	0.0	9.3
Last 5 y	0.2	1.8	0.0	0.4	9.4	23.8	0.1	8.8	52.8	37.0	3.7	13.2	9.6	8.7	0.0	8.1

Data and assessment

This is the first time yelloweye rockfish have been formally assessed in Pacific Council managed waters. Rogers et al. (1996) estimated a yelloweye rockfish ABC of 39 mt for the Northern area (Columbia and Vancouver) based on biomass estimates from the triennial trawl survey and assumptions about natural mortality (M) and catchability (Q).

Two length-based Stock Synthesis models were used to derive population trends for northern California and Oregon. Auxiliary indices of abundance from the NMFS triennial trawl survey and halibut longline survey (Halibut Commission) were examined but rejected. The northern California assessment includes two sport CPUE indices constructed from Marine Recreational Fishery Statistical Survey (MRFSS) sample data and CDFG data collected on-board Commercial Passenger Fishing Vessels (CPFV). The Oregon assessment model includes a sport CPUE index derived from ODFW estimated bottomfish effort and yelloweye catch. Both assessment models are for combined sexes, include two fisheries, sport and commercial spanning 1970-2000. Length composition

data are available beginning 1978 and 1980 for the northern California and Oregon assessment, respectively.

Unresolved problems and major uncertainties

There are a number of uncertainties that contribute to interpretation of results presented in this assessment. Some were explored through sensitivity analysis including natural mortality, selectivity and level of historical catch. Data on growth, maturity, movement and age were very limited precluding formal analysis. Length composition data have been collected for two decades, but sample sizes are small. Yelloweye can live over 100 years and information derived from length composition data is limited beyond age 25-30 as yelloweye approach asymptotic length.

There are also concerns that fisheries dependent indices of abundance may introduce bias resulting from annual variability in fishery catchability. No indication of bias was found, but data are likely imprecise. The Oregon recreational CPUE data provided by ODFW did not allow for complete review due to the aggregate nature of the data. For this reason, there is some uncertainty associated with these data.

Little is known about yelloweye stock structure. The specific habitat requirement for yelloweye rockfish support hypothesis for site fidelity, and little mixing may occur after settlement. It is likely that discrete sub-populations corresponding to high-relief rocky areas form a much larger meta-population.

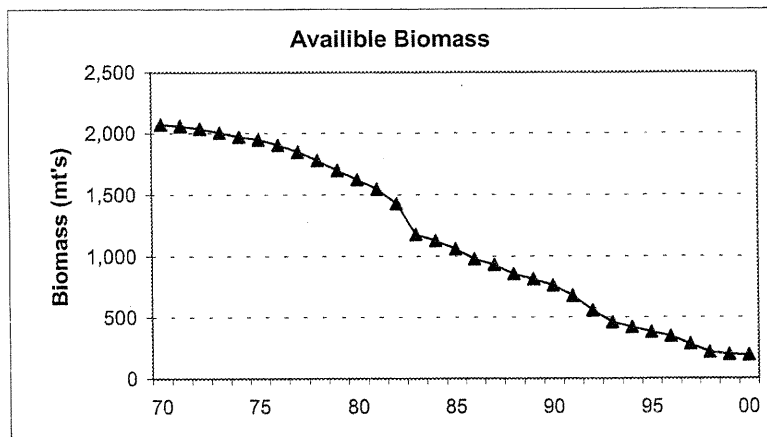
Reference points

The proxy target fishing mortality rate for rockfish allowable catch is $F_{50\%}$. This represents a SPR rate that would reduce the spawning biomass 50% from its unfished level. The rate can be further reduced by a precautionary "40-10 default OY" such that the further the stock is below $B_{40\%}$ the greater the reduction in harvest until at $B_{10\%}$ all harvest is prohibited. A formal rebuilding plan is required in the stock falls below $B_{25\%}$.

Stock Biomass

Northern California

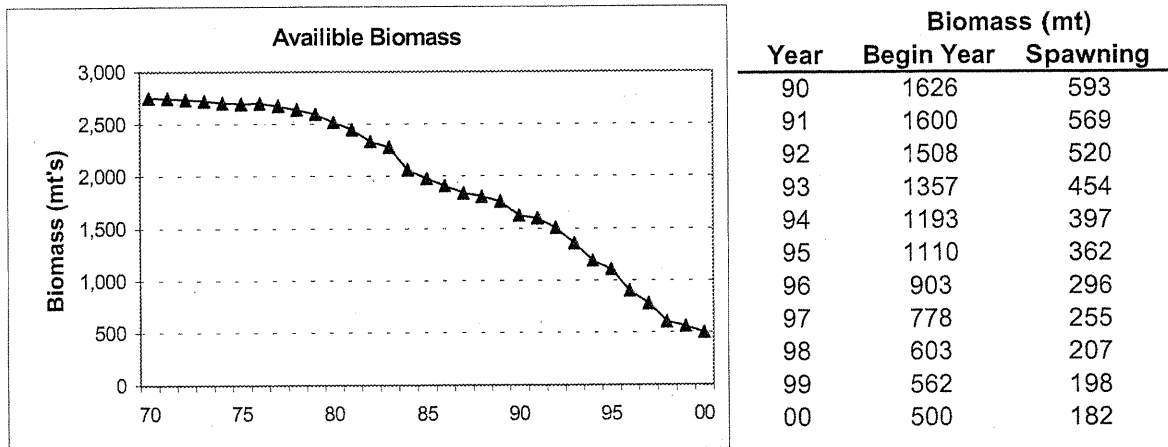
Results from the Stock Synthesis model indicate that stock biomass has significantly declined throughout the time series. Current spawning biomass is estimated to be approximately 7% of the unfished spawning biomass.



Year	Biomass (mt)	
	Begin Year	Spawning
90	760	280
91	678	245
92	558	199
93	458	164
94	420	151
95	380	137
96	346	123
97	280	99
98	214	79
99	198	74
00	194	73

Oregon

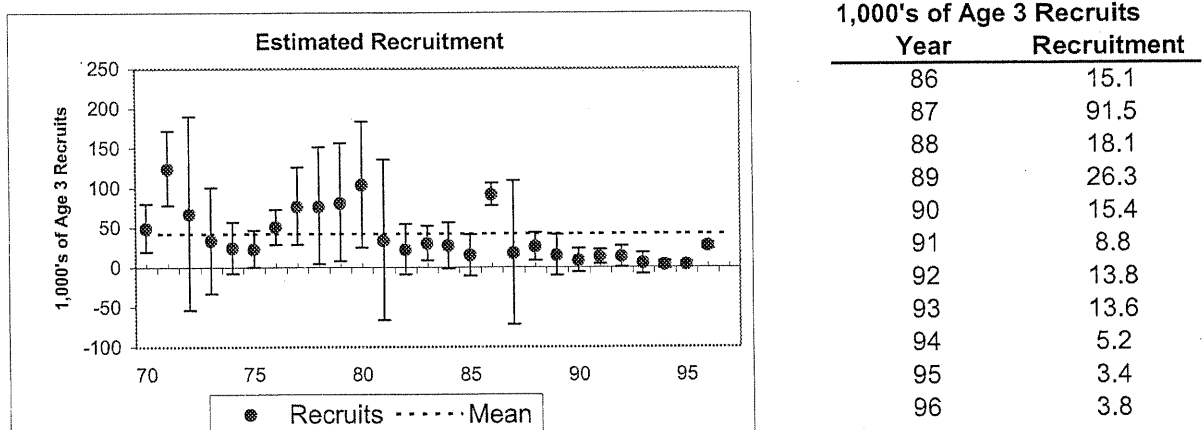
Results from the Stock Synthesis model indicate that stock biomass has significantly declined throughout the time series. Current spawning biomass is estimated to be approximately 13% of the unfished spawning biomass.



Recruitment

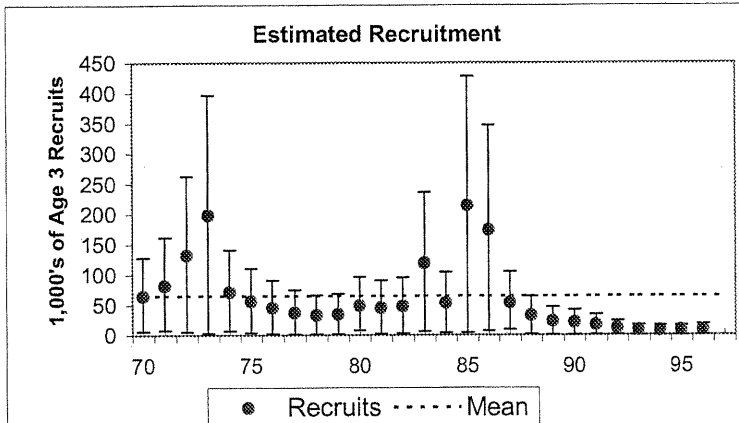
Northern California

Recruitment is variable across the time series and parallels a decreasing trend in population biomass. The last above average recruitment was 1987 (age 3 recruits) and recruitment failure is apparent during the last decade.



Oregon

Recruitment estimates are quite variable and imprecise across the time series. Above average recruitment (age 3 recruits) occurred during 1986 and 1987, but recruitment failure is evident during the last decade.



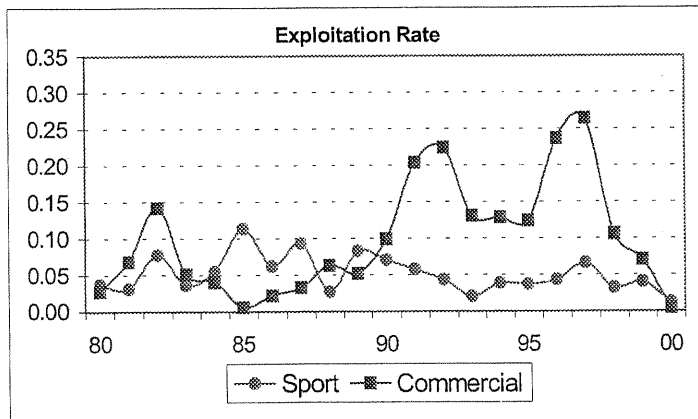
1,000's of Age 3 Recruits

Year	Recruitment
86	174.6
87	53.9
88	32.9
89	23.8
90	21.3
91	17.5
92	12.2
93	8.8
94	8.2
95	8.3
96	9.5

Exploitation status

Northern California

Commercial exploitation rate peaked at over 25% in 1997 decreasing to less than 1% in 2000. Exploitation rate in the sport fishery peaked at over 10% in 1985 decreasing to less than 5% in recent years.

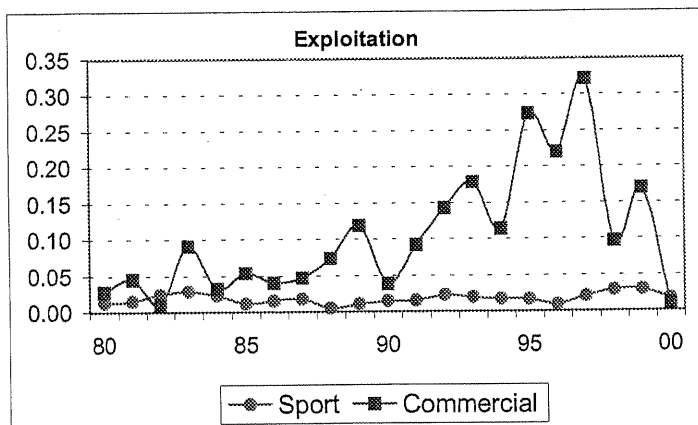


Exploitation Rate

Year	Sport	Commercial
90	0.071	0.099
91	0.057	0.204
92	0.044	0.225
93	0.021	0.131
94	0.039	0.130
95	0.037	0.125
96	0.044	0.237
97	0.066	0.265
98	0.033	0.106
99	0.041	0.071
100	0.012	0.005

Oregon

Commercial exploitation rate peaked at over 30% in 1997 decreasing to less than 2% in 2000. Exploitation rate in the sport fishery has been at or below 3% across the time series.



Exploitation Rate

Year	Sport	Commercial
90	0.015	0.039
91	0.016	0.092
92	0.023	0.144
93	0.020	0.179
94	0.017	0.115
95	0.017	0.274
96	0.010	0.221
97	0.021	0.322
98	0.030	0.098
99	0.030	0.170
100	0.017	0.011

Management performance

Base run estimates indicate harvest levels well above natural mortality since 1980. This coupled with recent poor recruitment may have led to population decline and over-exploitation. This is of concern because, like many other species of rockfish, yelloweye have been managed as part of a complex with little attention given to individual species. Yelloweye rockfish can be characterized as relatively small population(s) of fish that are long-lived, late maturing, slow growing, and susceptible to overfishing. Recent management decisions have greatly restricted "shelf" rockfish catch, which is reflected in recent low level of yelloweye landings by commercial fisheries.

Decision Table and Forecasts

Northern California

Forming the basis for a decision table, five-year yield projections ($F_{50\%}$) are provided representing three assumed levels of recruitment including mean recruitment across the time series, mean recruitment in the most recent 10 years and recruitment estimated from a Beverton-Holt stock recruitment relationship.

Northern California yelloweye yield forecast with no 40/10 reduction (SPR rate of 0.50).

Northern California yelloweye yield forecast with no further reduction (S.F. Hays et al. 2007)							
Year	Available	Spawning	Assumed ¹	Exploitation	Yield		
	Biomass	Biomass	Recruitment		Total	Sport	Commercial
Average recruitment across time series.							
2002	211	79	43	0.037	7.8	3.9	3.9
2003	230	81	43	0.036	8.3	4.2	4.1
2004	251	85	43	0.035	8.8	4.5	4.3
2005	273	89	43	0.035	9.5	4.8	4.7
2006	296	95	43	0.034	10.2	5.2	5.0
Average recruitment of last 10 years.							
2002	211	78	20	0.036	7.6	3.8	3.8
2003	220	80	20	0.036	7.9	4.0	3.9
2004	229	83	20	0.036	8.2	4.1	4.1
2005	238	86	20	0.036	8.5	4.3	4.2
2006	248	89	20	0.036	8.8	4.4	4.4
Recruitment estimated from a Beverton-Holt stock recruitment relationship.							
2002	211	78	22	0.036	7.6	3.8	3.8
2003	221	80	22	0.036	7.9	4.0	3.9
2004	231	83	22	0.036	8.2	4.1	4.1
2005	242	86	22	0.036	8.6	4.3	4.3
2006	252	89	22	0.036	9.0	4.5	4.4

¹ Recruitments in 1,000's of age 3 recruits.

Oregon

Decision table for the Oregon yelloweye assessment also provides five-year yield projections ($F_{50\%}$) representing three assumed levels of recruitment including mean recruitment across the time series, mean recruitment in the most recent ten years and recruitment estimated from a Beverton-Holt S-R relationship.

Oregon yelloweye yield forecast with no 40/10 reduction (SPR rate of 0.50).

Year	Available	Spawning	Assumed ¹	Exploitation	Yield		
	Biomass	Biomass	Recruitment		Total	Sport	Commercial
Average recruitment across time series.							
2002	497	194	61	0.031	15.4	8.3	7.1
2003	519	197	61	0.030	15.7	8.5	7.3
2004	543	199	61	0.030	16.1	8.8	7.4
2005	570	201	61	0.029	16.6	9.1	7.5
2006	599	203	61	0.029	17.2	9.5	7.6
Average recruitment of last 10 years.							
2002	497	194	33	0.031	15.3	8.2	7.1
2003	506	197	33	0.030	15.5	8.3	7.2
2004	515	199	33	0.030	15.7	8.4	7.2
2005	524	200	33	0.030	15.9	8.6	7.3
2006	534	201	33	0.030	16.1	8.7	7.4
Recruitment estimated from a stock recruitment relationship.							
2002	497	194	38	0.031	15.3	8.2	7.1
2003	508	197	38	0.030	15.5	8.3	7.2
2004	519	199	38	0.030	15.7	8.5	7.3
2005	531	200	38	0.030	16.0	8.7	7.3
2006	544	201	38	0.030	16.3	8.9	7.4

¹ Recruitment in 1,000's of age 3 recruits.

Recommendations: research and data needs

Additional effort to collect age and maturity data is essential for improved population assessment. Collection of these data may be necessary by onboard observers if this species becomes prohibited. Increased effort toward habitat mapping will provide information on essential habitat and distribution for this species. Development of fishery independent indices will be necessary as allowable catch becomes restricted. A study of the role of MPAs in harvest management will be beneficial for yelloweye rockfish and other sedentary species. Genetic study is required as a first step in delimiting stock boundaries for this species.

Sources of additional information

STAR panel report

Rogers, J.B., M. Wilkins, D. Kamakawa, F. Wallace, T. Builder, M. Zimmerman, M. Kander and B. Culver. 1996. Status of the Remaining Rockfish in the Sebastes Complex in 1996 and recommendations for management in 1997. Pacific Fishery Management Council 2130 SW fifth Ave. Suite 224, Portland, Ore. 97210.

2001 STAR PANEL REPORTS

- ★ Dover Sole STAR Panel Report
- ★ Sablefish STAR Panel Report
- ★ Shortspine Thornyhead STAR Panel Report
- ★ Yelloweye Rockfish STAR Panel Report

DOVER SOLE
STAR Panel Report

Hatfield Marine Science Center
Newport, Oregon
July 9-12, 2001

Stock Assessment Review (STAR) Panel Members:

Jack Tagart, Washington Department of Fish and Wildlife, STAR Chair
Gary Stauffer, NMFS Alaska Fisheries Science Center, SSC Representative
Paul Crone, NMFS Southwest Fisheries Science Center
Robin Cook, Fisheries Research Service, Marine Laboratory, Scotland, UK
Mark Saelens, Oregon Department of Fish and Wildlife, Groundfish Management Team Representative
Rod Moore, Groundfish Advisory Panel Representative

Stock Assessment Team (STAT) Members Present:

David B. Sampson, Oregon State University

Overview

The STAR Panel reviewed a draft report on the status of the Dover sole (*Microstomous pacificus*) stock off the U.S. Pacific coast. The review was conducted at the Hatfield Marine Science Center in Newport, Oregon during the week of July 9-12, 2001. The STAR Panel commends the STAT for the quality of its working draft and its cooperative spirit and willingness to respond to the Panel's comments and requests for additional analyses. Nevertheless, the draft stock assessment report submitted to the STAR Panel prior to our meeting was a work in progress and incomplete with respect to the Outline for Groundfish Stock Assessment Documents as specified in the Terms of Reference for the STAT/STAR process (2001terms.2.wpd). Subsequent to the STAR Panel meeting, the STAT team provided Panel members with a completed stock assessment.

Two presentations that addressed evaluations of research survey-related data preceded the Dover sole stock assessment presented by David Sampson. The primary objective of the two sets of analyses was to provide revised standardized time series of estimated survey abundance. The new time series would then be available for incorporation as auxiliary indices of stock trends in statistical age-structured population models. Tom Helser (NMFS/NWFSC) presented results from a study that addressed the following objectives (Helser et al. 2001): (1) determine the influence that vessel effects have on the interpretation of continental slope survey data collected by a single research vessel versus several chartered commercial fishing vessels; and most importantly, (2) develop accurate and precise relative abundance indices based on (1) above. Rick Methot (NMFS/NWFSC) presented results from a study that developed criteria to judge effective trawling (certain bottom contact) designations for each haul conducted during NMFS Triennial Bottom Trawl Survey (Zimmermann et al., 2001). Reclassification of haul effectiveness eliminated a large number of hauls previously used to estimate catch rate and survey biomass for species found on the continental shelf. A greater number of hauls were disqualified from early, as opposed to more recent surveys. As a consequence of reclassification, estimates of Dover sole biomass increased in the early portion of the time series.

Dr. Sampson presented results from an assessment of the Dover sole population off the U.S. Pacific coast (Sampson and Wood, 2001). His presentation included descriptions of the following: (1) history of the fishery and past assessments conducted on the stock; (2) sources of data used in the current modeling exercise; (3) a baseline model configuration, including the likelihood components incorporated in the model; and (4) several candidate models based on 'sensitivity' runs that addressed various assumptions regarding the number of fisheries, selectivity patterns associated with the fisheries, growth, recruitment, and emphasis levels applied to the data sources.

List of Requested Analyses

The STAR Panel recommended that four areas of the assessment be further evaluated, given that alternative plausible assumptions could be made regarding some of the analyst-specific decisions that were used in the overall modeling exercise.

- (1) Test the sensitivity of model fits to the “equilibrium” catch assumption, and to the extent practicable, provide rationalization for the choice of equilibrium catch. The analyst made a reasoned guess for the level of equilibrium catch. This catch level determines the initial age composition in the synthetic population generated by the model.
- (2) Further evaluate how size-retention and discard assumptions associated with the commercial fisheries influence pertinent model results, including fits (e.g., likelihood component estimates) and important management-related parameters (e.g., current stock biomass and yield). For example, use the same discard-related functions across the different fisheries to explore how fixing, versus estimating, the length-at-50% size-retention (for females) in each of the fisheries affects fits to the model.
- (3) Test the sensitivity of the model (through likelihood profiles) to the assumed “prior” constraints on growth parameters. The analyst had arbitrarily set the prior in alternative models to $CV = 2.5\%$ and 25% . The larger value produced a better fit to the size composition data. We wanted to determine how much the prior had to change to generate the improved fit.
- (4) The analyst was circumspect regarding the utility of the age data. There were significant differences in estimated mean size at age between fisheries. Furthermore, there were different trends in the changes of mean size-at-age over time, even between fisheries occupying contiguous grounds (Washington-deepwater versus Oregon-deepwater). The STAT approached the problem by using a truncated time series of age data. We requested that they further explore how age-distribution time series used in the model influence results generated from the model. For example, conduct sensitivity analyses on these data based on changes in emphasis levels, as well as the use of complete versus abbreviated time series.

Given the observed variability in mean size-at-age over time, the STAR Panel considered the possibility that there could be temporal changes in growth. However, due to the analyst’s concern that the trends in size-at-age were driven by fundamental problems in ageing, the STAR Panel did not request further evaluation of temporal changes in growth. That is, it is likely that further investigations regarding the integrity of the age-related data need to be resolved before issues surrounding variable growth over time can be revisited using objective analysis.

The analyst felt that another important area of uncertainty that needed further evaluation was recruitment. The initial base model was configured with a Beverton-Holt spawner/recruit curve with a shape parameter value estimated by the model. Alternative runs fixed the shape parameter

at 1. In all configurations, year-specific recruitment estimates were generated for each year from 1956 to 2000.

Comments on the Technical Merits and/or Deficiencies of the Document

Dover sole abundance was assessed using the length-based Stock Synthesis Model in 1997 and 2001. There were several major differences between the current assessment and the previous assessment conducted in 1997.

1. The current assessment covers all INPFC areas, including the Conception INPFC area (north of 35°S latitude), whereas the previous assessment omitted this southern INPFC area due to limited data.
2. Abbreviated age-distribution time series were used in the current assessment. The previous assessment used age-distribution data from 1981-95 and the current assessment omitted significant portions of the early time series, given concerns about biases associated with these data (see below).
3. Fishery-dependent data partitioned into five distinct fisheries (Oregon-deepwater, Washington-deepwater, Oregon-shallow, Washington-shallow, and California), whereas the previous assessment assumed a single fishery coast-wide.
4. Growth curve parameters are estimated within the model, whereas the former assessment fixed these parameters based on external estimates.
5. The 2001 assessment incorporated discard selectivity estimated in two time strata, rather than three strata used in 1997.
6. The standardized slope survey biomass index estimated by Helser et al. (2001) is used in the 2001 assessment.
7. The current assessment uses shelf survey length frequencies from 1986 to present. The former assessment included 1980 and 1983 data.

Key sources of data utilized in the Dover sole assessment include:

1. Fishery size composition data available from Washington (WA) and Oregon (OR) beginning in 1966 and in California (CA) beginning in 1969. WA and OR data were stratified by depth with a break at 200 fm. CA data were not stratified.

2. Fishery age composition data were available from CA for the period 1981-1999, but only those data from 1984 to present were utilized. OR age data were available from 1985 to 2000, data from 1991 to present were used in the analysis. WA age data were available from 1985 to 1998, only 1996-1998 data were used. OR and WA age data were depth stratified. As noted earlier, disconcerting trends in mean size-at-age caused the STAT to consider age data suspect. The truncated time-series of utilized age data represent the STAT's view of the more reliable age data.
3. Slope survey biomass estimates and size frequency data. The analyst used Index E from the Helser et. al (2001) analysis, this index relies on RV MILLER FREEMAN data only.
4. Discarded catch estimated during four periods: 1956-1961, 1962-1982, 1983-1988 and 1989-2000. Discarded catch was split between size-related (market) and trip-related (regulatory) discards. Base model estimates of size-related discards were driven by incorporation of a size retention curve that varied over two time strata (1956-1982, and 1983 to present). The STAT preferred model incorporated a 5-year linear transition (1981-1985) in retention parameters between the early and late time strata. Parameters of the size retention curve were alternately fixed and estimated by the model.

Additional but less critical data included:

5. The shelf trawl survey biomass estimates (1980 to 1998) and size data (1986-1998).
6. The trawl logbook CPUE time series (1978-1994). This index was produced for the prior assessment but not updated for this assessment.

Analysis during the STAR Panel review demonstrated that sensitivity to the priors on the growth parameter CVs diminished, becoming nearly asymptotic above CVs of 5%. The STAT preferred model was amended accordingly. The base model indexed the initial age composition by assuming the population was in equilibrium with a 6500 mt historic catch. The analyst was able to discover historical accounts of flatfish landings prior to 1950 that led the STAT and STAR Panel to conclude that the estimated equilibrium catch used to set the age composition at the beginning of the assessment time series was appropriately scaled at 6,000 mt. The latter historic catch was used in the STAT preferred model.

The majority of the sensitivity analyses conducted showed minor variability in estimated fits to key model data and resulted in similar estimates of important management-related parameters. Uncertainty in this assessment was predominately attributable to size-retention/discard properties of the individual fisheries and historical recruitment processes exhibited by the stock. The Panel felt that a decision-table matrix that included these two issues would generate a parsimonious set of candidate models that adequately described the variability in the sample data.

Areas of Disagreement

There were no outstanding disagreements within the STAR Panel or between the Panel and the STAT.

Unresolved Problems and Major Uncertainties

The analyst and STAR Panel both agreed that the sex-specific size distributions of Dover sole appear to vary between areas and across time. It was difficult to determine whether these variations are due to changes in size-related discarding or to changes in fishery selection (e.g., gear modifications and/or depth of fishing by the different fleets). Issues surrounding size-related discards and size selection by the fisheries are confounded in the fishery size-composition data. Assumptions used to determine properties of the discarded fish are subject to much uncertainty, given only limited observer data are available at this time. Results from the model were somewhat sensitive to assumptions regarding estimates of size-retention/discard exhibited by the various fleets.

Survey and fishery size-selectivity functions display a marked difference between males and females, with males experiencing much higher rates of fishing mortality than females. The ascending portion of the selectivity curve in the length-based stock synthesis model is constrained such that male and female selectivity assumes the same shape. There can be divergence in the absolute magnitude of the selectivity. The model must find a way to reduce the number of males in the population to be consistent with the observed sex ratios from both the trawl survey and fishery. Thus, through the selectivity curves, it generates higher rates of fishing mortality on males than females. These higher rates are a little difficult to explain, and represent an area of uncertainty in the model. Selectivity patterns are further confused by the estimation that fishery selection begins at smaller size female fish in the deep strata than in the shallow strata. This is obvious in both the WA and OR fisheries. It is possible that the constraint on the ascending selectivity accounts for the modeled selectivity configuration and that alternate model selectivity patterns could mitigate the higher selectivity of males at larger size. Regardless, there is probably a need to explore different process models, and/or amend the selectivity options available in stock synthesis.

As stated above, the potential influences of biased age data in this assessment make it difficult to assess the growth of this species and more importantly, make it difficult to evaluate an appropriate model structure that is based on the best stratification of the various fisheries. Some STAR Panel members thought the apparent incongruities in the fleet specific size-at-age data could represent real differences, while others believed that age-determination errors were the more likely cause. Regardless, utilization of the data as is results in substantial difficulty in fitting the observed data. The STAT solved the problem by limiting the time-series of data used in the model. The STAR Panel did not believe there was sufficient time during our review to explore alternative process models to explain the age differences, however, this remains an area for future exploration.

Stratification of the fishery into five fleets was an attempt, at least in part, to cope with regional differences in fishery selectivity. However, the OR fleet overlaps both the CA and WA fleet in geographic distribution making the stratification pseudo-regional. Second, one of the rationales for fleet stratification was an undocumented principle components analysis. Results from the analysis were inadvertently misapplied by the STAT when they stratified deep and shallow fisheries at 200 rather than 300 fm. Due to time limitations, the STAR Panel did not ask the STAT to reconstruct the data to correct the stratification mistake. It appeared likely that the stratification at 200 fm captured real differences in size composition within the catch. Nevertheless, the STAR Panel notes some caution when utilizing the depth fished datum from the biological samples since this variable is differentially recorded by state, and may represent a broader range of fished depth than indicated.

Finally, recruitment events estimated from the current model are predominately below the F40% spawner/recruit (S/R) replacement line (see Fig. 14 in Sampson and Wood, 2001), implying that an F40% harvest rate may be too aggressive for this stock. Although the likelihood component received low emphasis in the model, the STAT estimated the S/R relationship, and the lowered rate of productivity is the result. Assuming, alternative process models are evaluated in future assessments, the S/R relationship should be thoroughly evaluated for consistency with a long-term strategy of harvest at F40%.

Recommendations for Future Research and Data Collection

The GLM used by Helser et al. (2001) to standardize the slope trawl survey data needs to incorporate estimates from the 2001 slope survey and subsequently, recompute the indices. There is some concern that an anticipated vessel effect for Dover sole catch rates was not realized in this analysis. The chartered vessels used trawl gear with a mud-sweep that is recognized as a herding device for flatfish, whereas the RV MILLER FREEMAN did not use this gear. Flatfish catch rates from the MILLER FREEMAN are expected to be lower than those of the chartered vessels. The STAR Panel believes this hypothesis should again be tested following incorporation of the 2001 data.

There are obvious needs to visit the question of age determination for Dover sole. Specifically, there should be an attempt to re-examine OR and WA data from the mid-1980s. Given currently accepted age determination criteria, it should be determined whether the same degree of difference in mean size-at-age is observable in a re-analyzed data set.

All configurations of the current model fit the CPUE time series well. However, the series stops in 1995. The STAR Panel recommends extending the time series in future analyses.

There are a variety of hypotheses that can explain the fleet variability in size and age composition, including market demands, gear differences, environmental influences on growth rates and basic fish life history. A more thorough evaluation of Dover sole life history, with

particular emphasis on ontogenetic effects on their bathymetric distribution seems appropriate.

Alternative process models should be evaluated in future assessments. The stratification of fishing fleets should incorporate true geographic separation in addition to stratification based on fleet origin.

References

Helser, T. E., A. E. Punt, and R. D. Methot. 2001. A statistical approach to analyzing a multi-vessel fishery resource survey on the northwest continental slope. NOAA/NMFS/NWFSC Working Paper. 38 p.

Zimmermann, M., M. E. Wilkins, K. L. Weinberg, R. R. Lauth, and F. R. Shaw. 2001. Retrospective analysis of suspiciously small catches in the National Marine Fisheries Service west coast triennial bottom trawl Survey. AFSC Processed Report 2001-03. 135 p.

Sampson, D. B., and C. Wood. 2001. Stock status of Dover sole off the U.S. west coast in 2000-First Draft. Status of the Pacific Coast Groundfish Fishery Through 2001 and Recommended Acceptable Biological Catches for 2002. Pacific Fishery Management Council, Portland, Oregon.

SABLEFISH STAR PANEL REPORT
Hatfield Marine Science Center
Newport, Oregon
July 13th - 16th, 2001

Sablefish Stock Assessment Review (STAR) Panel Members
(listed in alphabetical order)

Jon Brodziak (Chairman), Northeast Fisheries Science Center

Robin Cook, Center for Independent Experts

Stratis Gavaris, Department of Fisheries and Oceans

Jim Golden, Oregon Department of Fish and Wildlife

Annette Hoffmann, Washington Department of Fish and Wildlife

Rod Moore, Pacific Fishery Management Council Groundfish Advisory Panel

Steve Ralston, Pacific Fishery Management Council Scientific and Statistical Committee

Mark Saelens, Pacific Fishery Management Council Groundfish Management Team

STAR Panel Terms of Reference

- review draft stock assessment documents and any other pertinent information
- work with stock assessment technical (STAT) teams to ensure assessments are reviewed as needed
- document meeting discussions
- review summaries of stock status (prepared by STAT teams)

Comments on Data and Modeling Issues in the Sablefish Assessments

The STAR panel reviewed the National Marine Fisheries Service (NMFS) and Pacific Groundfish Conservation Trust (PGCT) assessments of the west coast sablefish resource (NMFS STAT team 2001, PGCT STAT team 2001). Panel comments and recommendations on data and modeling issues are provided below. The STAR panel expressed their appreciation of both STAT team's work which had to be completed at short notice. The panel was particularly appreciative of the constructive co-operation between the STAT teams.

1. Data Issues

1.1. Derivation of the Slope Survey Index Series

The continental slope survey data used for this assessment was derived from surveys conducted by the *R/V Miller Freeman* between 1988 and 2000 and by surveys conducted using industry vessels (four vessels per year) between 1998 and 2000 (Helser et al. 2001). Analyses including fixed effects for year and INPFC/depth zones as well as either fixed or random effects for vessel suggested that the variation in fishing power between vessels was not significant. While these results seemed reasonable, the panel recommends that the mean catch rate and its variance be tabulated by INPFC/depth zone for 1999 and 2000, the only two years when both the *R/V Miller Freeman* and industry vessels conducted the survey, to help support the conclusion of no substantial differences in fishing power. For this table, pooling over industry vessels would be acceptable, as the main concern is the comparability of the larger *R/V Miller Freeman* to the industry vessels. A similar comparison, using figures, of length composition would be informative in response to concerns regarding potential differences in length selectivity between the *R/V Miller Freeman* and industry vessels.

The estimator of catch rate in each INPFC/depth zone and year combination, for the non-zero tows, assumed a gamma distribution and a log link function. It was not demonstrated that the expected value of the estimator was the population mean. The estimate of the proportion of non-zero tows in each INPFC/depth zone and year combination was obtained from a GLM main effects model, because inclusion of interactions was not computationally possible (likely due to INPFC/depth and strata combinations where there were no zero tows). An alternative to the main effects model would be to estimate the proportion of non-zero tows in each INPFC/depth and year combination as a simple binomial. The variance estimation was conducted using an ad hoc Monte Carlo technique, in order to account for the variance associated with estimating missing values for some INPFC/depth and strata combinations from a main effects model. The panel recommended that either bootstrap or analytical methods be applied to estimate variance. Although the panel had concerns regarding the estimation procedure, the calculated survey index trends were very similar to those obtained from the standard arithmetic estimators.

1.2. Discards

Both STAT teams used the same time series of percentages of discarded sablefish trawl catch (NMFS STAT team 2001, Table 5) in their analyses. The STAR panel and some members of the public present raised several issues with regard to discards:

- The panel noted that the treatment of discards differed between the NMFS and PGCT assessments. The NMFS assessment used a size-specific retention function to determine the age composition of trawl discards while the PGCT assessment assumed that the age composition of the trawl discards was the same as the trawl catch.
- The panel was concerned that sablefish discard mortality was assumed to be negligible for fixed gear fisheries. A substantial amount of small sablefish were probably caught and released by longline and pot fishers prior to 1985 (NMFS STAT team 2001) and these discarded fish were assumed to have survived. Because some west coast longline fishermen use ‘crucifiers’ to remove hooks from fish, assuming that discarded fish survive may be questionable. High grading may also lead to reduced survival of discarded sablefish catch in fixed gear fisheries.
- The panel was concerned with the assumed trawl discard rate during 1956-1982. Both STAT teams used an assumed discard rate of 10% for commercial trawl landings through 1982, when trip limits were first imposed on the sablefish fishery. Although some trawl discard occurred during 1956-1982, the discard rate has not been well-quantified. If, for example, a 10% discard rate occurred in 1983-1984 after the imposition of trip limits, it is plausible to assume that the discard rate prior to trip limit regulation was probably lower. On the other hand, at least two papers suggest that discard of sablefish was at least 10% (Herrman and Harry 1963, Barss and Demory 1985). While the STAR panel agreed to accept the STAT teams’ assumptions for the purpose of this assessment, it would be very desirable to conduct further investigation of historic discard information in published literature, agency ‘gray – literature’, and industry market order records.
- The panel noted that the estimated trawl discards were incorrectly calculated because discarded catch reflected the percent of retained catch, not total catch. The panel also noted that a trawl discard rate of 9% was used for 1956-1982. STAT teams noted the error and corrected it in subsequent model runs and analyses.
- The panel noted that Enhanced Data Collection Program (EDCP) data was used for estimating trawl discard rates in recent years and the panel recommended clarifying discard data sources for the period 1997-2000 in the assessments (see NMFS STAT team 2001).

1.3. Consistent Treatment of Survey Abundance Indices

There was agreement that the shelf and slope surveys were the principal indices of abundance and should be included in any assessment option considered. The panel had some concern regarding the inconsistent treatment of the surveys, e.g., the use of an arithmetic estimator for the shelf survey and a gamma log-link estimator for the slope survey, but did not consider this an important issue given the similarity in trends for the slope survey using both estimators. The slope survey did not cover the entire stock area in several years. Two approaches were considered to use the slope survey data with incomplete coverage: (i) fill in for missing INPFC/depth and year combinations using a main effects model or (ii) construct super-year indices by pooling adjacent years. The panel did not express a preference as either approach had merits and complications. Sensitivity trials indicated that assessment results were not greatly influenced by the choice of approach, however.

1.4. Use of 1988 Slope Survey Index

The 1988 slope survey index is substantially greater than index values for subsequent years, as has been noted and extensively discussed in previous assessments. The 1988 slope survey was conducted roughly one month later than other slope surveys and covered a fraction of the stock area. Because this timing coincides with expected changes in the depth distribution of deepwater spawning fish such as sablefish (Alverson 1960), it is possible that this data point indexed a different fraction of the sablefish population than other surveys. In addition, the high value of the 1988 data point appears to be inconsistent with the 1991 and subsequent slope survey index values given catch removals and the low natural mortality of sablefish. Three approaches for handling this apparent anomaly were considered: (i) include it in the 1991 super year where it is pooled with data from 4 other surveys, (ii) include it as an individual observation with 4 times the CV of the most recent 3 years or (iii) exclude it from the assessment. The panel did not have a strong preference among these options because each effectively down weighted the influence of this apparently anomalous observation, and this down weighting was considered to be appropriate.

1.5. Pot Survey and Logbook Catch-Per-Unit Effort Indices of Abundance

Two other indices of relative abundance of sablefish, the NMFS pot survey index and the logbook catch-per-unit effort (CPUE) index, had less support for inclusion but could not be entirely discounted as they are the only sources of information on abundance for earlier years. The panel considered that there were merits for both inclusion and exclusion of these two indices simultaneously, but did not consider it appropriate to exclude only one of them because many of the criticisms applied to both.

1.6. Exclusion of Shelf Survey “Water Hauls”

A recent analysis of suspiciously small catches during the triennial slope survey suggested that a substantial number of tows in 1980 were water hauls in which the bottom

trawl net did not fish the bottom (Zimmerman et al. 2001). The NMFS STAT team presented a revised shelf survey index computed with only hauls that captured more than 1 kg of benthic organisms during 1977-1995 (NMFS STAT team 2001). The panel considered the revised shelf survey index with water hauls excluded to be more credible because of the likely bias in the standard index. As a result, the panel recommended that the revised shelf survey index be used as an abundance index.

1.7. Use of Survey and Fishery Length and Age Composition Data

Some length and age composition data for the surveys and the three fishery components, (hook and line, pot, and trawl gear) were available for age-structured modeling but age composition data were generally more sparse. The NMFS STAT team chose to fit both length and age composition data while PGCT STAT team chose to fit age composition data. There was some concern about fitting both age- and length-based likelihood components because double use of the length composition data could inflate their influence. That is, age composition data generated by applying age-length keys to length composition data implied that model likelihood components for length and age composition were not statistically independent. One possible way to handle this concern would be to fit only age composition data when age data were available and to fit only length composition data when age data were not available. However, this was not considered to a significant issue that was worth pursuing during this review meeting.

2. Modeling Issues

2.1. NMFS Assessment

An age-structured likelihood-based Stock Synthesis model (Methot 2000) was used to characterize stock status. This model (NMFS STAT team 2001) was an extension of previous age-structured assessments of this stock. The model was structured to use all available data in an attempt to capture the complex bathymetric demography of sablefish as well as temporal changes in the three fishery components.

2.1.1. Assumed Value of Slope Survey Catchability

The STAT team provided information on uncertainty in slope survey catchability (Q) for the baseline models, although most baseline assessment models (3A-3F) assumed that the slope survey catchability was fixed at a value of $Q=0.75$. The panel asked that Q be estimated and that the uncertainty in slope survey catchability be characterized.

2.1.2. Recruitment Estimation

The baseline assessment models fit recruitment as lognormal deviations about a Beverton-Holt stock recruit relation. The estimated percentage of virgin (unexploited) recruitment at 20% of virgin biomass was about 20%, suggesting that the stock could not rebuild even without fishing. This parameter, referred to as steepness, was not well determined but is of paramount importance in the context of the established management framework for this resource. The panel asked to see model estimates of recruitment if a stock recruit relationship was not imposed during the fitting. In an attempt to capture the

uncertainty in this parameter and to gauge the consequences of alternative values for it, the panel requested that complete results be provided for two scenarios, one where steepness was freely estimated and one where it was fixed as 70%. These analyses were completed and reviewed by the panel.

2.1.3. List of Requested Analyses

- Check veracity of discard computations (NMFS STAT team 2001, Table 5). If in error, revise assessment model input data to include revised total catch time series.
- Make a choice regarding the inclusion or exclusion of pot survey and logbook CPUE indices.
- Provide model outputs where Q for the slope survey is estimated.
- Include baseline model results and population characteristics.
- Consider sensitivity analyses on assumed discard rate of 10%.
- Consider exclusion of 1988 slope survey data point as an outlier.
- Consider sensitivity analyses on assumed value of $M=0.07$.
- Consider uncertainty in computation of the ratio of current spawning biomass to virgin spawning biomass to show the precision of this estimated ratio.
- Consider sensitivity analyses of weightings of assigned penalty functions for selectivity and recruitment.

2.2. PGCT Assessment

The panel reviewed a draft assessment report prepared by the Pacific Groundfish Conservation Trust STAT team (PGCT team 2001). The work consisted of three main analyses:

- A simple analysis of trends from slope survey data
- An empirical surplus production analysis based on slope survey data
- A full age-structured model

These analyses, where possible, used the same data as described for the NMFS assessment except that the PGCT STAT team had excluded certain data sets where the team felt these were less suited to the analysis. Overall, the PGCT STAT team indicated that simpler analyses were preferable and that less confidence should be placed in the full age-structured model analysis. The PGCT STAT team drew attention to the fact that the

mean length in the catch and the fraction of the stock comprising the plus group (ages 15+ or 25+) had not shown any consistent trend over many years. This was a positive sign about stock status.

2.2.1. Simple Trend Analysis

The trend analysis of the surveys indicated that for the slope survey there was a decline in the stock biomass of roughly 2-3% per year. In the case of the shelf survey this decline was a little higher, about 5% per year.

2.2.2. Surplus Production Analysis

The surplus production model suggested that if the slope survey Q was small, the stock tended to have lower productivity but at a higher biomass while higher Q s indicated a smaller and more productive stock. Age-structured model estimates of Q tended toward the midrange of values examined. Some panel members had reservations on the utility of applying this type of analysis to sablefish.

2.2.3. Age-Structured Analysis

The age structured model was implemented using the COLERAINE assessment package (fish.washington.edu/research/coleraine).

Recruitment estimation is an important element of the model since this may have a large effect on the perception of stock status in relation to reference points. The recruitment estimates and the calculation of virgin biomass are sensitive to the steepness parameter assumption for the stock-recruit curve and the time span of the historical data used in the analysis. The panel discussed these issues in some depth. When estimated freely within the model, the steepness parameter was about 20% suggesting very low productivity consistent with low recruitment in recent decades. However, meta-analyses from studies of stock-recruitment data suggested a much larger value for the steepness parameter of sablefish.

In addition to the standard model output the draft PGCT document presented harvest projections and decision tables using a Bayesian approach. These tables presented the expected change in biomass and expected depletion in relation to virgin biomass after 20 years if the stock was fished at a range of constant catches. The analysis took into account uncertainty in the current stock size. The panel felt this was a very useful way of presenting information on uncertainty to managers.

2.2.4. Differences between NMFS and PGCT Age-Structured Models

The age-structured model approach as implemented within COLERAINE is similar to the Stock Synthesis approach adopted by the NMFS STAT team. The principal differences between initial PGCT and NMFS model configurations were:

- Exclusion of pot survey index as it was argued this was not representative of the whole stock.
- Exclusion of logbook CPUE index as it was argued this was not proportional to stock biomass.
- Exclusion of length frequency data, partly due to concerns over changing growth rates and also because of concerns about the same data twice since the age composition data derived from the same length samples is already used.
- Analysis starts in 1980 because that is when most of the data begin.
- Plus group of 15+ due to limitations of the code in Coleraine which does not accommodate variable-sized age bins.
- Natural mortality assumed to be $M=0.08$ and steepness parameter set to 0.7.
- Fixed selectivity patterns over time using age only.

2.2.5. List of Requested Analyses

- The panel noted that the selection of the time frame for the analysis had a large effect on the estimates of depletion with the use of a longer historical data series suggesting greater depletion. The panel therefore asked to PGCT team to make a model run using data from 1971 onwards.
- It was also requested that the model be run with the steepness parameter set to (a) 0.7 and (b) estimated freely. These runs should be made as similar as possible to the NMFS model in terms of M , growth and maturity. It was left to the STAT team to decide on which data (such as the pot survey and logbook data) to include in the model.

3. STAR Panel Preferred Assessment Model

3.1. The Steepness Parameter

The assumed Beverton-Holt stock-recruitment function in the age structured models is parameterized in terms of ‘steepness’ and virgin biomass. If the steepness parameter is estimated within the model, its value is 0.2. This is very low and suggests that the stock cannot sustain any fishing at all in the long term. Analyses of other stocks of fish have indicated that a higher steepness value might be expected for sablefish (on the order of 0.7) but if steepness is fixed in the age-structured models, recent recruitment estimates are larger but all lie below the fitted stock-recruit curve, suggesting that the data are pointing towards a much lower value. Given that these low recruitments have been generated from low spawning biomass, it is possible that a density dependent effect may have occurred. Alternatively, it may be that the series of low recruitments observed in recent years has been driven by a poor environmental regime. Such regimes are believed to operate over decadal scales. If stock-recruit data have been observed over a period too short to characterize the average steepness of the relationship, the fitted steepness value may give an inadequate measure of stock productivity.

The principal difficulty with an environmental regime shift is that it makes the calculation and interpretation of the virgin biomass reference point equivocal because over a decadal scale, when most of the observations have been made, the prevailing environmental regime determines the estimated productivity and this may not be representative of long-term productivity. Furthermore, any density-dependent effects are confounded with the environmental effects. The panel therefore suggested that two alternative states of nature be examined by the STAT teams in order to calculate virgin biomass. In the first, it would be assumed that all the recruitment variability was environmentally driven implying that a long-term average of the estimated recruitments was the best estimate to use to calculate virgin biomass since this would cover the broadest range of environmental conditions. For the second, if density-dependent effects are the cause of recent low recruitment, then it would be more appropriate to use the mean of earlier recruitment values when spawning biomass was much larger.

3.2. Model-Based Estimation of Recruitment

Both STAT teams’ models included penalty functions on an assumed form of spawner-recruit function with fixed recruitment variance. Although recruitment values were allowed to vary by year, the penalty function constrained recruitments to be near a deterministic Beverton-Holt spawner recruit curve. When the steepness parameter of the spawner recruit curve was fixed, the choice of its value was quite influential on the resulting depletion ratio for spawning biomass. A low value of 0.2 implied depletion ratios of 0.34 (NMFS) and 0.25 (PGCT) while a high value of 0.7 implied a ratio of 0.5 (NMFS) and 0.43 (PGCT). Because key model outcomes such as depletion ratio were sensitive to the steepness value, there was concern among panel members over the arbitrary nature of how this parameter was determined. Nonetheless, when steepness was freely estimated, it produced an implausible biological result. As a result, the panel

proposed using an alternative approach in which the penalty functions were removed to the greatest extent practicable so that year-specific recruitments were freely estimated. In this alternative, there was no need to arbitrarily specify a steepness value.

In the resulting analyses from both STAT teams, the estimated value of the slope survey Q was quite variable as evidenced by the flatness of the likelihood function over a large range of Q s. Thus there remained a large degree of uncertainty in current stock biomass. The estimated recruitment vector using the alternative approach was more variable and the high degree of variability caused some concern. In particular, the estimated recruitment values in some years were considered to be almost too low to be plausible. Nonetheless, the downward trend in recruitment during recent years was consistent with the observations of the shelf trawl survey, the survey tool best suited toward sampling recruitment for sablefish. Overall, the STAR panel accepted the alternative approach as their preferred model because this eliminated the need to assume a value for the steepness parameter.

3.3. Two Alternative Hypotheses for Sablefish Recruitment

Model runs from both the NMFS and PGCT STAT teams indicated an apparent change in recruitment that occurred following the 1990 year class. In particular, average recruitment prior to then ($1.1\text{--}1.5 \times 10^7$ age-1 fish, depending on the model) was highly variable and showed little trend. In contrast, from 1991-99 recruitment has been less than half of that value, and perhaps as low as one fifth. It was recognized by both assessment teams that an abrupt change in environmental conditions may have been responsible for the recent decline in recruitment and that it was important to consider low-frequency changes in environmental conditions when evaluating sablefish recruitment. However, such changes are difficult to incorporate in standard analyses of stock-recruit dynamics because environmental and density-dependent conditions are confounded, i.e., higher biomass/favorable conditions from 1971-90 and lower biomass/unfavorable conditions more recently. In general, this problem has been previously identified by the Council's Scientific and Statistical Committee in its *Terms of Reference for Groundfish Rebuilding Analyses* which require the estimation of unexploited spawning biomass (B_0).

The STAR panel recommended that two calculations be conducted to characterize the possible causes of changes in sablefish recruitment strength. The first would represent the hypothesis that spawning biomass (density-dependence) is the primary determinant of sablefish recruitment strength and that B_0 should be estimated from recruitments early in the assessment time series when spawning biomass was highest. The second state of nature would represent the hypothesis that environmental conditions are the primary determinants of recruitment strength and that B_0 should be calculated using the entire time series of recruitments. The panel requested that each STAT team prepare a decision table of their results using spawning biomass depletion as the response variable. The decision table would include two states of nature, i.e., B_0 based on (1) early recruitments or (2) all recruitments, and would evaluate the consequences of $F_{45\%}$ harvests with 40-10 rule reductions. The panel left it to the discretion of the assessment teams to trim either

end of the recruitment time series if estimates were deemed unreliable, but requested that both teams strive to use the same years if possible. Given that the environmental hypothesis should produce a lower B_0 , spawning biomass depletion under that scenario was expected to be less severe than under the density-dependence hypothesis.

3.4. Preferred Assessment Model

The STAR panel agreed upon a preferred assessment model after deliberating the merits of the two age-structured assessment approaches. Both STAT teams were asked to provide a single age-structured model run in which recruitments were freely estimated parameters, in contrast to other model configurations where an assumed stock recruitment steepness was used to determine recruitment deviations from the expected curve. Both STAT teams produced and presented the STAR panel preferred model results during the meeting. In addition, the panel requested that both STAT teams produce estimates of unfished sablefish spawning biomass as the product of average recruitment times unexploited spawning biomass per recruit, as determined by growth, maturity, natural mortality, and model-based selectivity values. Given the uncertainty in the cause of the recruitment decline and the low estimated steepness values for sablefish, the panel requested that unexploited spawning biomass be estimated for two states of nature: (i) an environmentally driven recruitment state and (ii) a spawning biomass driven recruitment state.

3.5. Management Policy

Under the management policy established by the Council under the Pacific Groundfish Fishery Management Plan (FMP), stocks with a current spawning biomass of less than 40% of virgin spawning biomass are limited to a harvest level reflecting the slope of a line drawn between 40% of virgin biomass and 10% of virgin biomass (known as the “40-10 rule”). This is the first assessment for sablefish that has been conducted since implementation of this policy. Assessment authors were requested to provide a table of outputs which included expected yields under the Council’s harvest policy ($F_{45\%}$ for sablefish) applying the 40-10 rule.

Assumptions about future recruitment could make a substantial difference in estimated yields under the Council’s harvest policy. To gauge the impact of different recruitment assumptions, the STAT teams were requested to provide one projection using the lower average recruitment during the 1990's, and a second projection using the higher long-term recruitment. Both teams completed these analyses during the meeting. Results showed that 3-year projections of spawning biomass depletion ratios and yields were insensitive to assumptions about future recruitment.

3.6. Harvest Projections

There is interest in determining the immediate consequences of alternative harvest choices in relation to the established policy. This is achieved by conducting short to medium term projections from plausible estimates of the current state. The projections are conducted with a forecast exploitation rate consistent with the established harvest policy,

therefore the principal concern is how the spawning biomass relates to the spawning biomass reference. In this case the panel admitted two spawning biomass reference points reflecting two plausible hypotheses regarding recruitment dynamics. In view of the potential divergence in forecast recruitment under these two recruitment hypotheses, and the lack of any basis upon which to favor either, medium term projections were not considered informative. Accordingly, projections were conducted for only three years, the minimum requirement under the existing management framework. Generally, it is desirable to include uncertainty associated with the estimate of current state, the estimate of reference points and the forecast processes (principally recruitment) when constructing decision tables. Recognizing that in this instance, the principle uncertainties lay in the estimate of reference points (divergent recruitment dynamics) and in the estimate of the current state (poorly determined slope survey catchability), stochastic recruitment was not deemed necessary. Deterministic projections, using mean recruitment in recent years, were prescribed. The panel elected to use the mean in recent years because there was no basis to assume that recruitment dynamics had reverted to the more productive stanza associated with pre-1990 conditions.

3.7. Summary

The analyses indicate that spawning biomass has been declining since the late 1970s and that recruitment during the 1990s has been low relative to earlier years. Indeed, the recent recruitment would not sustain a fishery, suggesting that the current regime could not have prevailed historically. It is not possible to determine with any confidence if the current low recruitment is due principally to reduced spawners or if it is principally environmentally driven. Admitting that a single stock recruit relation would not adequately capture this uncertainty, the assessment was conducted with recruitment freely estimated from the survey indices and size/age composition data. The resulting recruitments were used to establish two estimates of virgin spawning biomass from the product of spawning biomass and virgin recruitment. The first, a proxy for environmentally driven recruitment, was based on average recruitment over the entire history, and the second, a proxy for spawning biomass driven recruitment, was based on average recruitment during the historical period of high biomass and productivity. Three year projections, assuming that recruitment in the immediate future would be similar to that observed in recent years, were conducted to evaluate trajectories of spawning biomass and catch (Tables 1 and 2). The results indicate that biomass will continue to decline in the immediate future under the harvest strategy prescribed by the fisheries management plan. During the next years, spawning biomass will approach or drop below 25% of the virgin spawning biomass under the density-dependent hypothesis, and decline but remain above 30% under the environmentally driven hypothesis.

Table 1. Estimates of mean recruitment (R), virgin spawning biomass (B_0 , thousand mt), spawning biomass in 2001 (B_{2001} , thousand mt), and spawning biomass depletion ratio in 2001 (B_{2001}/B_0), along with results of 3-year projections of sablefish spawning biomass depletion ratios, total catches (mt), and exploitation rates (total catch/age-2+ biomass) under density-dependent and environmentally driven recruitment states of nature for the NMFS STAT team model using the STAR panel preferred assessment model configuration.

NMFS Assessment Model	State of Nature	
	Density dependent Recruitment	Environmentally driven Recruitment
Average R^1	15.2	11.1
B_0	202.5	148.5
B_{2001}	55.4	55.4
B_{2001}/B_0	0.27	0.37
R used for projections ¹	3.5	3.5
Ratio of R used for projections to average R	0.23	0.31
3-year projections of spawning biomass depletion ratio(B_{Year}/B_0)		
Year		
2002	0.25	0.34
2003	0.24	0.32
2004	0.22	0.30
3-year projections of total catch (mt)		
Year		
2002	3,877	4,565
2003	3,573	4,231
2004	3,338	3,976
Average 2002-2004	3,596	4,257
3-year projections of exploitation rate		
Year		
2002	3.9%	4.6%
2003	3.8%	4.5%
2004	3.7%	4.5%

¹ Units are millions of age-1 fish.

Table 2. Estimates of mean recruitment (R), virgin spawning biomass (B_0 , thousand mt), spawning biomass in 2001 (B_{2001} , thousand mt), and spawning biomass depletion ratio in 2001 (B_{2001}/B_0), along with results of 3-year projections of sablefish spawning biomass depletion ratios, total catches (mt), and exploitation rates (total catch/age-2+ biomass) under density-dependent and environmentally driven recruitment states of nature for the PGCT STAT team model using the STAR panel preferred assessment model configuration.

PGCT Assessment Model	State of Nature	
	Density dependent Recruitment	Environmentally driven Recruitment
Average R^1	11.0	9.0
B_0	144.7	118.1
B_{2001}	44.5	44.5
B_{2001}/B_0	0.31	0.38
R used for projections ¹	4.8	4.8
Ratio of R used for projections to average R	0.44	0.54
3-year projections of spawning biomass depletion ratio(B_{Year}/B_0)		
Year		
2002	0.28	0.35
2003	0.27	0.33
2004	0.26	0.32
3-year projections of total catch (mt)		
Year		
2002	3,922	4,317
2003	3,675	4,043
2004	3,504	3,845
Average 2002-2004	3,700	4,068
3-year projections of exploitation rate		
Year		
2002	4.8%	5.3%
2003	4.6%	5.1%
2004	4.5%	5.0%

¹ Units are millions of age-1 fish.

While the assessment results have large uncertainty, primarily due to the limited amount of data, the decline in biomass and the recent reduced recruitment are fairly well supported. The absolute biomass is not well established because the catchability estimate for the slope survey is not well determined. While the reliability of the exploitation rate estimate is associated with how well catchability is determined, exploitation rate appears to be low, in relation to the $F_{45\%}$ reference, over the plausible range of catchability. The virgin spawning biomass reference is also not well established because the recruitment process is not well understood, but it is evident that the estimated forecast biomass will be in the range of 22-32% of virgin biomass by 2004. The decision table includes results for two plausible recruitment hypotheses. It should be emphasized that wrongly assuming recruitment is environmentally driven will likely have negative consequences for resource conservation while wrongly assuming that recruitment is spawning biomass driven will likely have negative social and economic consequences.

Areas of Disagreement within the STAR Panel

The main areas of disagreement concerned the inclusion or exclusion of data series and the determination of the steepness parameter in the stock-recruitment curve. The STAR panel did not reach a consensus on:

- the inclusion of the 1988 slope survey datum
- the inclusion of pot survey index
- the inclusion of logbook CPUE index

However the differences in opinion were not strong and in general the treatment of these data did not have a major effect on the model results. It was left to the STAT teams to make the final choice of data utilization.

Key Issues and Major Uncertainties

Reliability of Recruitment Data

A major uncertainty in this assessment, for the purposes of management advice, is determination of whether the stock experienced higher recruitment prior to 1980 when the biomass is estimated to be higher. There are no reliable indices of abundance for this early time period. The magnitude of that historical biomass is being inferred from the level of absolute catches and from the preponderance of larger/older fish in the size and age compositions. It should be noted that the observed size and age compositions for larger/older fish are not well fitted by the PGCT model, or require complex time-varying selectivity in the NMFS model. The higher historical recruitment is a logical implication of the greater magnitude of the historical biomass. These conclusions are very sensitive to the relative weight attributed to the survey indices versus the size/age composition data. The surveys suggest a smaller difference between historical and present biomass and

recruitment than is indicated by the size/age composition observations. Interpretation of the size/age composition observations is complicated by selectivity, which is thought to vary over time for the fisheries components.

Poor Recruitment in the 1990s

Recent shelf and slope survey data indicate that the 1995 year-class is larger than those immediately preceding it, but the 1996 and 1997 year-classes are virtually absent. The trawl fishery age composition and preliminary results from the 2001 shelf survey suggest that the 1999 year-class may be average. However, average recruitment during the 1990s appears to be much lower than during the 1970s-1980s, regardless of assessment model.

Natural Mortality

An assumed value of $M=0.07$ has been used for assessing stock status. A lower value of M may be appropriate given the longevity of west coast sablefish. Similarly, it may be more appropriate to use higher values of M for younger sablefish that reside in continental shelf waters.

Relative Weighting of Data Sources

For both STAT teams, the age-structured modeling results were sensitive to the relative likelihood weights assigned to size and age composition data and relative abundance data. Changing the weights used by the STAT teams could have a substantial effect on model results.

Survey Coverage of Stock Range

No survey provides synoptic coverage of the geographic range of the stock. Recent investigations of the catchability of sablefish with fixed gear show that the stock range extends to at least 1000 fathoms (Matteson et al. 2001). The fraction of the stock outside the depth range of the primary sablefish resource survey (the slope survey) is unknown.

Latitudinal Migrations of Sablefish

Tag returns document that there is some interchange between the west coast stock and the British Columbia and Alaskan sablefish stocks (Kimura et al. 1997). Although the amount of net migration is unknown, apparent migration rates between the west coast stock and the British Columbia and Alaskan stocks on the order of 3-4% are a source of uncertainty for stock dynamics, especially in relation to changing environmental conditions due to El Nino-Southern Oscillation effects.

Regime Shift in Oceanographic Conditions in the California Current System

Environmental changes have been well-documented in the California Current System (CCS) but their effects on groundfishes, including sablefish, are not well understood (MacCall 1996, Francis et al. 1998). Recent research suggests there may be as many as three time scales of natural variability in the CCS: interannual, El Nino-Southern Oscillation (3-7 yr), and interdecadal climate-ocean oscillations (Ware 1995; McGowan et al. 1998). Furthermore, some recent analyses of historic wind stress and sea surface

temperature data collected off San Francisco suggest that the CCS may have more than two environmental states (Parrish et al. 2000), yet a further complication for evaluating future possibilities. If long-term environmental forcing substantially affects sablefish productivity, then our understanding of the natural variability of this resource is limited by the number of complete cycles, each lasting perhaps 50-60 years, that have been observed. Unfortunately, sablefish assessment data cover roughly 30 years or ½ of one cycle. Obviously, knowing the timing and amplitude of environmental forcing is important for quantifying the productivity of west coast sablefish. We need to know more about the inherent variability of the CCS and regional differences in larval transport mechanisms within it (e.g., Parrish et al. 1981) to provide decadal predictions of potential yields. If the CCS is now changing to a colder state which may be more favorable to sablefish, on average, there will still be a time lag in enhanced productivity due to delayed recruitment and maturation for this stock. Thus, it critical to convey to decision-makers that the chances to rebuild the sablefish stock may be either enhanced or diminished by changing ocean conditions and that for the near term, this uncertainty is likely to persist.

Prioritized recommendations for future research and data collection

1. Conduct annual shelf surveys to improve recruitment monitoring.
2. Ensure age sampling for surveys and fisheries is adequate with an emphasis on the characterization of younger sablefish. Consider age validation studies.
3. In view of the problems of interpreting recruitment and the effect this has on the calculation of reference points, it would be desirable to investigate robust measures of virgin biomass for sablefish, or alternative reference points, so that a standard procedure can be followed for future assessments. This would help provide a consistent basis for evaluating stock status.
4. Sablefish tagging studies are needed to monitor movement patterns relative to age, length, and latitude, and to help guide decisions about modeling selectivity patterns. A tagging study would be useful to verify assumptions about movement and the mixing of age and length classes for selectivity estimation.
5. A model-based investigation of the consequences of age-varying natural mortality with fixed slope survey catchability could provide insights on factors affecting the model fits to age compositions.
6. It would be useful to know the amount of uncertainty in the sablefish assessment models due to violations of key assumptions versus measurement error. Assessing the likely importance of errors due to model assumptions versus errors due to sampling variation would help to focus future research on sablefish.

References

- Alverson, D.L. 1960. A study of annual and seasonal bathymetric catch patterns for commercially important groundfishes of the Pacific northwest coast of North America. Pacific Marine Fisheries Commission, Bulletin 4, 66 p.
- Barss, W.H., and R.L. Demory. 1985. Observation on retention and discard of groundfish from a limited sampling of Oregon trawl vessels in 1982. Oregon Department of Fish and Wildlife, Information Report 85-7, Newport, Oregon, 15 p.
- Francis, R., S. Hare, A. Hollowed, and W. Wooster. 1998. Effects of interdecadal climate variability on the oceanic ecosystems of the NE Pacific. Fish. Oceanogr. 7:1-21.
- Helser, T.E., A.E. Punt, and R.D. Methot. Draft manuscript 2001. A statistical approach to analyzing a multi-vessel fishery resource survey on the northwest continental slope.
- Herrmann, R.B., and G.Y. Harry, Jr. 1963. Results of a sampling program to determine the catches of Oregon trawl vessels. Pacific Marine Fisheries Commission, Bulletin 6, pp. 39-51.
- Kimura, D., A. Shimada, and F. Shaw. 1997. Stock structure and movement of tagged sablefish, *Anoplopoma fimbria*, in offshore northeast Pacific waters and the effects of El Nino-Southern Oscillation on migration and growth. Fish. Bull. 96:462-481.
- MacCall, A. 1996. Patterns of low-frequency variability in fish populations of the California Current. CalCOFI Rep. 37:100-110.
- McGowan, J., D.R. Cayan, and L.M. Dorman. 1998. Climate-ocean variability and ecosystem response in the northeast Pacific. Science 281: 210-217.
- Matteson, K., R.W. Hannah, and J.T. Golden. 2001. Evaluation of pot and longline gear as survey tools for sablefish. Oregon Department of Fish and Wildlife, Information Report 2001-03, Newport, Oregon, 63 p.
- Methot, R.D. 2000. Technical description of the stock synthesis assessment program. NOAA Tech. Mem. NMFS-NWFSC-43, 46 p.
- National Marine Fisheries Service Stock Assessment Technical Team [NMFS STAT team]. Draft manuscript 2001. Status of the sablefish resource off the U.S. Pacific coast in 2001.
- Pacific Groundfish Conservation Trust Stock Assessment Technical Team [PGCT STAT team]. Draft manuscript 2001. Status of the sablefish resource off the U.S. Pacific coast in 2001.

Parrish, R.H, C.S. Nelson, and A. Bakun. 1981. Transport mechanisms and reproductive success of fishes in the California Current. *Biological Oceanography*. 1(2):175-203.

Parrish, R.H., F.B. Schwing, and R. Mendelssohn. 2000. Mid-latitude wind stress: the energy source for climatic shifts in the North Pacific Ocean. *Fish. Oceanogr.* 9(3):224-238.

Ware, D.M. 1995. A century and a half of change in the climate of NE Pacific. *Fish. Oceanogr.* 4(4):267-277.

Zimmerman, M., M. Wilkins, K. Weinberg, R. Lauth, and F. Shaw. 2001. Retrospective analysis of suspiciously small catches in the National Marine Fisheries Service West Coast Triennial Bottom Trawl Survey. USDOC/NMFS, Alaska Fisheries Science Center Processed Report 2001-03, 135 p.

SHORTSPINE THORNYHEAD ROCKFISH
STAR Panel Report

Hatfield Marine Science Center
Newport, Oregon
July 9-12, 2001

Stock Assessment Review (STAR) Panel Members:

Jack Tagart, Washington Department of Fish and Wildlife, STAR Chair
Gary Stauffer, NMFS Alaska Fisheries Science Center, SSC Representative
Paul Crone, NMFS Southwest Fisheries Science Center
Robin Cook, Fisheries Research Service, Marine Laboratory, Scotland, UK
Mark Saelens, Oregon Department of Fish and Wildlife, Groundfish Management Team Representative
Rod Moore, Groundfish Advisory Panel Representative

Stock Assessment Team (STAT) Members Present:

Kevin Piner, NMFS Northwest Science Center, STAT Chair
Richard Methot, NMFS Northwest Science Center

Overview

The STAR Panel reviewed the draft stock assessment report by the STAT (Piner and Methot, 2001) for the shortspine thornyhead (*Sebastolobus alascanus*) resource. The review took place during the week of July 9-12, 2001 at the Hatfield Marine Science Center in Newport, Oregon. The STAT provided STAR Panel members with a draft report in advance of the STAR workshop documenting the analyses completed prior to the meeting. The STAR Panel commends the STAT for the quality of its working draft and its cooperative spirit and willingness to respond to the Panel's comments and requests for additional analyses. Nevertheless, the draft stock assessment report submitted to the STAR Panel prior to our meeting was a work in progress and incomplete with respect to the Outline for Groundfish Stock Assessment Documents as specified in the Terms of Reference for the STAT/STAR process (2001terms.2.wpd - "Probably need a more accessible reference here"). Subsequent to the STAR Panel meeting, the STAT team provided Panel members with a completed stock assessment.

Before reviewing the shortspine stock assessment, Drs. T. Helser and R. Methot briefed the STAR Panel on two reports, "A Statistical Approach to Analyzing a Multi-vessel Fishery Resource Survey on the Northwest Continental Slope" by Helser et. al. (2001) and "Retrospective Analysis of Suspiciously Small Catches in the NMFS West Coast Triennial Bottom Trawl Survey" by Zimmermann et al. (2001). These reports document the results of separate analyses of the NMFS slope trawl surveys and triennial shelf surveys, respectively, providing new and alternate time series for groundfish biomass estimates used in the stock assessment. Although the Panel did not formally provide peer review of these two documents, it did, in general, accept the results for use as alternative biomass time series to be considered in the assessments.

Dr. Piner, STAT Chair, summarized the shortspine thornyhead fishery, data, and model assumptions and scenarios. Considerable discussion followed concerning the quality of the data, appropriateness of model assumptions, base model configurations, potential alternative configurations, and interpretation of results. The Panel requested additional alternative model analyses to examine sensitivity of assessment results focusing on areas of data uncertainties and model configuration assumptions. Dr. Piner noted and the STAR Panel concurred that fishery size-composition data were insufficient, due to small sample sizes, as well as sampling strategies that potentially bias observation of the true size-composition of landed catch. Specifically, the bathymetric demography of shortspine thornyhead is unaccounted for in the sampling program. Consequently, fishery size data provide little information to the assessment model. The shelf survey provides some information on nearshore abundance of small shortspine thornyhead, but these data did not lend themselves to interpretation of year-class strength, given the limited bathymetric range of the survey contrasted with the habitat preferences of this species and the triennial survey periodicity. The coast-wide slope trawl surveys are the principal data source that influence results generated from the various model scenarios.

The shortspine thornyhead assessment suffers from limited and sparse data sources, which translate into significant uncertainty in the assessment. The consensus of the STAR Panel is that

the shortspine thornyhead assessment model results are barely sufficient for setting harvest levels for the 2002 fishery. *In addition, model projected yield should be treated cautiously because it is dependent on projected constant recruitment, a condition we think is unlikely.* Biological reference points estimated from the assessment are problematic and highly uncertain, given concerns regarding the limited biomass time series, questionable accuracy of current ageing methods, reliability of the growth rate parameter estimates, and the possible biases associated with age-composition data for the fisheries and surveys.

List of Requested Analyses

The Panel requested a series of model runs to explore the sensitivity of the model to estimates of growth rate parameters and survey selectivity. Prior to meeting with the STAR Panel, the STAT examined model sensitivity to the natural mortality (M) and survey catchability (q) parameters. Since the model was highly dependent on tuning to the slope survey, it became apparent that total stock biomass was determined by the choice of survey q . To explore sensitivity to growth and survey selectivity, the Panel recommended fixing q for the slope survey at 0.7 and setting M equal to 0.06. We then asked the analysts to: (1) fix the von Bertalanffy growth parameters based on external estimates of these quantities; (2) estimate growth parameters within the model; and (3) evaluate both asymptotic and dome-shaped selectivity assumptions for size distributions generated from the slope survey. We also requested that the analyst look at the consequences of equal emphasis on all data sets, versus emphasis on slope survey data only. Based on the numerous model configurations, the Panel, working in collaboration with the STAT, identified a base run and a set of alternative runs that were designed to bracket the uncertainty and thus, the range of plausible model scenarios. The final set of models reflect the options listed above, but rather than forcing survey q to equal 0.7, q is either estimated within the model or fixed at 1.0, with M fixed at either 0.04 or 0.06. Finally, we asked the STAT to prepare a straightforward estimate of yield based on an exploitation strategy of $0.75 \cdot M$, with slope survey biomass adjusted in concordance with fishery selectivity. The STAT used these model configurations to develop 2002 harvest level projections.

Comments on the Technical Merits and/or Deficiencies of the Document

The STAT developed a length-based stock synthesis model similar to the models used in past assessments. Important changes from previous models include:

1. The southern stock boundary was extended from the southern edge of the INPFC Monterey Area to Point Conception within the INPFC Conception Area to match the southern range of the recent NMFS slope trawl surveys.

2. The model was expanded to a two-sex model to account for differences in the maximum fish length (L_{∞}) between males and females. However, sex-specific size-composition data were only available from the slope survey, 1997 to 2000.
3. Given the lack of reliable age data and the brevity of the slope survey size-composition time series, there were few data upon which to estimate recruitment. Consequently, recruitment was assumed to be constant over time. The previous stock assessment model assumed two constant recruitment periods split at 1977.
4. In 1998, shortspine thornyhead were modeled as a single coast-wide fishery. In the current assessment the fishery is stratified into 3 components: a northern (OR) trawl fishery, a southern (CA) trawl fishery and a single coast-wide discard fishery.
5. Recent analysis estimated size-at-50% maturity to be 18 cm; a reduction of 4 cm from the previous estimate.

The available data pertinent to shortspine thornyhead assessment included:

1. NMFS slope trawl survey time series of fish abundance (1981-2000) and size/sex compositions (1997-2000). The analyst used a standardized biomass time series (i.e., model B from Helser et al. (2001).
2. NMFS triennial shelf survey time series (1977-2000) and size/sex compositions (1995-1998), with and without “water haul” corrections (Zimmermann et al., 2001).
3. Coastal fishery landing statistics by state (1962-2000), with some length-composition data from port sampling, California (1978-2000) and Oregon (1990-2000).
4. Four separate studies that investigated discard rates, some with associated size-composition information.
5. A new, but unreviewed estimate of foreign fisheries thornyhead catches (1966-1976).
6. Trawl discard estimates for 1995-1999 from the ODF&W Enhanced Data Collection Program were added to the discard time series.

The shortspine model was configured to utilize available data, but suffers from insufficient information regarding historical length compositions and the lack of validated ageing methods to determine age composition of fishery landings and survey catches. Given the absence of reliable ageing methods for long-lived thornyheads, estimates of growth rates are quite uncertain. Also, because of limited age-composition information and insufficient fishery length-composition data, there is little information available for estimating recruitment, regardless of the model scenario considered.

Additional complication arises from the length-specific geographic patterns in thornyhead abundance that show a consistent pattern of high abundance of small thornyheads off nearshore waters of Oregon, and relatively high abundance of large thornyheads in offshore waters of the Monterey INPFC area, with little to no small fish observed in inshore waters of other INPFC areas. Slope survey results show the highest estimated biomass in the Monterey INPFC area in deeper waters, suggesting that offshore distribution of shortspine thornyhead may extend beyond 700 fm. The northern area appears to be a recruitment area for fish less than 20 cm. Also, the surveys found that the size of fish increases with depth, with the largest fish in the deep strata being females. One can develop a number of alternative scenarios to explain these patterns, including migration, localized fishing patterns, and localized and sporadic recruitment events. As discussed below, the regional and bathymetric variability in size compositions complicates estimation of survey size selectivity and catchability.

The magnitude of the new estimates of the foreign catch of thornyheads in the southern area seems unrealistically high for 1967-1968, given what we know about the nature of the foreign fisheries. These revised catch estimates have little impact on the recent biomass trend and current level, which is driven by recent slope survey results; however, a zero foreign catch for those two years would increase the Spawning Biomass Ratio (B_{2001}/B_0) by about 4%.

Given that coast-wide biomass estimates are available for the four most recent years (1997-2000), model estimates of current biomass are perhaps less uncertain compared to previous assessment results. Nevertheless, estimated biomass is completely dependent on estimates of slope survey catchability (q). Any reduction in the assumed value of q will result in a linear increase in the 2001 biomass estimate. In the stock synthesis model, q is used as a scaling factor and is linked to the estimates of survey size selectivity and thus, the absolute value of this parameter can be easily misinterpreted. Legitimate values of q can range well above 1.0. In the current model, q increases to a value near 3 when survey size selectivity is allowed to be dome-shaped. The high catchability is estimated for smaller fish, with the larger fish experiencing a q closer to 0.7. The implication of such a parameterization is that a portion of the larger fish in the population are not available to the slope survey. Integrating the effects of the size selectivity on q , we acknowledge that the slope survey appears to underestimate the absolute biomass of shortspine thornyhead, however, the magnitude of the underestimate is poorly determined.

The commercial trawl CPUE data was included in the model runs, but was de-emphasized to ensure this data source did not dominate fits produced in the various model scenarios. In general, all model scenarios fit the CPUE data equally well.

Areas of Disagreement

There were no major outstanding disagreements among the members STAR Panel and the STAT representatives at the conclusion of the review.

Unresolved Problems and Major Uncertainties

Estimates of natural mortality and growth rates for female and male shortspine thornyhead will remain uncertain as long as we have no reliable ageing methods. Given the apparent slow growth and the structure of thornyhead otoliths, the usual ageing methods are unlikely to work for shortspine thornyheads. This will continue to hinder the development of an age-composition time series and subsequent indices of annual recruitment; it will constrain our ability to achieve reliable estimates of sex-specific growth rates and impede attempts to improve estimates of natural mortality. These sources of uncertainty will not go away anytime soon, given the long time series of data that will be required to resolve these problems.

The geographic and bathymetric stratification of the size/sex compositions of the shortspine thornyhead population may make it impossible to model our sampling observations without development of a customized process model and/or changing the sampling strategy for this species.

The new slope trawl survey analysis, which developed a quantitative scheme for combining the two NMFS slope trawl surveys, will allow the continuation of the slope time series once the MILLER FREEMAN survey ends. The 2001 surveys will be the last year for the AFSC-conducted MILLER FREEMAN survey.

Recommendations for Future Research and Data Collection

In view of the data-related difficulties that arise when applying the stock synthesis model to estimate abundance and yield, it would be worth investigating methods that utilize the slope survey index directly to construct a simple management decision rule designed to maintain the stock within desired limits.

The final GLM model for survey calibration must incorporate the results from the planned 2001 surveys. An annual standardized trawl survey must continue.

Given the observable geographic and bathymetric differences in the distribution of shortspine thornyhead, new innovative sampling strategies should be considered for monitoring the landed catch. At a minimum, stratification by region and depth appear necessary. Research and development for finding a valid ageing method for shortspine thornyhead must continue; however, lacking improved age reading methods, we should expand our sex-specific size composition sampling.

Research is needed to understand the mechanisms that explain why spatial patterns in abundance and size compositions exist as shown in the slope survey information. This includes documenting geographic centers for early settlement of juvenile shortspine thornyheads, as well as the offshore depth limits of thornyheads off the Monterey INPFC area, and determining the relationship between these two apparent centers of abundance. This information should be directed at understanding the size component to survey selectivity and overall catchability, q . In addition, research is needed to explore the distribution and abundance of shortspine thornyhead south of the INPFC Conception area and in those areas inaccessible with current survey gear. Finally, the estimates of foreign catch in the southern area need to be more rigorously investigated to confirm the levels currently assumed.

Estimate discards.

LITERATURE CITED

- Helser, T.A, A.E. Punt, and R.D. Methot. 2001. A statistical approach to analyzing a multi-vessel fishery resource survey on the northwest continental slope. Manuscript Report, 38 p.
- Piner, K. and R.M. Methot, 2001. Stock status of shortspine thornyhead off the Pacific west coast of the United States 2001. First Draft. Status of the Pacific Coast Groundfish Fishery Through 2001 and Recommended Acceptable Biological Catches for 2002. Pacific Fishery Management Council, Portland, Oregon.
- Zimmerman, M., M.E. Wilkins, K.L. Weinberg, R.R. Lauth and F.R. Shaw. 2001. Retrospective analysis of suspiciously small catches in the NMFS west coast triennial bottom trawl survey. AFSC Processed Report 2001-03, 135 p.

YELLOWEYE ROCKFISH
STAR Panel Meeting Report

NMFS Santa Cruz Laboratory
Santa Cruz, California
June 25-29, 2000

STAR Panel Members

Erik Williams, Southeast Fisheries Science Center (Chair)
Rick Stanley, Department of Fisheries and Oceans, Canada (Rapporteur)
Stephen Smith, Department of Fisheries and Oceans, Canada
John Geibel, California Department of Fish and Game
Tom Jagielo, Washington Department of Fish and Wildlife (SSC)

PFMC Committee Representatives

Dave Thomas, GMT
Kelly Smotherman, GAP

STAT Team Members Present

Farron Wallace, Washington Department of Fish and Wildlife

Overview

The STAR panel reviewed the assessment of yelloweye rockfish at the Santa Cruz Laboratory, CA on June 25-29, 2001. This represents the first assessment of this species in U.S. waters. The yelloweye stock was assessed with 2 models, northern California and Oregon models. The Washington state portion of the stock was not assessed. The northern California and Oregon portions of the stock were modeled using the length-based Stock Synthesis Model (SSMOD).

The STAR panel attempted to evaluate the Oregon recreational CPUE index (ODF&W) in several ways, but ultimately came to the conclusion that the data had been pre-filtered and aggregated to an extent that rendered critical review nearly impossible. For this reason the STAR panel feels there is much uncertainty about the estimates from this index that need to be addressed in future assessments, but believe it does represent the best available data at this time.

The consensus of the STAR panel is that the yelloweye rockfish stock assessment is based on the best available data. The use of the SSMOD seems adequate, but some limitations were encountered, suggesting that a more flexible software such as AD Model Builder may be a better assessment tool in the future.

The consensus of the STAR panel is that the yelloweye rockfish stock assessment represents a thorough and effective analysis and is based on the best available data. The STAR panel supports the document's presentation of the current stock status. The STAR panel commends the STAT team for their excellent work in conducting the stock assessment and for their cooperative spirit and willingness to respond to the panel's comments and requests.

Discussion of changes requested and completed during the STAR panel meetings June 25-29, 2001

1. Zero catches in the sport catch data be included in GLM analysis of CPUE from the sport fisheries. This change was made during Panel meetings. The change had little impact on model behavior but was retained because it was considered a more appropriate treatment of the data.
2. The Panel commented that it is likely more accurate for the CPUE data to be analyzed using the delta-distribution GLM approach. Erik Williams provided results to the STAT team from a delta-lognormal GLM applied to the CPUE data.
3. CPUE trends in the sport fisheries should be input as survey indices (as opposed to effort indices) in the SSMOD model. This change was implemented and retained but had little impact on model behavior.
4. The Panel requested that variance estimates of sport fishery CPUE be estimated directly using a regression of log-transformed CPUE. This was completed during the meeting. It had little impact on the model behavior but was retained as a feature.

5. It was agreed that triennial survey estimates of yelloweye rockfish not be considered in the assessment since it was obvious from the low frequency of catches that the survey was not fishing in yelloweye habitat.
6. Selectivity parameters for early harvests should be based on data derived from later commercial samples, as the early harvest was assumed to be dominated by the commercial fishery. This feature was adopted during the meetings but had little influence on the final results.
7. The STAR panel requested that the model use an asymptotic selectivity function and allow the model to fit increasing M for ages greater than 12. The option for considering a dome-shaped selectivity function and constant M with age was removed from consideration. While this change had significant impact on some of the model output, it did not have a major impact on the overall biomass trend or final ratio of terminal spawning biomass to unfished biomass.
8. Sensitivity tests were conducted on the weighting of the Stock/Recruitment (SR) relationship. This was found to have little influence on overall biomass trends. The author noted that a steepness value of 0.67 was adopted from recent meta-analysis for rockfish, although a value of 1.0 provided the best fit.
9. An additional length bin to represent smaller fish (<20 cm) was incorporated during the meeting. This provided a modest improvement in fit to younger fish but little impact overall on model behavior.
10. The STAR panel requested that recommendations for generic changes to model structure made during discussion of either the Northern California or Oregon assessment be assumed to apply to both assessments.
11. The STAR panel requested that the model fit the three most recent years from the SR function instead of using mean R .
12. The STAR panel cautioned the author to be aware that the “List” batch function of SSMOD may find false minima and thus critical likelihood profiling should not be conducted in List mode.
13. The author was directed to use unfished biomass for calculation of the ratio of current to virgin biomass, as opposed to equilibrium biomass.
14. The STAR panel agreed with the author’s choice to use growth parameters derived from Washington samples (Neah Bay) in preference to California samples for the Oregon assessment.
15. As requested, the CV’s on length at age for age 6 and 60, were recalculated but had little impact on stock dynamics.
16. The STAR panel requested use of “effective” sample size. There was little impact on model behavior since sample sizes were already at relatively low levels.
17. The STAR panel requested using age 3 as age of first recruitment.
18. The STAR panel recommended allowing model to estimate recruitment through 1996 and mean R for 97-99.

Changes requested that were not completed during the STAR panel meetings

1. The STAR panel requested that the author resolve why Figure 2 in his presentation differed from the document.

2. The STAR panel asked the author why a sport fishery CPUE estimate for the Oregon coast was not included for 1978 and 1979 as it was in the black rockfish assessment (Ralston and MacCall 2001). The author stated that he would examine this subsequent to the meetings.
3. The STAR panel requested final sensitivity tests on results to critical parameters. This would include varying the estimates of terminal M.
4. The STAR panel requested that the author forecast with three scenarios with respect to future recruitment: (1) the mean of last 10 years; (2) the mean from the entire time series, and (3) from the SR function. The target reference point will be $F_{50\%}$.
5. The panel requested that final analyses include sensitivity analysis of random start points, a retrospective analysis, and that the forecasting be conducted for at least three years.
6. The author will ensure that all elements that are identified in the "Outline for Groundfish Stock Assessment Documents" will be included in the next draft.

Editorial requests and other comments

1. Figures 17 and 19 of mean length be rescaled.
2. The document should note that the estimates of variance in the ratio of current to unfished biomass assumes no covariance between the two estimates. If this assumption is false, the variance estimates would be overestimated.
3. The document should comment why no examination of bag limit saturation on CPUE was examined in the assessment.
4. The STAR panel agreed with the decision to split Washington analysis from that for Oregon, but recommended that reasons for this be described in the document.
 - ie. the CPUE trend is not comparable because of different bag limits.
5. The document should include a comment about skepticism concerning the anomalous large year class in the time series.
6. The STAR panel requested that the estimates of recent recruitments not be included in the figures.
7. The document should include an explanation of the sources of sport fishery data (ie. MRFSS or RECFIN).
8. The STAR panel questioned whether variation in bag limits could affect comparability in CPUE. The author suggested it would only be an issue for the most recent 1-2 years when bag limits have been reduced. One panel member suggested that high-grading may also be occurring in the last two years. This would particularly be an issue for a Washington assessment because of decline in bag limits. The author noted that in earlier years, rockfish bag limits were not ever approached by yelloweye catches.
9. The author noted that ageing of yelloweye rockfish has been validated by recent radiometric work that is now in press.
10. With respect to possible changes in the fishing "power" over time, the author noted, that fishing could be expected to have increased because of technological changes such as DGPS.

11. Emphasize in report, the impact of sustained poor recruitment on low current biomass.

Comments on the Technical Merits and/or Deficiencies of the Assessment

The yelloweye rockfish assessment was modeled using the SSMOD program. In several cases the STAR panel was unable to request analyses due to limitations of this software or unable to understand the mechanics of the computations due to inadequate documentation. It is suggested that better documentation be supplied for the SSMOD software or that future assessments use more flexible/transparent software. Despite some of these shortcomings, the SSMOD software employs advanced methods for assessing fisheries data and represents one of the best methods for fisheries assessments available.

The STAT team should be commended for the many analyses undertaken to determine the best use of the data sources. Any perceived deficiencies in the assessment are likely the result of inadequate or poor data.

Unresolved Problems and Major Uncertainties

The lack of information on the collection and pre-assessment analyses used for the ODF&W recreational charter boat data did not allow for a complete review. For these reasons, there is some degree of uncertainty associated with this data source. This data should be scrutinized in more detail in future assessments. Despite this uncertainty, the yelloweye rockfish assessment is based on the best available data at this time.

Prioritized Research Recommendations and Data Collection

The panel provided the following prioritized list of research directions to improve yelloweye rockfish assessment:

1. More effort and focus on sampling in support of stock assessment of yelloweye rockfish. Most of this effort should be directed at the sport fishery:
 - continue and, if possible, increase observer sampling on sport charters in California)(ie CPFV and MRFFS)
 - provide adequate age sampling.
2. Increased effort toward habitat mapping;
3. Exploration of methods for development of fishery independent indices;
4. Genetics studies to determine if stock boundaries exist;
5. Studies of the role of introducing MPA's in harvest management for yelloweye rockfish

STOCK ASSESSMENT ERRATA

RECEIVED

JAN 16 2002

PPMC



State of Washington
DEPARTMENT OF FISH AND WILDLIFE

Mailing Address: 600 Capitol Way N · Olympia, WA 98501-1091 · (360)902-2200 · TDD (360)902-2207
Main Office Location: Natural Resources Building · 1111 Washington Street SE · Olympia, WA

January 14, 2002

To whom it may concern:

The "Status of Yellowtail Rockfish Resource in 2000", report to the Pacific Fishery Management Council, published in the "Appendix to the Status of the Pacific Coast Groundfish Fishery through 2000 and Recommended Acceptable Biological Catches for 2001 Stock Assessment and Fishery Evaluation" contained an error in Section 1.6: Management performance, page 6. The error is in the last paragraph of this section and relates to the characterization of the Council's historic compliance with ABCs and HGs. Catch data from the Canadian portion of the S. Vancouver stock area were inadvertently included in the coast-wide WOC catch when contrasting ABC and HG with realized catch. This was a mistake. The revised record of management performance demonstrates a less severe departure from the planned harvest levels than previously indicated, with substantial compliance in recent years. Figure 3, page 83 of our report is amended accordingly. The authors apologize for this error.

Sincerely,

A handwritten signature in cursive script, appearing to read "Jack V. Tagart".

Jack V. Tagart, Ph.D.
Research Scientist.

Attachments: 1

1.6 Management performance

Stock assessments provide managers with an estimate of the acceptable biological catch (ABC). This represents the assessment author's evaluation of the sustainable productivity of the stock. The ABC is sometimes presented as a range reflecting uncertainty in the estimated abundance. Typically, the PFMCI has selected an "official" ABC within the range of the assessment's upper and lower ABC estimate. In addition, from 1983 to 1998, the Council also designated a harvest guideline. The harvest guideline was a catch target level or "soft" quota. As landings neared the HG, more stringent management regulations were imposed, but landings in excess of the HG did not necessarily prompt closure of the fishery. Since 1998, the HG has been replaced with an optimum yield (OY) designation. The OY is treated much the same as the HG, except that OY can be no greater than the Council's designated ABC. The ABC is now treated as a hard quota, as landings approach the ABC managers are required to close fisheries expected to contribute to further catch.

Between 1985 and 1990, for assessed stocks north of Cape Mendocino, the Council set the yellowtail rockfish HGs equal to ABC and near the mid-point values for high and low ABC estimates reported in the most current assessment (Table 2). From 1991 to 1993, the Council set their ABC 10% higher than the assessment's lower ABC estimate (Tagart, 1991), and their HG was set at the lower estimate of ABC. Through 1993, HGs were set without regard to discarded catch.

Beginning in 1994, the in-season yellowtail rockfish catch monitoring included an estimated 16% discard rate. The 1994-1996 ABC was again set at the mid-point of the assessment estimated high and low ABC (Tagart, 1993). The 1994 HG was set equal to the Council ABC. In 1996, the HG was set below the estimated ABC after discounting for anticipated discards.

In 1997, the Council's official yellowtail rockfish ABC was based on a range derived from the 1996 assessment ABC estimates (Tagart and Wallace, 1996). Because this assessment was controversial, and pending an updated assessment the following year, the Council adjusted the HG toward the level recommended in the assessment but significantly above the assessment's ABC. The upper end of the 1997 HG was set approximately 50% higher than the assessment estimated high ABC. The stock assessment was updated in 1997. Based on 1997 assessment estimates, the Council set the 1998-2000 ABC equal to the high range estimate of ABC and they set HG/OY 10% below the ABC.

Over the last 17 years (1983-1999), yellowtail rockfish trip limits have been ineffective at constraining catch within the HG set for the US fishery. From 1983-1989, total catch (including estimated discard) averaged 66% greater than the HG, and ranged from 17% to 197% over the HG. During this time period estimated total catch averaged 66% greater than the HG. Compliance with the HG improved in more recent years. Between 1990 and 1994, the HG was exceeded 3 times, with catch averaging 19% above the recommended guideline. In the last 5 years (1995-1999) the HG was exceeded only once. Results are similar when contrasting catch to Council recommended ABC's (Figure 3).

Unmonitored discards represent an ongoing problem for catch accounting and evaluation of management performance; fishery compliance with harvest guidelines could vary substantially from our estimates dependent on actual discarded catch.

Table 2. Comparison of assessment estimated and PFMC selected ABC and HGs for yellowtail rockfish stocks in the U.S. portions of the Eureka to Vancouver areas only. [VUS is the U.S. portion of the Vancouver area, Cape Elizabeth to the US/Canada provisional boundary; EUR/COL is the combined Eureka and Columbia areas, Cape Mendocino to Cape Elizabeth].

YEAR	STOCK ASSESSMENT ABCs ¹						PFMC VALUES ¹					
	EUR/COL		VUS		TOTAL		ABC's ²			HG'S		
	LOW	HIGH	LOW	HIGH	LOW	HIGH	EUR/COL	VUS	TOTAL	LOW	HIGH	STAND. ³
1983	2,900	4,900	1,200	1,600	4,100	6,500	1,800	1,400	3,200	1,400	3,200	3,200
1984	2,900	4,900	1,200	1,600	4,100	6,500	1,800	1,400	3,200	1,400	3,200	3,200
1985	785	2,897	277	856	1,062	3,753	2,400	600	3,000	600	3,000	3,000
1986	2,227	3,154	854	1,812	3,081	4,966	2,900	1,100	4,000	1,100	4,000	4,000
1987	2,227	3,154	854	1,812	3,081	4,966	2,900	1,100	4,000	1,100	4,000	4,000
1988	2,227	3,154	854	1,812	3,081	4,966	2,900	1,100	4,000	1,100	4,000	4,000
1989	1,990	4,031	1,196	3,028	3,186	7,059	3,200	1,100	4,300	1,100	4,300	4,300
1990	1,990	4,031	1,196	3,028	3,186	7,059	3,200	1,100	4,300	1,100	4,300	4,300
1991	3,433	5,853	1,226	1,801	4,659	7,654	3,400	1,200	4,600	4,300	4,300	4,300
1992	3,433	5,853	1,226	1,801	4,659	7,654	3,400	1,200	4,600	4,300	4,300	4,300
1993	3,433	5,853	1,226	1,801	4,659	7,654	3,400	1,300	4,700	4,400	4,400	4,400
1994	5,466	6,049	131	2,239	5,597	8,288	5,550	1,190	6,740	6,740	6,740	6,740
1995	5,466	6,049	131	2,239	5,597	8,288	5,550	1,191	6,741	6,740	6,740	6,740
1996	5,466	6,049	131	2,239	5,597	8,288	5,550	1,192	6,742	6,170	6,170	6,740
1997	536	1,423	337	529	873	1,952	1,319	454	1,773	825	2,924	2,924
1998	839	1,582	380	1,957	1,218	3,539	1,770	1,770	3,539	2,619	2,911	3,539
1999	937	1,615	449	1,919	1,386	3,534	1,770	1,770	3,539	2,407	2,407	3,539
2000	1,072	1,680	540	1,864	1,613	3,544	1,770	1,770	3,539	2,980	2,980	3,539

1 ABC and HG reference the U.S. portion of the area specific stock estimates only.

2 For 1998 and beyond, this is the Council's upper range ABC, distributed to stock based on assessment estimates of area specific yield.

3 STAND., represents a standardize HG inclusive of estimated discard.

YELLOWTAIL ROCKFISH: EUREKA TO U.S. VANCOUVER

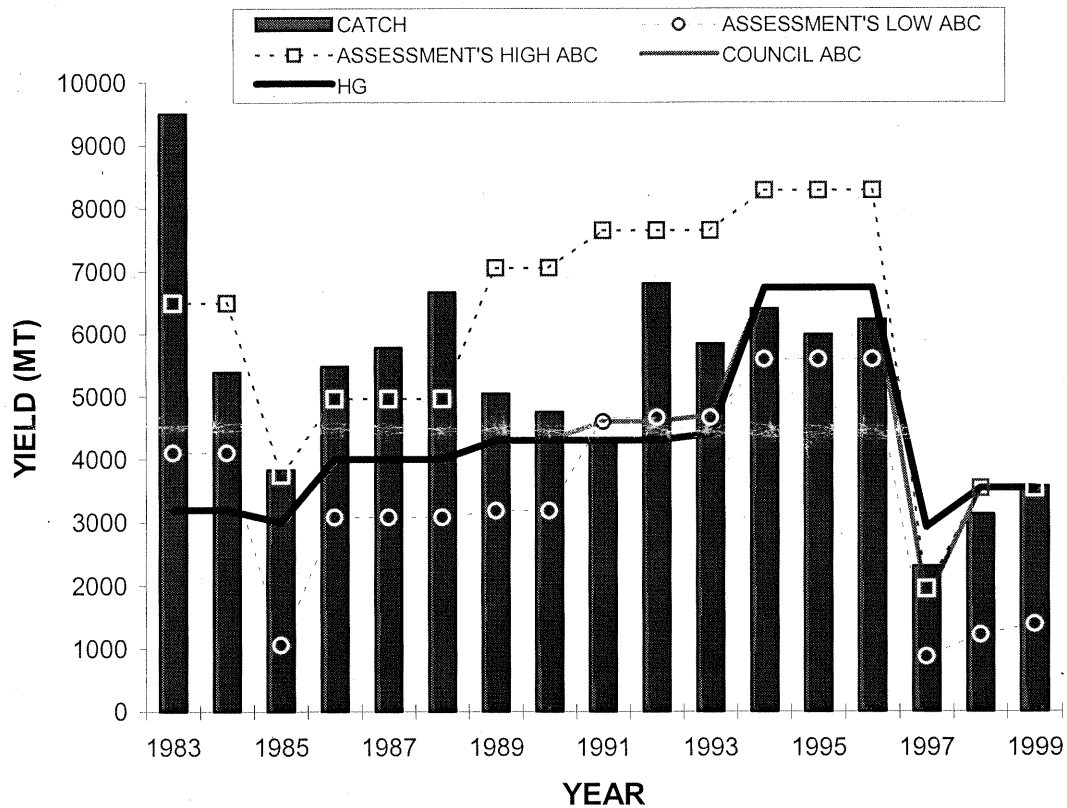


Figure 3. Comparison of stock assessment estimated and PFMC selected yellowtail rockfish ABCs and HGs for the U.S. portion of the Eureka to Vancouver stock assessment areas. [Low and High ABCs are from the stock assessment estimates, Council ABC is the "official" or designated ABC for the stock, in 1998 and 1999 the displayed HG is actually the Council's OY]

REBUILDING ANALYSES FOR OVERFISHED STOCKS

- ★ Bocaccio Rebuilding Analysis
- ★ Canary Rockfish Rebuilding Analysis
- ★ Cowcod Rebuilding Analysis
- ★ Darkblotched Rockfish Rebuilding Analysis
- ★ Lingcod Rebuilding Analysis
- ★ Pacific Ocean Perch Rebuilding Analysis
- ★ Widow Rockfish Rebuilding Analysis

Bocaccio Rebuilding

Alec D. MacCall 9/8/99
NMFS Santa Cruz/Tiburon Laboratory
3150 Paradise Dr.
Tiburon, CA 94920
email: alecm@tib.nmfs.gov

Introduction

In 1998, the PFMC adopted Amendment 11 of the Groundfish Management Plan, which established a minimum stock size threshold of 25% of unfished biomass. Based on existing abundance estimates (Ralston et al. 1996), bocaccio was declared formally to be overfished, thereby requiring development of a rebuilding plan for consideration by the Council in the fall of 1999. This timing was complicated by the stock assessment schedule, which called for a new bocaccio stock assessment to be prepared in the summer of 1999.

Development of alternative management options for bocaccio rebuilding began before the new assessment was available, and required interim use of the results of the 1996 stock assessment. MacCall (1999) developed a simple production model to project bocaccio rebuilding trajectories. Assuming the 1999 stock to be at 50% of the 1996 abundance, that preliminary model indicated that the total catch (plus discards) would have to be reduced to about 100 tons.

The new stock assessment (MacCall et al. 1999) established that the stock off California is genetically distinct from bocaccio found to the north, and that the groundfish management line at Cape Mendocino can be considered as the northern boundary of the stock for management purposes. The new assessment found that under continuing recruitment failure, the index of bocaccio spawning output had fallen from Ralston et al's estimate of 568 units in 1996 to 259 units in 1999. Estimated total biomass fell from 3,857 mt in 1996 to 1,271 mt in 1999. A portion of this change was due to a change in estimation methodology. The decline shown by the 1999 assessment was more severe than the 50% decline assumed in MacCall's (1999) preliminary rebuilding analysis.

Management Reference Points

Bmsy: The rebuilding target is the spawning abundance level that produces MSY. This cannot be determined directly, but experience in other fisheries has shown that Bmsy is often near 40% of the initial unfished spawning abundance (Binit). This is the rebuilding target endorsed by the SSC's Rebuilding Workshop (Conser 1999). Binit can be estimated by simulating an unfished resource with recruitment levels sampled from an appropriate historical time period. The STAR Panel proposed that the entire history of recruitment be used, but the Rebuilding Workshop favored using

an early period when biomasses were large (in this case, the 1970 to 1979 year classes. The two approaches generate simulated distributions of initial abundance that can be compared with the 1969 abundance estimated in the stock assessment (Figure 1). A biomass as large as that in 1969 would be unlikely given the frequency distribution based on samples taken from the entire series of recruitments, but would be commonplace based on use of recruitments sampled from the early period. Estimated unfished abundance is a linear function of recruitments, so the mean recruitment from 1970 to 1979 (9.7896 million fish) can be expanded by the SPR ratio at $F=0$ (1.286 units of spawning output per recruit) to give estimated $B_{init} = 12587$ units of spawning output. The corresponding estimate of B_{msy} is 40% of this amount, or 5035 units of spawning output. For comparison, the estimated 1999 spawning output of 259 is 5.1% of the rebuilding target, and is only 2.1% of B_{init} .

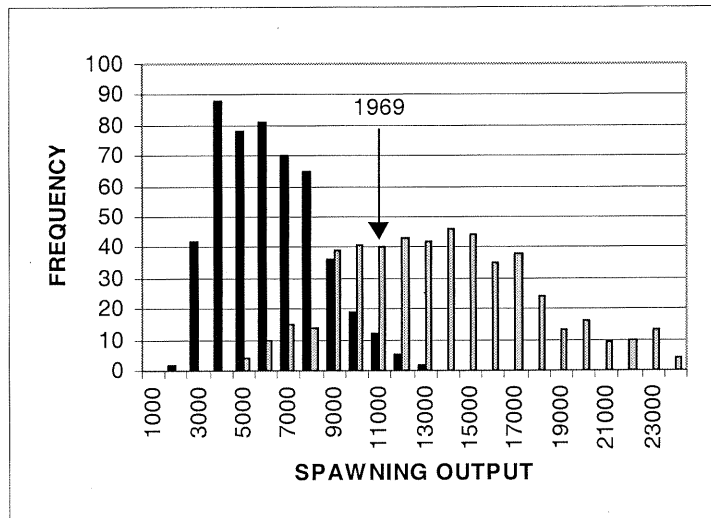


Figure 1. Simulated distribution of unfished abundances based on resampling recruitments. Dark bars utilize entire series; light bars utilize 1970 to 1979 values. Spawning output in 1969 is shown for comparison.

Mean generation time: If the stock cannot be rebuilt in ten years, then the maximum time allowed for rebuilding is the length of time required to rebuild at $F=0$ plus one generation time. Mean generation time can be estimated from the net maternity function (product of survivorship and fecundity at age, Figure 2), and for bocaccio is estimated to be 12.06 years, which is rounded to an integer value of 12 years.

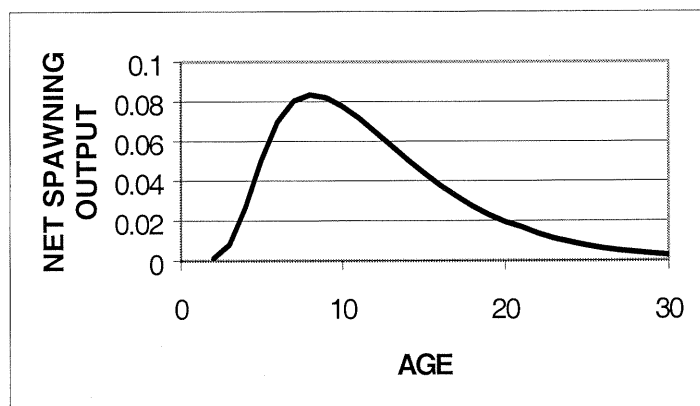
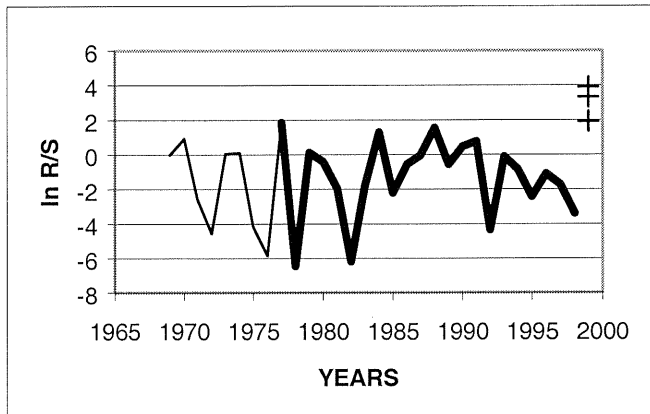


Figure 2. Net maternity function for bocaccio, normalized to unit area.

Simulation Model

The simulation model tracks abundances at age, with an accumulator at age 21+. Values of weights at age, selectivity and fecundity are taken from Appendix 1 of MacCall et al. (1999). Population simulations begin with the 1999 age composition, and the age 1 recruitment strength in year 2000 is set according to one of three scenarios described below (see "Initial Conditions"). Subsequent recruitments are generated by a random draw of one of the historical values of R/S , which is multiplied by current spawning output (S) to obtain the following year's recruitment. For each recreated sequence of R/S values, three sets of simulations are run corresponding to the three recruitment scenarios. In each case, the time (number of years) to reach the rebuilding target at $F=0$

(T_{min}) is first determined. Then the value of fishing mortality rate is determined that allows the stock to achieve the rebuilding abundance in the maximum allowable length of time ($T_{max}=T_{min}+12$). The model simulated a maximum of 300 years. One hundred of these simulations (i.e., with one hundred different sequences of reproductive successes) were run in order to obtain percentage probabilities of successful rebuilding within the required time frame.



Initial conditions: Initial age structure used in the simulations is taken from the most recent stock assessment (MacCall et al. 1999). However, that assessment does not include an estimate of the strength of the 1999 year class, which appears to be larger than any seen in recent years according to anecdotal reports. The strong 1999 year class is likely to be a demographically important component of the population, and should not be ignored in rebuilding projections.

Three possible strengths of the 1999 year class are considered (Figure 3): It could be equivalent to the 1991 year class (“low”), the 1988 year class (“medium”), or the 1984 year class (“high”). Even the “low” value of the 1999 year class would require that

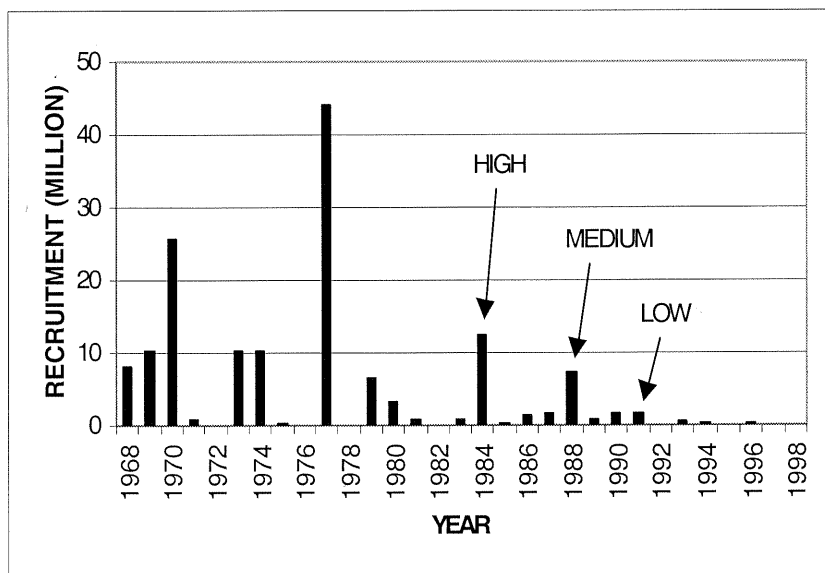


Figure 3. History of bocaccio year class strengths, showing reference for three alternative values assumed for 1999.

reproductive success, in recruits per spawning output, was equal to that in 1988, the highest ever observed. The alternative reproductive successes associated with the “medium” and “high” values would be far higher than any value observed previously (Figure 4).

The rebuilding projection is driven by resampling of historical values of reproductive success (Figure 4) without adjustment for population size effects (the slope of the relationship between log spawning success and spawning output is not significantly different from 0). Values of R/S for years prior to 1977 (the first year of length composition information) are presumably imprecise, and were not used. Each of the three alternative 1999 recruitment models includes the corresponding 1999 value of R/S in the values to be resampled. The medium and high recruitment cases generate very high 1999 values of R/S , which contributes to a corresponding large increase in model resource productivity for those cases.

1999 year class: Because the three different 1999 recruitment cases result in very different management recommendations, some attempt to quantify the 1999 year class strength is desirable. Fish impingement data from electric power generating stations in southern California (K. Herbinson, Southern California Edison, pers. comm) provide information that helps resolve this problem. Two power plants at San Onofre provide records from 1984 to March, 1999. A plot of the number of days on which impinged bocaccio were observed shows a general relationship to the historical recruitment strengths from the stock assessment. The 1991, 1988 and 1984 counts are generally higher than the counts from years known to have weaker recruitment. The 1999 data cover only the first three months of the year, but the number of positive station-days already exceeds previously observed values. A strict quantitative interpretation is probably not warranted. The relationship between the 1984 and 1988 points is counter to the corresponding estimated year class strengths, and argues that the relationship is not precise. However, a reasonable qualitative conclusion would be that the 1999 year class is probably at the strong end of the three alternative scenarios in the rebuilding plan.

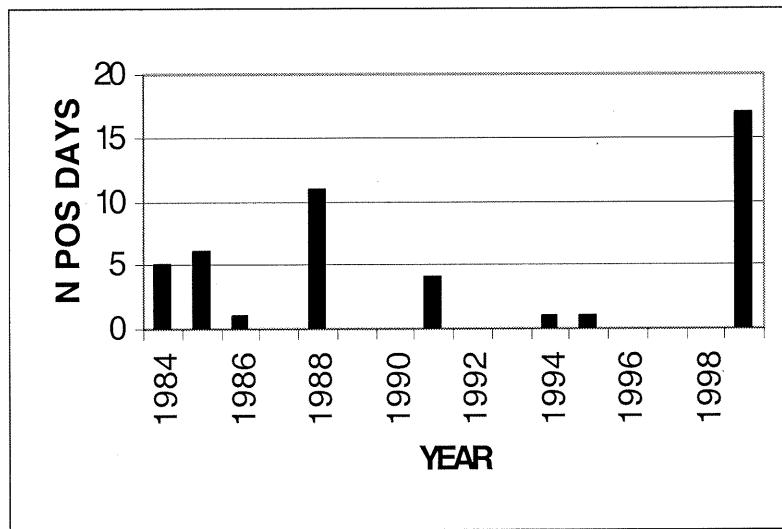


Figure 5. Number of days in which impinged bocaccio were observed at two San Onofre electric power generating stations through March, 1999 (data supplied by K. Herbinson, Southern California Edison).

Projections

Table 1 presents the probabilities of rebuilding under alternative fishing rates. Catch levels given in the table are associated with the respective fishing rate and assumed strength of the 1999 year class. The medium and high 1999 recruitment scenarios anticipate an additional recreational catch of 1999 year class bocaccio in year 2000. One-year-old fish are not normally available to commercial fisheries, so an alternative calculation of catch of age 2+ fish is presented as the amount that can be allocated among fishery segments in year 2000. Rebuilding policies are based on a constant harvest rate, given the selectivity curve, and are most easily summarized by the catches in 2000, 2001 and 2002 (Table 1). Probability of successful rebuilding is related directly to year 2000 catch in Figure 6.

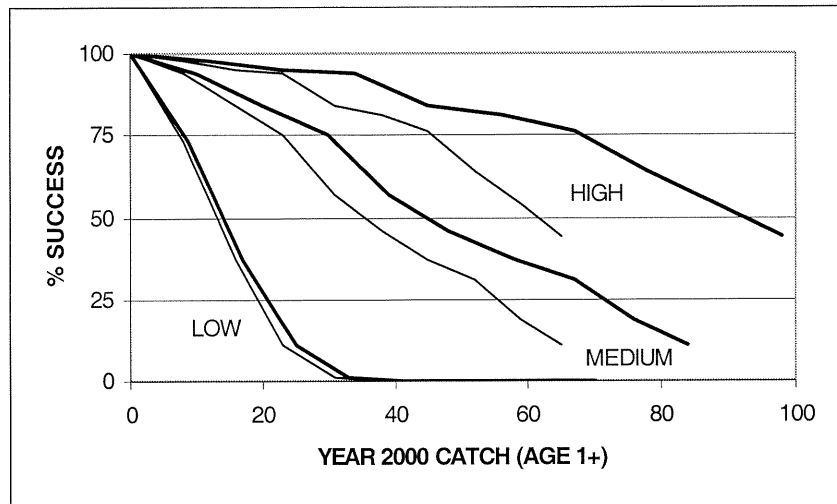


Figure 6. Probability of rebuilding within the require time period as related to total catch in year 2000. Three recruitment scenarios are shown. Heavy line is catch of age 1+; light line is corresponding catch of age 2+; the difference is one-year-old fish that are available only to recreational fisheries.

Acknowledgment: Kevin Herbinson (Southern California Edison) provided useful data on bocaccio impingement at the San Onofre power plants, allowing improved estimates of the strength of the 1999 year class.

References

- Conser, R. 1999 In prep. Report of the PFMC-SSC workshop on rebuilding plans.
- MacCall, A. 1999. A preview of bocaccio rebuilding (4/15/99). .
- MacCall, A., S. Ralston, D. Pearson and E. Williams. 1999. Status of bocaccio off California in 1999, and outlook for the next millennium. Prepared for the PFMC.
- Ralston, S., J. Ianelli, R. Miller, D. Pearson, D. Thomas, and M. Wilkins et al. 1996. Status of bocaccio in the Conception/Monterey/Eureka INPFC areas in 1996 and recommendations for management in 1997. Pacific Fishery Management Council.

Table 1. Probabilities of bocaccio rebuilding, assuming three alternative 1999 year class strengths. Catch is projected for three years; PERCENT SUCCESS is percentage of simulations achieving rebuilding schedule; MEDIAN TIME is median time (years) to reach rebuilding target. Bold entries indicate that more than one half the simulations achieved rebuilding requirements.

LOW 1999 YEAR CLASS						
CATCH: FYEAR	AGE 2+ 2000	AGE 1+ 2000 2001 2002			PERCENT SUCCESS	MEDIAN TIME
0.00	0	0	0	0	100	76
0.01	8	9	9	11	73	87
0.02	16	17	17	21	37	104
0.03	23	25	26	31	11	136
0.04	31	33	34	40	1	162
0.05	38	41	42	50	0	245
0.06	45	48	49	59	0	300
0.07	52	55	57	67	0	300
0.08	59	63	64	76	0	300
0.09	65	70	71	84	0	300

MEDIUM 1999 YEAR CLASS						
CATCH: FYEAR	AGE 2+ 2000	AGE 1+ 2000 2001 2002			PERCENT SUCCESS	MEDIAN TIME
0.00	0	0	0	0	100	26
0.01	8	10	15	25	94	27
0.02	16	20	29	49	84	30
0.03	23	30	43	73	75	33
0.04	31	39	58	96	57	37
0.05	38	48	71	120	46	42
0.06	45	58	85	142	37	49
0.07	52	67	99	164	31	58
0.08	59	76	112	186	19	68
0.09	65	84	125	208	11	90

HIGH 1999 YEAR CLASS						
CATCH: FYEAR	AGE 2+ 2000	AGE 1+ 2000 2001 2002			PERCENT SUCCESS	MEDIAN TIME
0.00	0	0	0	0	100	20
0.01	8	12	20	38	98	20
0.02	16	23	41	76	95	21
0.03	23	34	61	114	94	22
0.04	31	45	81	151	84	22
0.05	38	56	101	188	81	23
0.06	45	67	120	224	76	24
0.07	52	78	140	259	64	27
0.08	59	88	159	294	54	30
0.09	65	98	179	329	44	36

**Canary Rockfish Rebuilding Analysis
Addendum for November 2000 PFMC meeting
(revised December 7, 2000)**

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

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

Features of Selected Assessment and Rebuilding Scenario:

1. Age-specific female natural mortality (scenario #1 from northern area assessment).
2. Expected unfished female spawning biomass is calculated from the average age 1 recruitment level in 1967-1977 (Figure 1).
3. Current female spawning stock size is at 8.7% of the unfished level in scenario #1¹.
4. Rebuilding target is 40% of unfished biomass level.
5. Rebuilding rates are based upon random resampling of recruits per spawner (R/S) observed in 1978-1997 (Figure 2)
6. Rebuilding forecasts were conducted using a range of constant catch levels, rather than constant fishing mortality level. This allows a higher catch in the early years, but no increased catch in later years if the stock rebuilds along the currently forecasted trajectory.

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

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

Results with Low Recruitment

1. Rebuilding with no fishing occurs in 64 years in 50% of the simulations (Table 1, Figure 3).
2. Generation time is 17 years, so allowed rebuilding time frame is $64+17 = 81$ years.
3. Catch in the northern area of 39 mtons per year would allow rebuilding in 81 years in 50% of the simulations (Figure 3 and Figure 4).
4. The range of possible rates of rebuilding is wide (Figure 3) due to the high variability in recruitment.
5. A constant catch of 39 mtons per year represents an exploitation rate of less than 1% per year during the early years of rebuilding. A constant exploitation rate of only 0.37% would also achieve rebuilding in 81 years, but would have short-term catch levels of only 16 mtons then higher catch levels as the stock rebuilds.
6. Over the next five years, abundance is expected to increase even if the catch is as high as the current ABC of approximately 200 mtons, but lower catches are necessary to achieve the rebuilding target.

Results with Medium Recruitment

1. Rebuilding with no fishing occurs in 41 years in 50% of the simulations (Table 1)
2. Generation time is 17 years, so allowed rebuilding time frame is $41+17 = 58$ years
3. Catch in the northern area of 73 mtons per year would allow rebuilding in 57 years in 52% of the simulations. This scenario is selected as the basis for the rebuilding plan.
4. The expected trajectory of female spawning biomass is presented in Figure 5 and Table 3.

Discussion Points:

1. The extremely low rate of rebuilding, and the low level of allowable catch while rebuilding, is due to the low level of R/S (Figure 2) that has been observed for canary rockfish. There are two reasonable explanations for this low recruitment:
 - A. STOCK - If the low level of R/S observed during the 1990s is due to an inherent inability of the canary rockfish stock to produce good recruitment at low spawner levels, then rebuilding is unlikely to be faster than calculated here, and future fishery productivity of canary rockfish could be lower than for other rockfish species.
 - B. CLIMATE - If the low level of R/S observed during the 1990s is due to long term, climate-related fluctuations in fish productivity, then a change to more productive ocean conditions could restore higher recruitment levels sooner and produce more rapid rebuilding. The timing and magnitude of such a current or future climate shift and its effect on recruitment of canary rockfish cannot be predicted with available information. As more information on climate effects on recruitment is obtained, better forecasts of rebuilding times should be possible.
2. A coastwide annual catch of 93 mtons is based upon the calculated 73 mtons for the northern area and an expansion to the southern area. Because of uncertainty in the north-south boundary in the assessment, there is not sufficient evidence to require a strict north-south allocation of the 93 mton coastwide catch. An updated stock assessment that carefully examines the north-south characteristics of the stock should be conducted after results of the summer 2001 survey are available.
3. Future rebuilding analyses will present the progress towards rebuilding and will update information on expected future rates of rebuilding. These analyses will incorporate updated stock assessments and should have more information on effects of climate on recruitment, so it is highly likely that some adjustment to the rebuilding plan will be necessary.

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

Scenario #1						
Years for Resampling	% Rebuilt	Years to Rebuild			Annual Catch	Allow -able Years
		Min	Max	Median		
78-95	-	55	249	119	0	136
78-95	53%	63	275	132	13	
78-86	-	47	165	74	0	
87-95	-	114	999	369	0	
78-96	-	38	176	74	0	
78-97	-	37	129	64	0	81
78-97	50%	43	167	80	39	
78-95, HR	-	39	231	82	0	
87-97, HR	-	13	57	24	0	41
87-97, HR	67%	17	97	35	150	
78-97 HR	--	14	105	31	0	48
78-97 HR	51%	18	136	47	125	
78-97, MR	-	21	101	41	0	58
78-97, MR	52%	0.52	22	155	57	73

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

Scenario #2						
Years for Resampling	% Rebuilt	Years to Rebuild			Annual Catch	Allow -able Years
		Min	Max	Median		
78-95	-	58	797	192	0	218
78-95	34%	66	999	273	15	
78-86	-	35	180	75	0	
87-95	-	999	999	999	0	
78-96	-	37	312	98	0	
78-97	-	33	228	84	0	110
78-97	51%	51	338	108	25	
78-95, HR	-	23	675	85	0	
87-97, HR	-	10	66	20	0	46
87-97, HR	68%	12	183	36	150	
87-97, HR	51%	14	999	45	185	
78-97, HR	-	11	77	24	0	50
78-97, HR	59%	14	262	45	100	
78-97, HR	52%	14	313	48	125	

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

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

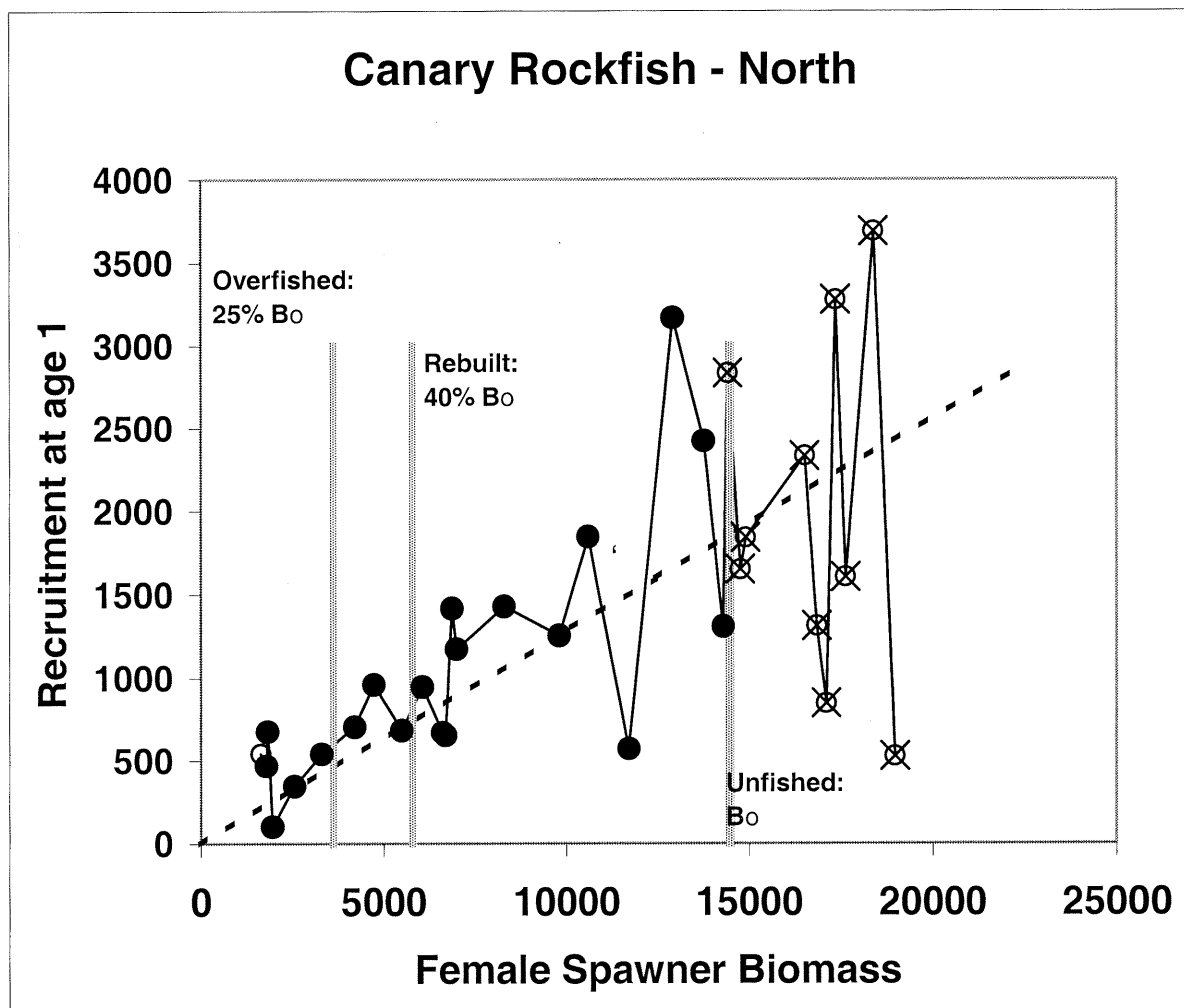


Figure 1. Time series of recruitment versus spawning biomass for canary rockfish in the northern area according to scenario #1 and with recruitments in 1996-1998 (leftmost points on figure) reduced to 50% of value in stock assessment according to recommendations of STAR panel. The recruitment points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



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

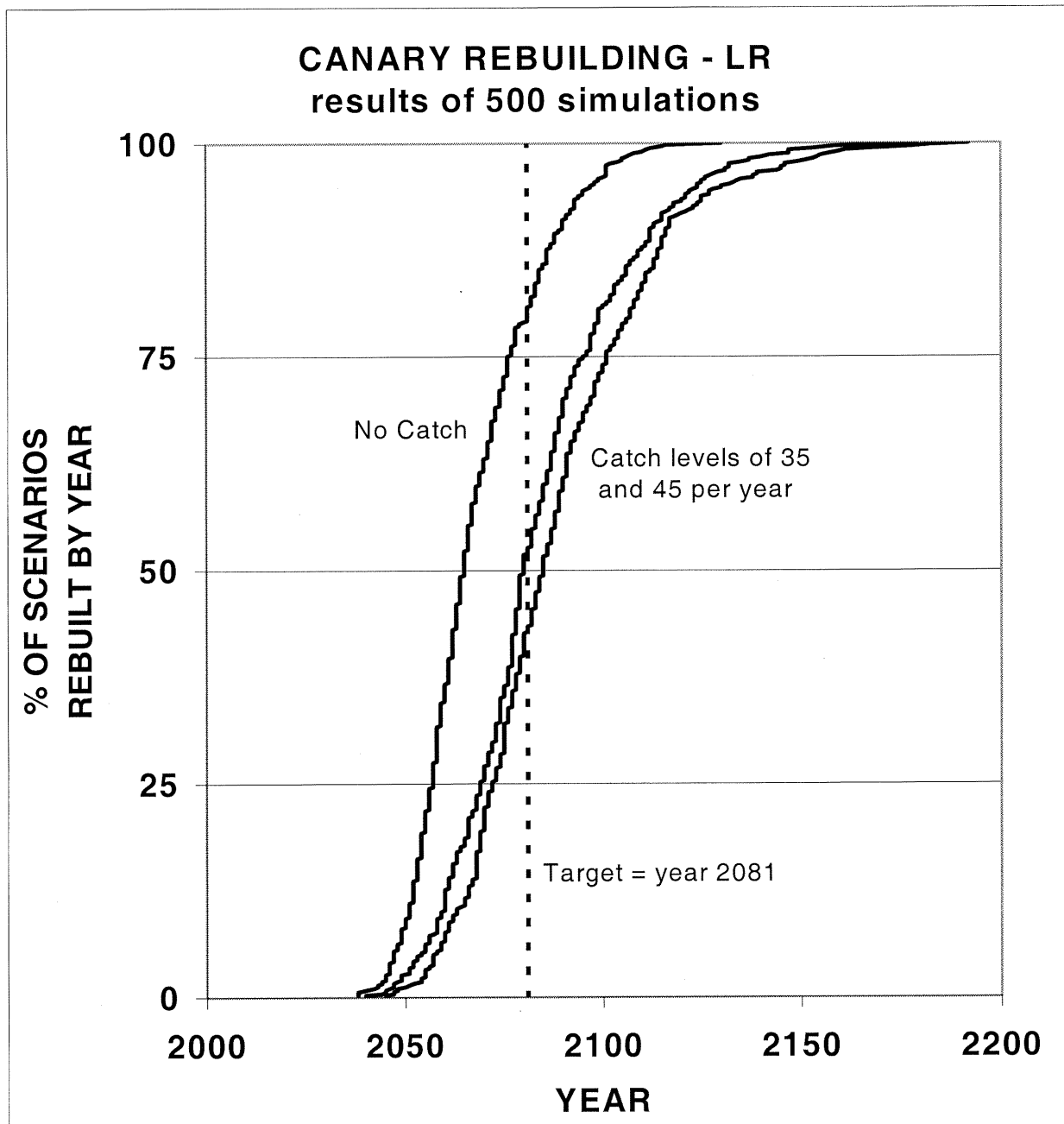


Figure 3. Percentage of 500 simulations that achieve the rebuilt biomass level in the indicated year according to the LR scenario. The “no catch” line shows that 50% of the simulations achieve the rebuilt level in 64 years. At a catch of 39 mtons per year (intermediate between displayed levels of 35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

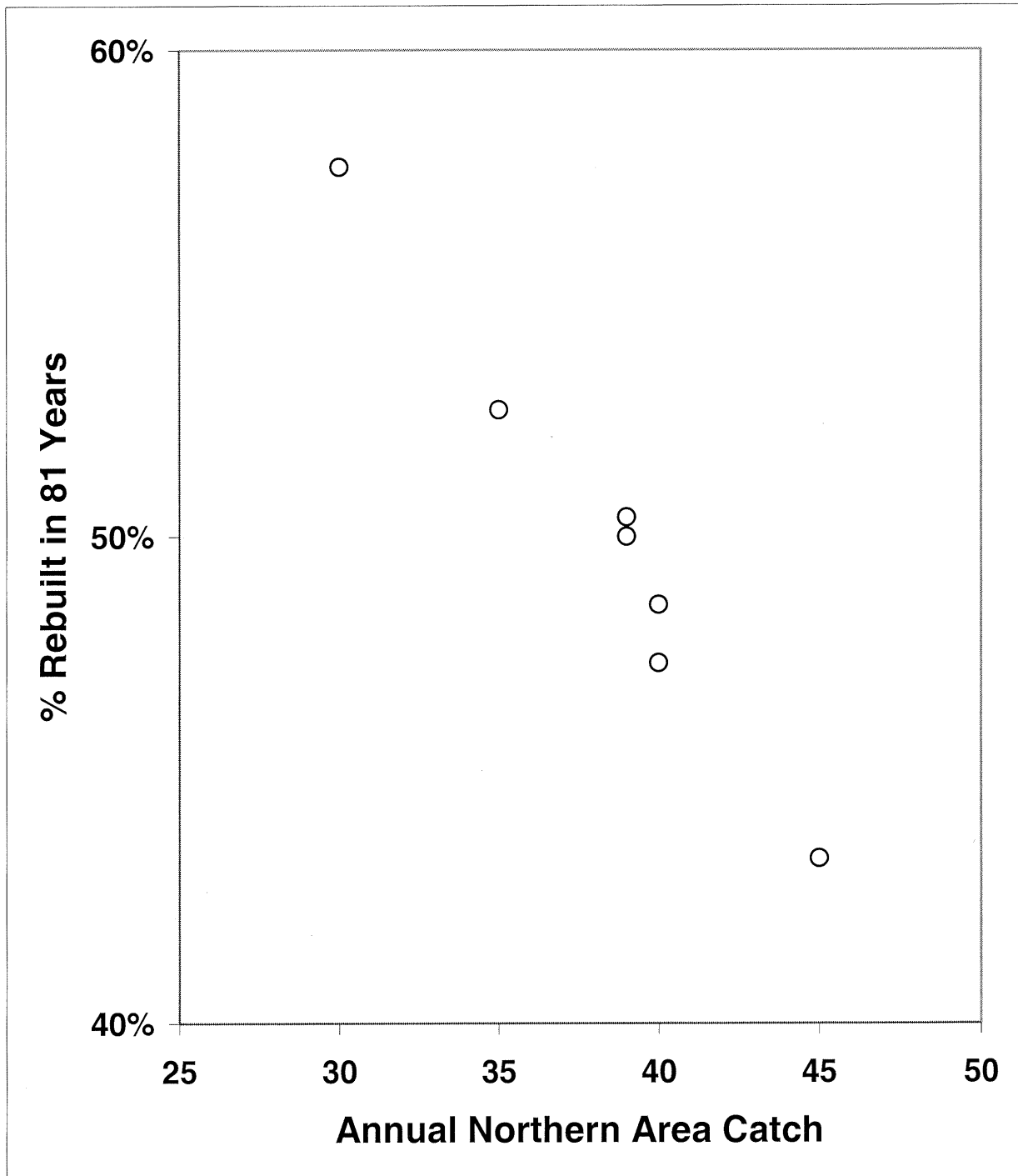


Figure 4. Relationship between annual catch level in the northern area (scenario #1, LR) and the probability of being rebuilt in 81 years. The multiple points shown at catch levels of 39 and 40 mtons demonstrate the level of variability in this calculation due to the use of only 500 simulations.

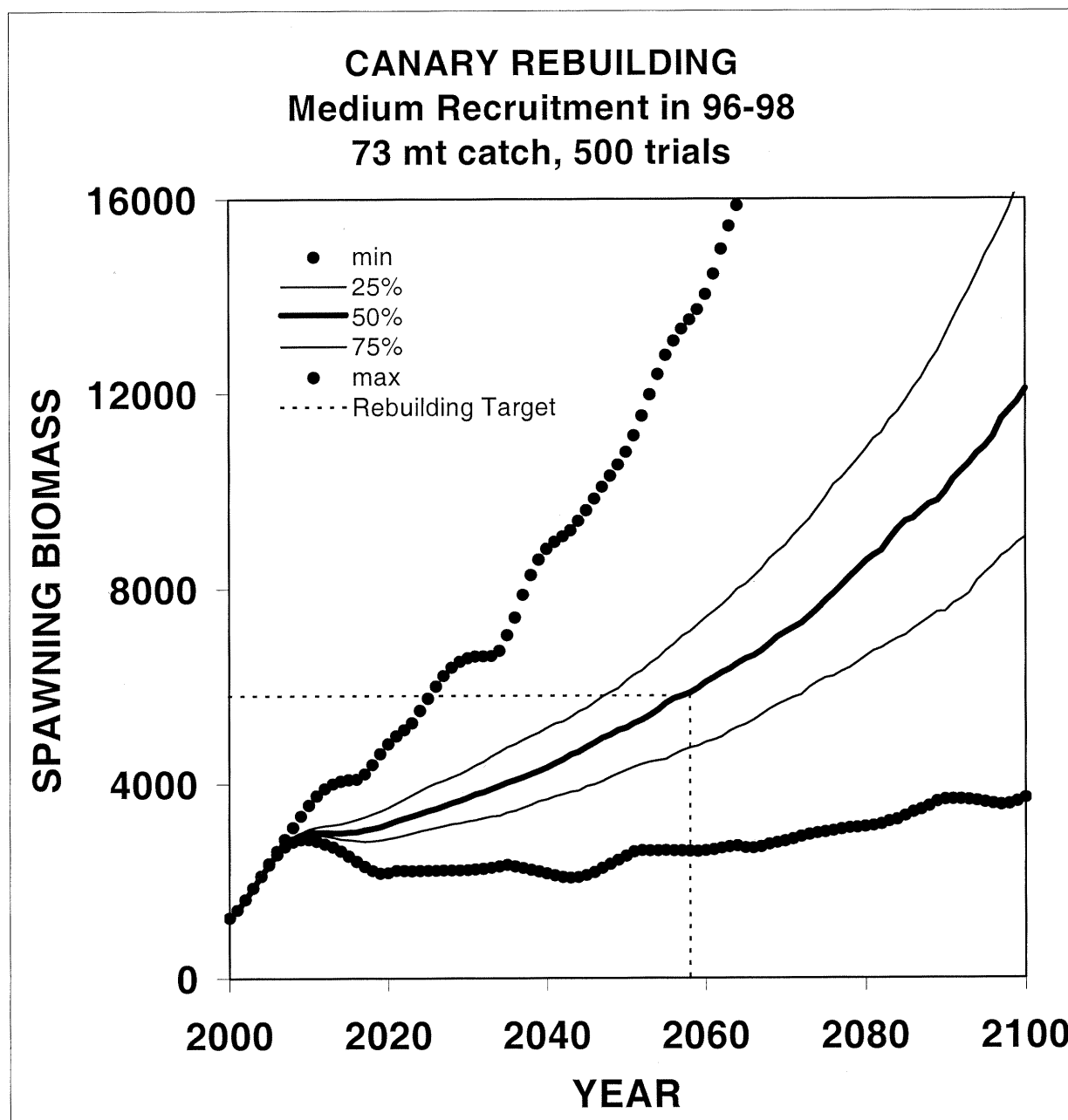


Figure 5. Trajectory of spawning biomass expected in the MR scenario with an annual catch of 73 mtons and recruitment levels selected by randomly resampling recruits per spawner from 1978-1997. The initial steeper recovery is due to the sequence of stronger recruitment during 1996-1998. The maximum (MAX)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

Cowcod Rebuilding

John Butler and Tom Barnes

Introduction

The cowcod (*Sebastes levis*) resource is currently considered to be one continuous population that extends from Washington south into Mexico. Fishable biomass is similar to spawning biomass because cowcod are recruited to the fishery near the size of first maturity. While cowcod spawning biomass will always be somewhat less than fishable biomass, for the purposes of the rebuilding analysis they are assumed to be approximately equal. The International North Pacific Fisheries Commission (INPFC) Conception Area portion of the stock was assessed by U. S. scientists in 1999 at which time the spawning biomass was determined to have fallen below 10% of its unfished size (Figure 1). The Pacific Fishery Management Council (PFMC) responded by imposing significant reductions in quotas.

Management Reference Points

B_{msy}: The rebuilding target is the spawning biomass level that produces MSY. Experience from other fisheries has shown the B_{msy} is often near 40% of initial biomass, which is also the biomass target for rebuilding the stock. Butler et al. (1999) estimated initial biomass at 3370 MT with 2840 MT and 3990 MT as lower and upper 95% confidence intervals. The rebuilding target for the Conception Area is then 1350 MT biomass with 1140 and 1600 MT as lower and upper 95% confidence intervals respectively.

Mean Generation Time

If the stock cannot be rebuilt within 10 years, then the maximum time allowed for rebuilding is the length of time required to rebuild at $F=0$ plus one mean generation time. Mean generation time (Pielou 1977) can be estimated from the net maternity function (product of survivorship and fecundity at age; Figure 2 and Table 2). Parameters used to estimate mean generation time are taken from Butler et al. (1999). Because larger and older cowcod females have high reproductive values, mean generation time is sensitive to maximum age. The oldest cowcod in a sample of 264 fish was 55 y (Butler et al. 1999), but it may not represent maximum age of this species. It is likely that older fish could be found if a larger sample size were available, or if samples were available from the unexploited population. A plausible range of maximum age of cowcod is from 60-100 years which results in mean generation times of 35-40 years. Since data were not available to narrow this range, we used 75 y as the maximum age for cowcod and estimated mean generation time at 37 y. This long generation time is due in part to the fact that cowcod continue to grow after maturity, and thus older and larger female cowcod have very high reproductive value.

Simulation Model

We modeled cowcod rebuilding using a surplus production model because of the density dependent population growth inherent in the logistic equation (Appendix I). We also tried the delay difference model used in the cowcod stock assessment (Butler et al. 1999), but that model yielded longer rebuilding times (Average time = 145 y). Population simulations began with the 1998 cowcod biomass. Surplus production was modeled using a log-normal distribution fitted to recruitment during 1951-1998 (Butler et al. 1999). Population trajectories with a fixed mean r indicated that minimum time to B_{msy} with no fishing was 61 y.

The time series of recruitment from the stock assessment model is highly correlated with a lag of one year (Figure 3). In order to test whether the auto correlation affected rebuilding time, we incorporated an auto correlation of 0.8 into recruitment to the population. This changed the pattern of biomass trajectories but had no effect on the median time to rebuilding or the probability of success when averaged over 500 replicates.

The maximum time to rebuild to B_{MSY} allowed by the Magnuson-Stevens Fishery Conservation and Management Act is the minimum time (61 y) plus one mean generation time (37 y) or a total of 98 y. Population trajectories with randomly sampled log-normal production were repeated 250 times with different constant values of F to find a fishing rate that provided some catch but resulted in a 60% probability of achieving B_{MSY} within the maximum allowed time.

Initial Conditions

The cowcod stock assessment (Butler et al. 1999) found uncertainty in the 1998 biomass. Upper and lower 95% confidence intervals indicated that the 1998 cowcod biomass could be at 4-11% (126-451 MT) of unfished stock size. In order to capture the uncertainty in current cowcod stock size, population trajectories were initialized at 126, 238 and 451 MT. Mean time to B_{MSY} with no fishing varies, which under different initial conditions, are 42, 62 and 80 y respectively.

Projections

The probability of rebuilding success under alternative fishing rates and three initial conditions are presented in Table 1. If the 1998 population is as low as 4% of the virgin biomass, almost no realistic quota achieves rebuilding. If the 1998 biomass is 7% of virgin biomass, which is the basecase scenario from the assessment, then a quota of 2.4 MT will achieve rebuilding in about 95 y. If the 1998 biomass is 11% of the virgin biomass, then a quota of 4.5 MT will achieve rebuilding in 67 y.

Discussion

The combination of an unproductive stock and extremely low current biomass level compounds the difficulties to rebuild cowcod. Rebuilding yields are very low compared to the large amount of fishing effort that is present in California waters. This provides the opportunity for target yields to be inadvertently exceeded due to inherent imprecision in catch statistics, and unrecorded fishing mortality from discarded bycatch. Calculations show that the long-term consequence of small over harvest could be significant. Unaccounted removals as small as 1-2 tons per year may sufficiently jeopardize the rebuilding plan. Although it will be necessary to closely monitor annual commercial and recreational landings, additional information will be necessary to provide assurance that rebuilding targets are not exceeded. Reliable estimates of discards are a critical element to rebuilding efforts, since discarded cowcod do not survive. Identification of geographic areas where cowcod density is comparatively high may also be of interest to managers seeking ways to assure that cowcod catches do not exceed rebuilding targets.

Future reassessments will demonstrate whether management measures have accomplished intended objectives. However, it is likely that many years will need to pass before it is possible to detect statistically significant change in abundance for an unproductive species such as cowcod.

Rebuilding yields have been calculated for that portion of the stock that is found in the Conception Management Area. The stock ranges much further to the north, and a significant fishery has also occurred in the Monterey Management Area. The Monterey Area was not included in rebuilding calculations because that portion of the stock is data poor, and consequently was outside the area of the stock assessment. However, significant catches have occurred in the Monterey Area over many years, and it is likely that the stock is also overfished in that portion of the range. One possible approach for estimating rebuilding yields for the Monterey Area is to take proportional catch reductions to that which are necessary in the Conception Area.

Literature cited

Butler, J. L., L. D. Jacobson, J. T. Barnes, H. G. Moser, and R. Collins. 1999. Stock assessment of cowcod. In: Pacific Fishery Management Council. 1999. Appendix: Status of the Pacific Coast Groundfish Fishery through 1998 and recommended biological catches for 1999: Stock assessment and fishery evaluation. Pacific Fishery Management Council, 2130 SW Fifth Avenue, Suite 224, Portland, Oregon, 97201.

Pielou, E. C. 1977. *Mathematical Ecology*. John Wiley and Sons, New York.

List of Figures

Figure 1. Basecase model results for Cowcod spawning biomass with 95% confidence interval.

Figure 2. Net maturity function of female cowcod.

Figure 3. Cowcod recruitment biomass and spawning biomass during 1951-1998.

Table 1. Probabilities of cowcod rebuilding under a constant harvest rate, assuming three alternative 1998 biomass levels. **Catch** is the mean annual catch during the first three years of the projection period (1999-2000); **Percent Success** is the percentage of simulations that achieve rebuilding schedule; **Median Time** is median time (y) to reach Bmsy (=0.4*3370 MT). Bold values are base case run.

LOW 1998 BIOMASS (4 % OF VIRGIN BIOMASS)

F	CATCH MT	PERCENT SUCCESS	MEDIAN TIME
0	0	100	81
0.00425	0.55	60	94
0.01	1.3	1	121
0.02	2.5	0	277
0.03	3.7	0	>300
0.04	5	0	>300

MEDIUM 1998 BIOMASS (7 % OF VIRGIN BIOMASS)

F	CATCH	PERCENT SUCCESS	MEDIAN TIME
0	0	100	62
0.009	2.1	60	90
0.01	2.4	55	95
0.02	5	0	227
0.03	7	0	>300
0.04	9	0	>300

HIGH 1998 BIOMASS (11 % OF VIRGIN BIOMASS)

F	CATCH	PERCENT SUCCESS	MEDIAN TIME
0	0	100	42
0.01	4.5	99	67
0.014	6.4	60	92
0.02	9	0	186
0.03	13	0	>300
0.04	16	0	>300

Table 2. Weight at age, Maturity, Reproductive output (M_x) and Survivorship (L_x) of Cowcod (*Sebastes levis*)

Age	Weight	Maturity	M_x	L_x
1	-805.36302	0	0	1
2	-590.69241	0	0	0.94648515
3	-377.30596	0	0	0.89583414
4	-165.196	0	0	0.8478937
5	45.6451091	0	0	0.8025188
6	255.22496	0.01	2.5522496	0.75957212
7	463.551097	0.0189	8.76111573	0.71892373
8	670.631019	0.0308	20.6554354	0.68045064
9	876.472182	0.0497	43.5606675	0.64403642
10	1081.082	0.0794	85.8379105	0.60957091
11	1284.46783	0.1246	160.044691	0.57694981
12	1486.637	0.19	282.461029	0.54607443
13	1687.59678	0.2789	470.670742	0.51685133
14	1887.35442	0.3894	734.93581	0.48919211
15	2085.9171	0.5125	1069.03251	0.46301307
16	2283.29197	0.6341	1447.83544	0.43823499
17	2479.48614	0.7408	1836.80333	0.41478291
18	2674.50666	0.8249	2206.20055	0.39258587
19	2868.36057	0.8859	2541.08063	0.37157669
20	3061.05483	0.9276	2839.43446	0.35169182
21	3252.5964	0.9548	3105.57904	0.33287108
22	3442.99215	0.9721	3346.93267	0.31505754
23	3632.24895	0.9829	3570.13749	0.29819728
24	3820.37361	0.9895	3780.25968	0.2822393
25	4007.3729	0.9936	3981.72571	0.2671353
26	4193.25355	0.9961	4176.89986	0.2528396
27	4378.02226	0.9976	4367.515	0.23930892
28	4561.68567	0.9986	4555.29931	0.22650234
29	4744.25041	0.9991	4739.98058	0.2143811
30	4925.72303	0.9995	4923.26017	0.20290853
31	5106.11008	0.9997	5104.57825	0.19204991
32	5285.41805	0.9998	5284.36097	0.18177239
33	5463.65339	1	5463.65339	0.17204486
34	5640.82252	1	5640.82252	0.16283791
35	5816.93182	1	5816.93182	0.15412366
36	5991.98763	1	5991.98763	0.14587576
37	6165.99624	1	6165.99624	0.13806924
38	6338.96393	1	6338.96393	0.13068048
39	6510.89692	1	6510.89692	0.12368714
40	6681.80141	1	6681.80141	0.11706804
41	6851.68353	1	6851.68353	0.11080316
42	7020.54942	1	7020.54942	0.10487354
43	7188.40514	1	7188.40514	0.09926125
44	7355.25674	1	7355.25674	0.0939493
45	7521.11023	1	7521.11023	0.08892162
46	7685.97158	1	7685.97158	0.08416299

47	7849.84673	1	7849.84673	0.07965902
48	8012.74156	1	8012.74156	0.07539608
49	8174.66196	1	8174.66196	0.07136127
50	8335.61374	1	8335.61374	0.06754238
51	8495.6027	1	8495.6027	0.06392786
52	8654.6346	1	8654.6346	0.06050677
53	8812.71517	1	8812.71517	0.05726876
54	8969.85009	1	8969.85009	0.05420403
55	9126.04503	1	9126.04503	0.05130331
56	9281.3056	1	9281.3056	0.04855782
57	9435.6374	1	9435.6374	0.04595926
58	9589.04598	1	9589.04598	0.04349975
59	9741.53686	1	9741.53686	0.04117187
60	9893.11554	1	9893.11554	0.03896856
61	10043.7875	1	10043.7875	0.03688317
62	10193.5581	1	10193.5581	0.03490937
63	10342.4327	1	10342.4327	0.0330412
64	10490.4168	1	10490.4168	0.03127301
65	10637.5157	1	10637.5157	0.02959944
66	10783.7346	1	10783.7346	0.02801543
67	10929.0788	1	10929.0788	0.02651618
68	11073.5536	1	11073.5536	0.02509717
69	11217.1641	1	11217.1641	0.0237541
70	11359.9155	1	11359.9155	0.02248291
71	11501.813	1	11501.813	0.02127974
72	11642.8616	1	11642.8616	0.02014095
73	11783.0665	1	11783.0665	0.01906311
74	11922.4327	1	11922.4327	0.01804295
75	12060.9652	1	12060.9652	0.01707739
76	12198.6689	1	12198.6689	0.01616349
77	12335.549	1	12335.549	0.01529851
78	12471.6102	1	12471.6102	0.01447981
79	12606.8574	1	12606.8574	0.01370493
80	12741.2957	1	12741.2957	0.01297151
81	12874.9297	1	12874.9297	0.01227734
82	13007.7643	1	13007.7643	0.01162032
83	13139.8043	1	13139.8043	0.01099846
84	13271.0544	1	13271.0544	0.01040988
85	13401.5194	1	13401.5194	0.0098528
86	13531.2039	1	13531.2039	0.00932553
87	13660.1127	1	13660.1127	0.00882647
88	13788.2503	1	13788.2503	0.00835412
89	13915.6214	1	13915.6214	0.00790705
90	14042.2305	1	14042.2305	0.00748391
91	14168.0823	1	14168.0823	0.00708341
92	14293.1812	1	14293.1812	0.00670434
93	14417.5318	1	14417.5318	0.00634556
94	14541.1385	1	14541.1385	0.00600598
95	14664.0058	1	14664.0058	0.00568457
96	14786.1381	1	14786.1381	0.00538036

97	14907.5398	1	14907.5398	0.00509243
98	15028.2152	1	15028.2152	0.00481991
99	15148.1688	1	15148.1688	0.00456197
100	15267.4048	1	15267.4048	0.00431784

Appendix I

Annual surplus production during 1951-1998 was computed by:

$$P_y = B_{y+1} - B_y + C_y \quad 1)$$

Where B_y was a biomass estimate from the basecase run of the cowcod assessment model (Butler et al. 1999) at the beginning of the year y , K is the population carrying capacity or “virgin biomass,” C_y was catch data and r is the slope of the production function at the origin. Production was modeled using the logistic model with process errors:

$$P_y = r B_y \left(1 - \frac{B_y}{K} \right) \quad 2)$$

Solving for r_y gives:

$$r_y = \frac{P_y K}{B_y (K - B_y)} \quad 3)$$

The recruitment parameter r_y was calculated for each year from 1951-1998 and modeled using the lognormal distribution. Then forward projections of biomass were obtained from rearranging Eq (1), giving:

$$B_{y+1} = B_y + P_y - C_y \quad 4)$$

Where P_y was obtained from Eq. (2) using a stochastic lognormal r .

Rebuilding Analysis for Darkblotched Rockfish

November, 2001

Richard Methot and Jean Rogers
NOAA Fisheries - NWFSC
Seattle, WA and Newport, OR

The west coast stock of darkblotched rockfish was assessed in 2000 using data through 1999 (Rogers et al. 2000). The assessment used the length-based stock synthesis model (Methot 2000) to analyze fishery size and age composition data and trends in abundance from the shelf and slope trawl surveys. The assessment determined that abundance of darkblotched rockfish had declined below the overfished threshold, 25% of the estimated unfished level of abundance, which triggered initiation of a rebuilding plan to restore this stock to its MSY level of abundance, which is provisionally set at 40% of the unfished level. The rebuilding analysis documented here is intended to provide information for use by the PFMC and NMFS in designing a rebuilding plan for this stock.

A slope trawl survey was conducted in the fall of 2000, after completion of the darkblotched rockfish stock assessment but prior to the rebuilding analyses. The SSC recommended in June 2001 that the darkblotched rebuilding analysis should be based on an assessment update that included that 2000 survey data, and recruitments during the more recent era should be the basis for the rebuilding rate. This document provides the recommended analyses. Rebuilding projections are presented based upon two scenarios for estimating the virgin recruitment level and, for each of these scenarios, two scenarios for estimating future recruitment levels. Here, the term "virgin" represents the average stock condition that would occur in the absence of fishing. Of these four scenarios, the recommended result is based upon virgin recruitment estimated from the entire time series and future recruitment estimated from the more recent portion of the time series. Analyses utilize the methodology developed by Punt (2001).

The 2000 survey biomass estimate was similar to the 1997 slope survey biomass estimate and lower than the 1999 slope survey biomass estimate. Updating the assessment model with the 2000 data results in a downward revision in the estimated recruitment and abundance throughout the time series (Figures 1-3, Table 1). The major change is in the level of recruitment since the mid-1980s (Table 2). In the original assessment model, the mean level of recruitment was similar in the early (1963-1982) and late (1983-1996) eras of the time series. With the updated model, the mean recruitment in 1983-1996 is only 67% of the earlier level. This decline in recruitment results in the estimated level of spawn output projected to the beginning of 2002 to be only 12-14% of the virgin level, depending upon whether the virgin level is taken from the initial conditions of the assessment or from the mean level of recruitment during 1963-1996, respectively.

The rebuilding time frame is determined by assuming fishing mortality for darkblotched rockfish can be stopped as of 2002. If the median time to rebuild the spawn to 40% of the

unfished level is less than 10 years with no fishing then the maximum allowable rebuilding time is ten years. If it is at least 10 years without fishing, then it is the time to rebuild plus one generation time. A generation time is: (age x survival x spawn) summed for all ages/(survival x spawn) summed for all ages.

The updated assessment model has the same basic life history parameters as the original model (Table 3). With these parameters, F50% is 0.0321; generation time is 33 years; and the unfished level of spawn output per recruit is 18.42.

This rebuilding analysis uses recruitments from 1983-1996 for the forecast. The addition of 2000 survey data makes it reasonable to include recruitments through 1996 since these fish are well represented in the survey. The early year began in 1983 to delineate the shift from higher to lower recruitment level. Although the updated assessment provides abundance estimates through 2001, the recruitments for the last few years are not precisely estimated. The 1997-1999 values are based on few data, and the 2000-2001 recruitment values are simply set at an assumed level for the assessment. Therefore, for the rebuilding analysis the calculations start with the estimated numbers at age in 1998, generate recruitments with a random pattern beginning in 1999, and use the observed or extrapolated catch level for 1999, 2000, and 2001.

There are three plausible alternatives for generating estimates of future recruitment from recent (1983-1996) recruitments. One is to simply resample from the estimated recruitments in 1983-1996, second is to resample from the recruits per spawner then multiply by the projected future spawner level, third is to resample deviations from an estimated spawner-recruitment curve. The third option is not yet available because a spawner-recruitment curve has not yet been developed for this stock. Table 2 illustrates that recent recruitment has been lower than historical recruitment, and that recent recruits per spawner have been higher than in the past. Projections here will be based upon resampling directly from recruitments which exhibits no apparent trend over the 1983-1996 time period (Figure 2), whereas the recruits per spawner (Figure 3) shows an upward trend with strong spikes in recent years.

Table 1. Time series for darkblotched rockfish in 2001 updated assessment.

YEAR	SPAWN	RECRUIT	EXPLOIT	CATCH	R/S
VIRGIN	34355	1865	0.000	0	
INIT EQ	28036	1865	0.007	200	0.054
63	28036	4143	0.012	315	0.148
64	27908	10	0.009	246	0.000
65	27858	10	0.018	474	0.000
66	27552	10	0.090	2405	0.000
67	25090	3965	0.151	3659	0.144
68	21287	330	0.095	1982	0.013
69	19389	6646	0.029	560	0.312
70	19053	45	0.030	573	0.002
71	18654	10	0.034	639	0.001
72	18125	2996	0.032	603	0.161
73	17634	240	0.020	374	0.013
74	17467	3514	0.025	469	0.199
75	17329	1035	0.015	285	0.059
76	17489	838	0.025	459	0.048
77	17503	928	0.010	195	0.053
78	17786	1226	0.014	254	0.070
79	17998	2095	0.045	851	0.118
80	17581	3678	0.026	471	0.204
81	17549	3008	0.030	543	0.171
82	17408	1731	0.066	1217	0.099
83	16486	555	0.049	872	0.032
84	15888	499	0.074	1286	0.030
85	14873	728	0.108	1787	0.046
86	13447	913	0.084	1277	0.061
87	12659	1841	0.166	2375	0.137
88	10860	1418	0.138	1692	0.112
89	9681	1480	0.118	1295	0.136
90	8802	375	0.142	1427	0.039
91	7704	755	0.133	1189	0.086
92	6799	1208	0.084	680	0.157
93	6407	1155	0.153	1199	0.170
94	5563	650	0.123	860	0.101
95	5066	3830	0.109	721	0.688
96	4703	1749	0.111	707	0.345
97	4346	370	0.127	797	0.079
98	3910	2677	0.146	890	0.616
99	3417	218	0.055	326	0.056
100	3455	1171	0.038	239	0.343
101	3661	1171	0.020	130	0.339

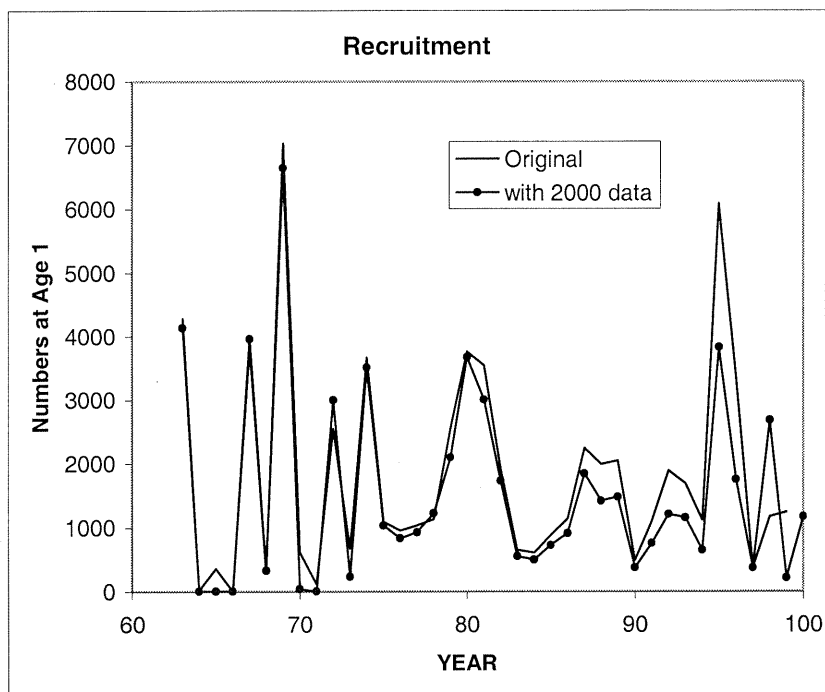


Figure 1. Time series of recruitment in the original (2000) and updated (2001) assessment model for darkblotched rockfish.

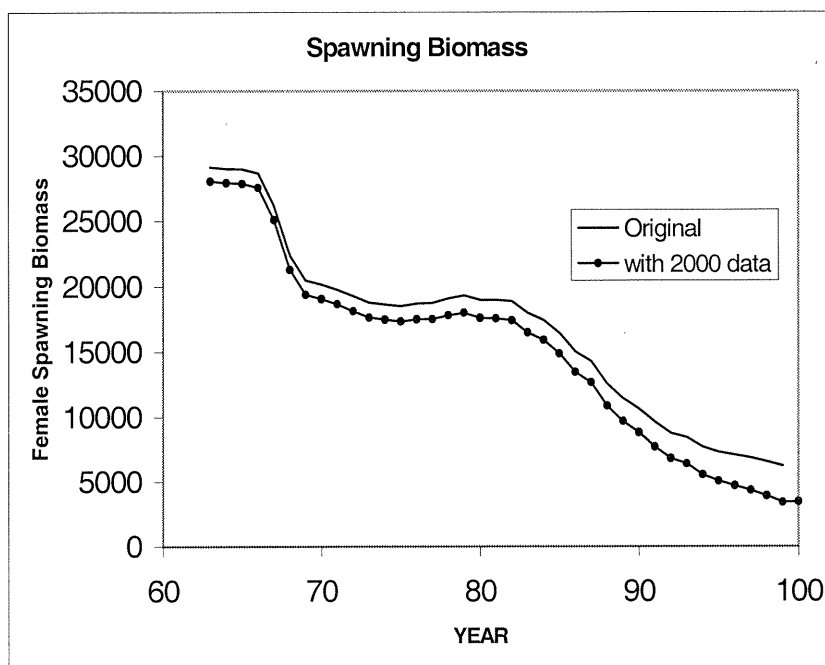


Figure 2. Time series of spawn output and recruitment for original and updated assessment model.

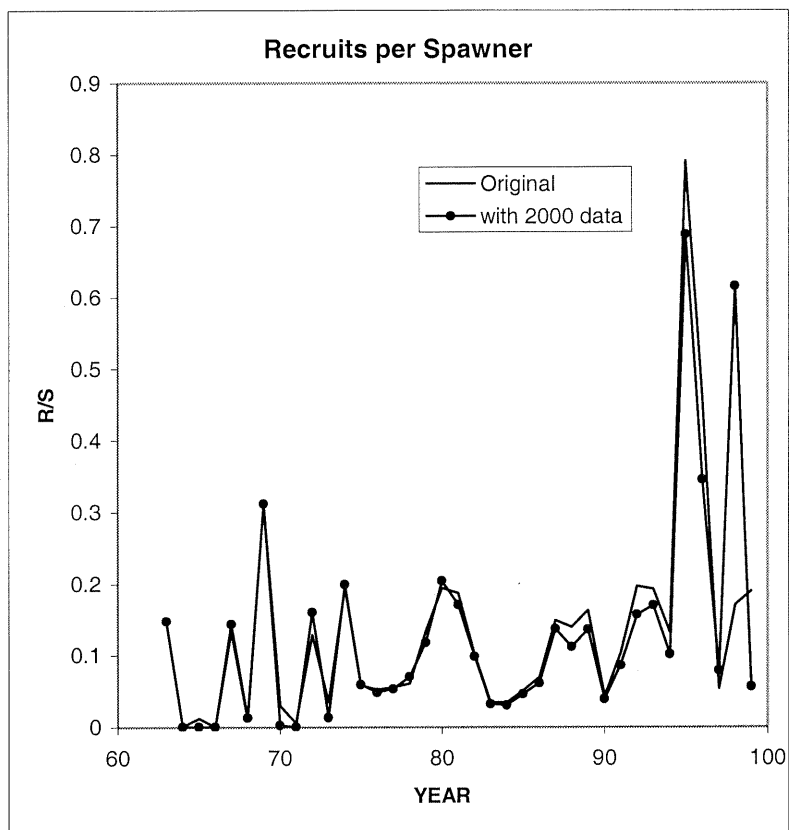


Figure 3. Time series of recruits per spawner for original and updated assessment model.

Table 2. Mean recruitment in early and late eras of the original and updated assessment models.

Year	Original			with 2000 data	
	Recruit	R/S		Recruit	R/S
Initial	1925	--		1865	--
63-82	1972	0.093		1823	0.091
63-96	1903	0.130		1577	0.116
83-96	1806	0.183		1225	0.153

The downward shift in recruitment beginning in the mid 1980s is probably due to an combination of two factors: decreased abundance of spawners and shifts in ocean conditions. It is probable that both have some impact on the decline in recruitment, but the relative magnitude of these two factors cannot be unambiguously determined from available data. In order to examine the potential consequences of these two hypotheses, four rebuilding scenarios were constructed.

A1 - Environment hypothesis: Virgin recruitment determined from the long-term average (1963-1996) which spans good and poor environmental conditions. Recruitments during rebuilding are taken only from the recent (1983-1996) era with poor recruitments in recognition of the uncertain time at which mean recruitment will again shift.

A2 - Virgin recruitment as in A1, but recruitment during rebuilding is taken from the entire time series (1963-1996) in recognition of the possibility that future recruitments will be better represented by the entire historical period. This is an optimistic scenario that is supported only by the moderately strong recruitment in 1995 and 1996.

B1 - Stock-Recruitment hypothesis: Virgin recruitment determined from the model initial conditions in recognition of the historical abundance of the stock. Recruitments during rebuilding are taken from the recent era. This is a pessimistic scenario because it does not account for increased recruitment even as the stock rebuilds.

B2 - Virgin recruitment from initial conditions and rebuilding recruitments from the entire time series.

The results of the rebuilding analyses for the four scenarios is summarized in Table 4 and Figures 4-5. Scenario A1 is considered to be a reasonable basis for forecasting the rebuilding of darkblotched rockfish. It provides for short-term harvest (181 mt in 2002 for a 60% probability of rebuilding) that is similar to the 1999-2001 catch level and to the F50% ABC level, and is intermediate between scenarios A2 and B1. A table of the rebuilding trajectory for scenario A1 is presented in Table 5 and the input parameter file is in the appendix.

Characteristics of some alternatives are worth noting. Faster initial rebuilding (Figure 4) would occur under application of the 40:10 OY adjustment because the 2002 OY would be very low due to the projected spawning biomass in 2002 being at only 14% of the virgin level. Some of the rebuilding scenarios produce short-term catch levels that would exceed the F50% ABC level. Presumably, these would be capped at the F50% ABC level to stay within the overfishing limit.

All four scenarios are based upon the updated assessment model which estimates current stock abundance to be low and implies that the catchability for the shelf and slope trawl surveys is near 1.0. If the actual catchability is less than 1.0, then the current biomass is being underestimated. Improved estimates of catchability and current biomass will be obtained as the survey time series gets longer and as new analyses of survey data are conducted. Meanwhile, the high estimated catchability implies a degree of precaution in these projected levels of catch during rebuilding.

Table 3. Age-specific population characteristics. The mean generation time is 33 years: (age x survival x spawn) summed for all ages/(survival x spawn) summed for all ages.

Both		Females			Males			
AGE	Natural Mortality	spawn (eggs x 100000)	fishery weight (kg)	fishery % selected	Population numbers in 1998	fishery weight (kg)	fishery % selected	Population numbers in 1998
1	0.05	0	0.052	0.001	586	0.043	0.001	586
2	0.05	0	0.136	0.002	179	0.117	0.002	179
3	0.05	0	0.263	0.018	1512	0.227	0.012	1512
4	0.05	0	0.377	0.108	2615	0.333	0.076	2617
5	0.05	0.006	0.472	0.323	451	0.423	0.259	453
6	0.05	0.039	0.56	0.573	627	0.502	0.51	634
7	0.05	0.139	0.645	0.759	630	0.574	0.716	641
8	0.05	0.323	0.729	0.868	323	0.642	0.841	329
9	0.05	0.574	0.809	0.927	126	0.702	0.907	129
10	0.05	0.858	0.885	0.958	449	0.754	0.942	462
11	0.05	1.149	0.955	0.974	375	0.798	0.961	386
12	0.05	1.428	1.018	0.984	359	0.836	0.972	371
13	0.05	1.687	1.075	0.989	154	0.867	0.979	160
14	0.05	1.923	1.125	0.992	100	0.894	0.984	104
15	0.05	2.134	1.169	0.995	58	0.916	0.987	60
16	0.05	2.321	1.207	0.996	51	0.934	0.989	54
17	0.05	2.486	1.24	0.997	126	0.948	0.991	132
18	0.05	2.63	1.269	0.997	198	0.96	0.992	206
19	0.05	2.756	1.293	0.998	180	0.97	0.993	186
20	0.05	2.865	1.315	0.998	106	0.978	0.993	110
21	0.05	2.959	1.333	0.998	41	0.985	0.994	43
22	0.05	3.041	1.349	0.999	34	0.99	0.994	35
23	0.05	3.111	1.362	0.999	28	0.995	0.994	29
24	0.05	3.171	1.374	0.999	29	0.998	0.995	30
25	0.05	3.223	1.383	0.999	91	1.001	0.995	93
26	0.05	3.267	1.392	0.999	15	1.003	0.995	16
27	0.05	3.305	1.399	0.999	54	1.005	0.995	55
28	0.05	3.337	1.405	0.999	2	1.007	0.995	2
29	0.05	3.364	1.41	0.999	11	1.008	0.995	12
30	0.05	3.388	1.414	0.999	121	1.009	0.995	123
31	0.05	3.408	1.418	0.999	4	1.01	0.995	5
32	0.05	3.425	1.421	0.999	56	1.011	0.995	57
33	0.05	3.439	1.424	0.999	0	1.011	0.995	0
34	0.05	3.452	1.426	0.999	4	1.012	0.995	4
35	0.05	3.462	1.428	0.999	0	1.012	0.995	0
36	0.05	3.471	1.43	0.999	41	1.012	0.995	43
37	0.05	3.478	1.431	0.999	16	1.012	0.995	17
38	0.05	3.485	1.432	0.999	14	1.013	0.995	15
39	0.05	3.49	1.433	0.999	13	1.013	0.996	13
40	0.05	3.514	1.438	0.999	203	1.013	0.996	206

Table 4. Summary results for four rebuilding scenarios as described in the text.

Scenario	A1	A2		B1	B2
Virgin Years	63-96	63-96		init	init
Virgin Recr.	1577	1577		1865	1865
Virgin Spawn	29044	29044		34348	34348
Target (40%) Spawn	11618	11618		13739	13739
Spawn 2002/Virgin	0.140	0.140		0.118	0.118
Resample from:	83-96	63-96		83-96	63-96
Rebuild year with F=0	2014	2013		2018	2015
Max allowed rebuild year	2047	2046		2051	2048
Pr(rebuild)	0.5	0.5		0.5	0.5
F	0.033	0.051		0.023	0.039
median rebuild year	2047	2046		2051	2048
OY in 2002	190	295		135	229
Pr(rebuild)	0.6	0.6		0.6	0.6
F	0.031	0.048		0.021	0.036
median rebuild year	2040	2039		2044	2041
OY in 2002	181	277		125	211
Pr(rebuild)	0.7	0.7		0.7	0.7
F	0.029	0.045		0.02	0.034
median rebuild year	2034	2033		2038	2036
OY in 2002	168	260		115	196
Pr(rebuild)	0.8	0.8		0.8	0.8
F	0.027	0.041		0.018	0.031
median rebuild year	2030	2028		2034	2031
OY in 2002	157	238		105	179
2002 ABC at F50%	187	187		187	187

Table 5. Expected time series of rebuilding under scenario A1 and with a 60% probability of rebuilding by 2047.

Year	Median Catch	Median Spawn	Spawn/Target	Pr(rebuilt)
2002	181	4060	0.350	0.000
2003	198	4506	0.388	0.000
2004	213	5000	0.430	0.000
2005	225	5514	0.475	0.000
2006	235	6023	0.518	0.000
2007	244	6502	0.560	0.000
2008	252	6940	0.597	0.000
2009	260	7327	0.631	0.000
2010	267	7687	0.662	0.000
2011	272	8009	0.689	0.000
2012	279	8307	0.715	0.000
2013	284	8589	0.739	0.000
2014	289	8828	0.760	0.002
2015	293	9052	0.779	0.005
2016	296	9255	0.797	0.018
2017	299	9438	0.812	0.036
2018	303	9595	0.826	0.060
2019	306	9744	0.839	0.076
2020	309	9877	0.850	0.095
2021	313	9995	0.860	0.116
2022	316	10120	0.871	0.153
2023	318	10237	0.881	0.171
2024	319	10355	0.891	0.187
2025	321	10476	0.902	0.211
2026	322	10550	0.908	0.224
2027	324	10636	0.916	0.254
2028	324	10685	0.920	0.280
2029	326	10737	0.924	0.299
2030	327	10789	0.929	0.323
2031	329	10852	0.934	0.343
2032	330	10901	0.938	0.366
2033	330	10963	0.944	0.388
2034	331	11003	0.947	0.401
2035	332	11039	0.950	0.418
2036	332	11084	0.954	0.443
2037	333	11082	0.954	0.458
2038	333	11120	0.957	0.473
2039	334	11156	0.960	0.493
2040	334	11164	0.961	0.502
2041	334	11171	0.962	0.517
2042	335	11194	0.964	0.530
2043	335	11227	0.966	0.545
2044	333	11239	0.967	0.562
2045	335	11232	0.967	0.575
2046	335	11236	0.967	0.585
2047	336	11241	0.968	0.600

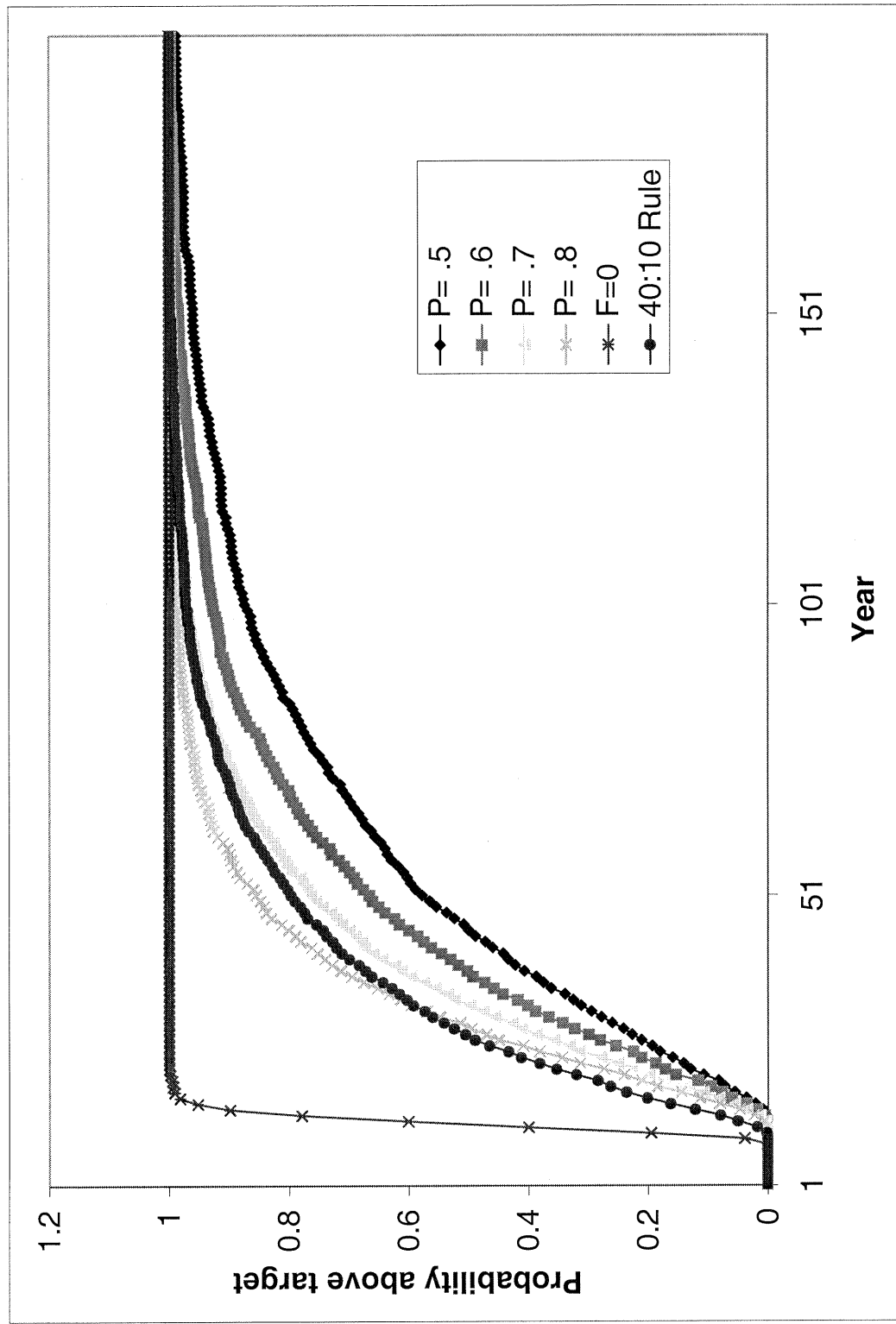


Figure 4. Probability that spawning biomass will be above the target level in each year according to Scenario A1 and six different harvest schedules. Harvest schedules $P=0.5$ to $P=0.8$ refer to probability of being rebuilt by 2047.

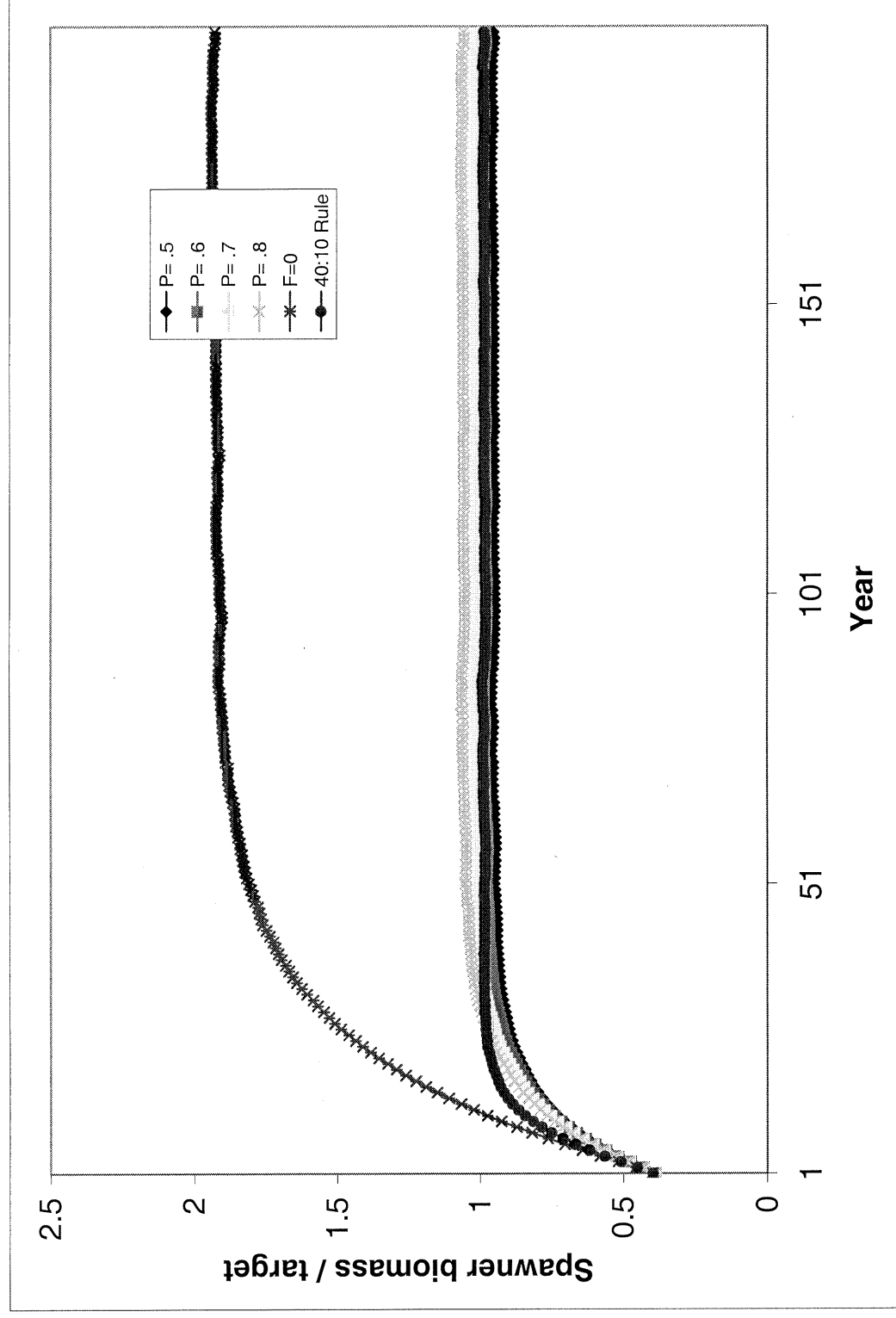


Figure 5. Time series of the ratio of spawner biomass to the target (40%) spawner biomass according to scenario A1 and six harvest schedules.

References

- Methot, R.D. 2000. Technical description of the stock synthesis assessment program. NOAA Technical Memorandum NMFS-NWFSC-43, 46 p.
- Punt, A.E. 2001. SSC default rebuilding analysis. Technical specifications and user manual. version 1.0 12 p.
- Rogers, J.B. R.D.Methot, T.L.Builder, K.Piner, and M.Wilkins. 2000. Status of the darkblotched rockfish (*Sebastes crameri*) resource in 2000. Appendix to Status of the Pacific coast groundfish fishery through 2000 and recommended acceptable biological catches for 2001. PFMC, 2130 SW Fifth Avenue Suite 224, Portland, OR 97201.
- STAR. 2000. Darkblotched rockfish STAR panel meeting report. In: Status of the Pacific coast groundfish fishery through 2000 and recommended acceptable biological catches for 2001. PFMC, 2130 SW Fifth Avenue Suite 224, Portland, OR 97201.

Appendix. Input file for rebuilding analysis with Scenario A1

```
#Title,,
Darkblotched - with 2000; virgin=63-96; resamp=83-96
# Number of sexes,,
2,,
# Age range to consider (minimum age; maximum age),,
1,40,
# First year of projection,,
1998,,
# Is the maximum age a plus-group (1=Yes;2=No),,
1,,
# Generate future recruitments using historical recruitments (1), historical recruits/spawner (2),
or a stock-recruitment (3)
1,,
# Constant fishing mortality (1) or constant Catch (2) projections,,
1,,
# Pre-specify the year of recovery (or -1) to ignore,,
-1
# Fecundity-at-age,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
#
1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35
,36,37,38,39,40
0,0,0,0.0005,0.0059,0.0386,0.1386,0.3234,0.5741,0.8582,1.1487,1.4279,1.6874,1.9228,2.1336,2.
321,2.4857,2.63,2.7557,2.8648,2.9591,3.0406,3.111,3.1712,3.2228,3.2669,3.3047,3.3369,3.3644
,3.3878,3.4078,3.4248,3.4393,3.4516,3.462,3.4709,3.4785,3.4849,3.4904,3.5136
# Age specific information (Females then males) M; body wt; selex;
Numbers,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
# Females,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.
05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05
,0.05
0.0518,0.1358,0.2632,0.3774,0.4724,0.5598,0.6453,0.729,0.8095,0.8852,0.955,1.0182,1.0746,1.
1246,1.1685,1.2068,1.24,1.2687,1.2935,1.3148,1.333,1.3487,1.3621,1.3736,1.3833,1.3917,1.398
7,1.4048,1.4099,1.4143,1.418,1.4212,1.4239,1.4261,1.4281,1.4297,1.4311,1.4323,1.4333,1.4375
0.0011,0.0023,0.0176,0.1077,0.323,0.573,0.7587,0.8681,0.9268,0.9578,0.9745,0.9838,0.9892,0.
9925,0.9945,0.9959,0.9968,0.9974,0.9978,0.9981,0.9984,0.9986,0.9987,0.9988,0.9989,0.9989,0.
999,0.999,0.9991,0.9991,0.9991,0.9992,0.9992,0.9992,0.9992,0.9992,0.9992,0.9992,0.99
93
1338.4,176.1,790.9,1642.5,260.3,417.4,379.6,201.2,83.3,271.3,214,228.2,92.5,60.2,33.5,30.2,77.
2,111.4,115.1,56.4,28.9,19.4,15.8,17.7,55.1,3.5,40.2,0.1,0.5,71.3,3.3,36.2,0.1,0.1,0.1,24.6,9.6,8.4
,7.6,119
# Male,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.
05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05
,0.05
```

```

0.0435,0.1173,0.227,0.3327,0.4232,0.5018,0.5743,0.6419,0.7021,0.754,0.7983,0.8358,0.8674,0.
8937,0.9155,0.9335,0.9483,0.9604,0.9703,0.9784,0.9851,0.9904,0.9948,0.9983,1.0012,1.0035,1.
0054,1.0069,1.0081,1.0091,1.0099,1.0106,1.0111,1.0116,1.0119,1.0122,1.0124,1.0126,1.0128,1.
0133
0.001,0.0018,0.0118,0.0758,0.2592,0.5105,0.7156,0.8405,0.9073,0.9422,0.9612,0.9724,0.9794,0
.9839,0.987,0.9892,0.9908,0.9919,0.9927,0.9933,0.9938,0.9942,0.9944,0.9947,0.9948,0.995,0.9
951,0.9952,0.9952,0.9953,0.9953,0.9954,0.9954,0.9954,0.9955,0.9955,0.9955,0.9955,0.9955,0.9
955
1338.4,176.1,791,1644.3,262,424.4,389.4,207.6,86.3,282.2,222.8,238.3,96.9,63.1,35.2,31.8,81,1
16.6,120,58.6,29.9,20,16.2,18.2,56.4,3.5,41,0.1,0.5,72.7,3.3,36.9,0.1,0.1,0.1,25.5,9.9,8.7,7.8,120.
9
# Number of simulations,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
1000,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
# recruitment and biomass,,,,,
# Number of historical assessment years ,,,,,
37,,,,,
# Historical data,,,,,
# year,recruitment,spawner,in B0,in R project,in R/S project
1950,1577,29044,1,0,0
1963,4143,28036,0,0,0
1964,10,27908,0,0,0
1965,10,27858,0,0,0
1966,10,27552,0,0,0
1967,3965,25090,0,0,0
1968,330,21287,0,0,0
1969,6646,19389,0,0,0
1970,45,19053,0,0,0
1971,10,18654,0,0,0
1972,2996,18125,0,0,0
1973,240,17634,0,0,0
1974,3514,17467,0,0,0
1975,1035,17329,0,0,0
1976,838,17489,0,0,0
1977,928,17503,0,0,0
1978,1226,17786,0,0,0
1979,2095,17998,0,0,0
1980,3678,17581,0,0,0
1981,3008,17549,0,0,0
1982,1731,17408,0,0,0
1983,555,16486,0,1,1
1984,499,15888,0,1,1
1985,728,14873,0,1,1
1986,913,13447,0,1,1
1987,1841,12659,0,1,1
1988,1418,10860,0,1,1
1989,1480,9681,0,1,1

```

```

1990,375,8802,0,1,1
1991,755,7704,0,1,1
1992,1208,6799,0,1,1
1993,1155,6407,0,1,1
1994,650,5563,0,1,1
1995,3830,5066,0,1,1
1996,1749,4703,0,1,1
1997,370,4346,0,0,0
1998,2677,3910,0,0,0
# Number of years with pre-specified catches,,,,,
4
# catches for years with pre-specified catches,,,,,
1998,889
1999,326
2000,236
2001,130
# Number of future recruitments to override,,
0,,
# Process for overriding (-1 for average otherwise index in data list),,
# Which probability to product detailed results for (1=0.5; 2=0.6; etc.),,
1,,
# Steepness,sigma-R,
0.5,0.5,
# Target SPR information: Use (1=Yes), target SPR rate,power
0,0.5,1
# Discount rate (for cumulative catch),,
0.1,,
# Truncate the series when 0.4B0 is reached (1=Yes),,
0,,
# Set F to FMSY once 0.4B0 is reached (1=Yes),,
0,,
# Percentage of FMSY which defines Ftarget
0.9
# Conduct MacCall transition policy (1=Yes)
0
# Defintion of recovery (1=now only;2=now or before)
2
# Produce the risk-reward plots (1=Yes)
0

```


Updated Rebuilding Analysis for Lingcod

August 8, 2001

Tom Jagielo¹ and Jim Hastie²

1. Washington Department of Fish and Wildlife
600 Capitol Way N
Olympia, WA 98501

2. National Marine Fisheries Service
2725 Montlake Blvd. E.
Seattle, WA 98112

Introduction

In 1997, an assessment of lingcod prepared for the PFMC found that female spawning biomass estimates were below 25% of the unfished biomass level for the northern portion of the stock (Jagiello et al 1997). An analysis was subsequently prepared which indicated that rebuilding to the $B_{40\%}$ level was possible within 10 years at $F=0$ (Jagiello 1999). Based on the analysis for the northern area, a 10 year rebuilding plan was implemented by PFMC for the entire West Coast (Washington-Oregon-California). The rebuilding plan began in 1999 and set the target date of the start of 2009 for achieving the $B_{40\%}$ spawning stock size.

More recently, a new coastwide assessment for lingcod was conducted in 2000 (Jagiello et al 2000). The new assessment provides separate estimates of spawning stock biomass for the northern (LCN: US-Vancouver and Columbia) and southern (LCS: Monterey, Eureka, Conception) areas. Spawning stock size estimates have increased since 1997 in both areas, indicating progress toward the rebuilding target since the implementation of coastwide catch reductions (Figure 1). Recruitments are plotted by brood year in Figure 1a.

The present rebuilding analysis utilizes information from the most recent stock assessment and conforms to the SSC Terms of Reference for Groundfish Rebuilding Plans. This analysis provides new rebuilding trajectories for both the northern and southern areas that provide for lingcod rebuilding within the time frame originally established by PFMC in 1999.

Data and Parameters

This analysis uses the SSC Default Rebuilding Analysis software developed by Punt (2001). For each area, data inputs included: 1) spawning output by age (the product of the weight-at-age and % maturity-at-age vectors); 2) sex-specific natural mortality; 3) age specific weight (kg), selectivity, and numbers of fish for the year 2000; and 4) vectors of annual recruitment (age 2 fish) and spawning biomass estimates (1973-2000). Age

specific data were input for ages 2-20+, with 20+ serving as an accumulator age. The population projection was configured to begin in 2001 with rebuilding occurring by the start of 2009 (year 10 from the original rebuilding start year of 1999). Catches were pre-specified for 2001, and were derived from the projections for the years 2002-2008.

Management Reference Points

Separate estimates of B_0 were computed using random draws from 1) the full time series of recruitment estimates (1973-1995), and 2) the time series of early recruitments (1973-1982) (Table 1). Distributions of the simulated B_0 estimates under these alternative recruitment scenarios indicated a marked difference for the northern area, but little difference for the southern area (Figure 2). For both areas, the full recruitment time series B_0 scenario was selected for the rebuilding projection analysis (Table 1 values shown in bold). Comparison of the spawning stock estimates for 2000 (Table 1) with the full recruitment time series estimates of B_0 indicate that the recent coastwide spawning population size is approximately 15% of the unfished population size.

The median time to rebuild at $F=0$ was determined by the previous lingcod rebuilding analysis to be 5 years, and the maximum time allowed to rebuild (T_{max}) was established by PFMC to be 10 years (by the start of 2009) (Jagiello 1999). The present analysis confirmed that rebuilding could occur within 10 years with no fishing; the median time to rebuild at $F=0$ was estimated to be 3.6 years for the northern area, and 4.8 years for the southern area.

Rebuilding Projections

Population projections were conducted using the "recruits" in lieu of the "recruits-per-spawner" option provided by Punt (2001). The basis for this choice was the lack of a credible spawner-recruit relationship for lingcod (Figures 3 and 4). This is evidenced particularly for the northern area (Figure 3), where the ratio of recruit/spawning output increased substantially from 1987-1993 -- a period where the trend in spawning stock size was decreasing (Figure 1). Recruitments for the LCN and LCS projections were randomly drawn from the values estimated from the most recent years (1986-1995) in the assessment (Jagiello et al 2000).

Performance of alternative rebuilding policies

Estimates of fishing mortality, median years to rebuild, and OY (mt) for 2002-2009 were computed for alternative probabilities of achieving the rebuilding target by start of 2009-- 50%, 60%, 70% and 80%--as well as the 40-10 and $F=0$ policies (Table 2). The bottom panel of Table 2 shows the coastwide rebuilding OYs for each policy, which represent the combination of northern and southern yields. These trajectories are also portrayed in Figure 7. For comparative purposes, Figure 7 also depicts the 2000 harvest and the 2001 OY. The 2002 OY associated with a 60% likelihood of rebuilding is slightly lower than the OY adopted for 2001. Plots of the probability ogives for each of the alternative policies, including $F=0$ and the 40:10 rule, are shown in Figures 5 and 6. Also shown in

these figures are the median projected OYs through 2009, for each policy, and the trajectories of median ratios of spawner biomass to target biomass. For the alternative with 60% likelihood of rebuilding, Figure 8 portrays the variability in the ratio of spawner-to-target biomasses in the northern and southern areas. The median ratio is portrayed, along with the 5th, 25th, 75th, and 95th percentiles for the years 2001-2009. For figures relating to biomass, the year indices reflect the status at the beginning of the year.

References

- Jagiello, T., P. Adams, M. Peoples, S. Rosenfield, K. Silberberg, and T. Laidig. 1997. Assessment of lingcod (*Ophiodon elongatus*) for the Pacific Fishery Management Council in 1997. In: Status of the Pacific Coast groundfish fishery through 1997 and recommended biological catches for 1998. Stock assessment and fishery evaluation. Pacific Fishery Management Council, Portland, Oregon.
- Jagiello, T.H. 1999. Lingcod Rebuilding. Analysis submitted to Pacific Fishery Management Council, May 5, 1999. Attachment G.9.c June 1999, PFMC Briefing Book.
- Jagiello, T.H., D. Wilson-Vandenberg, J. Sneva, S. Rosenfield, and F. Wallace. 2000. Assessment of Lingcod (*Ophiodon elongatus*) for the Pacific Fishery Management Council in 2000. In Appendix to Status of the Pacific Coast Groundfish Fishery Through 2000 and Recommended Acceptable Biological Catches for 2001, Stock Assessment and Fishery Evaluation. 142 p. Pacific Fishery Management Council, 2130 SW Fifth Avenue, Suite 224, Portland, Oregon 97201, October 2000.
- Punt, A.E. 2001. SSC Default Rebuilding Analysis. Technical specifications and user manual. Ver. 1.000003 (July 2001).

Tables and Figures

Table 1. Estimates of unfished spawning stock biomass (B_0), Bmsy proxy ($B_{40\%}$), and spawning stock size in 2000 (B_{2000}) for the northern (LCN) southern (LCS) areas. Values in bold were used for rebuilding projections.

	Spawning Output (mt)				
	All Recruitments (1973-1995)		Early Recruitments (1973-1982)		Recent Estimate
	Unfished (B_0)	Target ($B_{40\%}$)	Unfished (B_0)	Target ($B_{40\%}$)	(B_{2000})
LCN	22,882	9,153	31,033	12,413	3,527
LCS	20,971	8,389	22,799	9,120	3,220

Table 2. Rebuilding projection results; Top: northern area (LCN), Middle; southern area (LCS), Bottom: LCN and LCS Combined.

LCN						
Fishing rate	0.0607	0.0531	0.051	0.0474	40:10 Rule	F=0
Prob to rebuild by Tmax	50%	60%	70%	80%	55%	100%
Median years to rebuild	7.0	6.6	6.1	5.9	6.7	3.6
OY (mt)						
2002	384	337	324	302	189	0
2003	429	379	365	341	284	0
2004	470	417	402	376	384	0
2005	502	447	432	405	473	0
2006	531	475	460	432	553	0
2007	561	504	487	459	621	0
2008	581	523	506	477	665	0

LCS						
Fishing rate	0.0667	0.061	0.0533	0.0472	40:10 Rule	F=0
Prob to rebuild by Tmax	50%	60%	70%	80%	68%	100%
Median years to rebuild	7.0	6.7	6.3	6.0	6.5	4.8
OY (mt)						
2002	262	240	211	187	91	0
2003	296	273	241	214	150	0
2004	345	319	283	253	232	0
2005	399	370	329	295	332	0
2006	448	416	371	334	434	0
2007	494	460	412	371	534	0
2008	536	500	448	405	644	0

Coastwide OY (mt)	Prob to rebuild by Tmax:				40:10 Rule	F=0
Year	50%	60%	70%	80%		
2002	646	577	535	489	280	0
2003	725	651	606	555	434	0
2004	815	735	685	629	616	0
2005	901	817	761	701	805	0
2006	979	891	831	766	987	0
2007	1,055	963	899	830	1,155	0
2008	1,117	1,022	954	882	1,309	0

Figure 1. Time series of female spawning stock biomass estimates (mt).
Source: Jagiello et al. 2000.

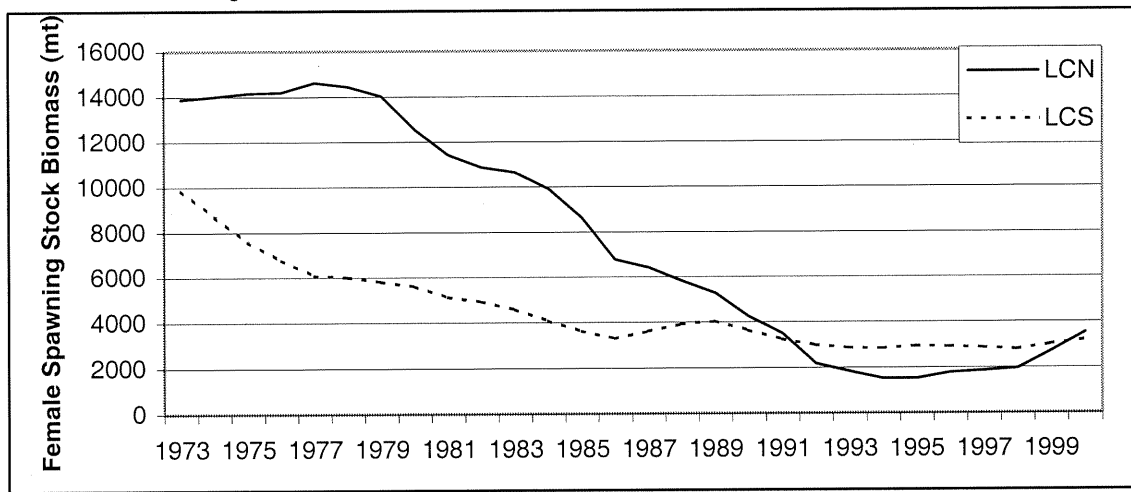


Figure 1a. Full recruitment time series by brood year (1971-1993) for LCN and LCS.

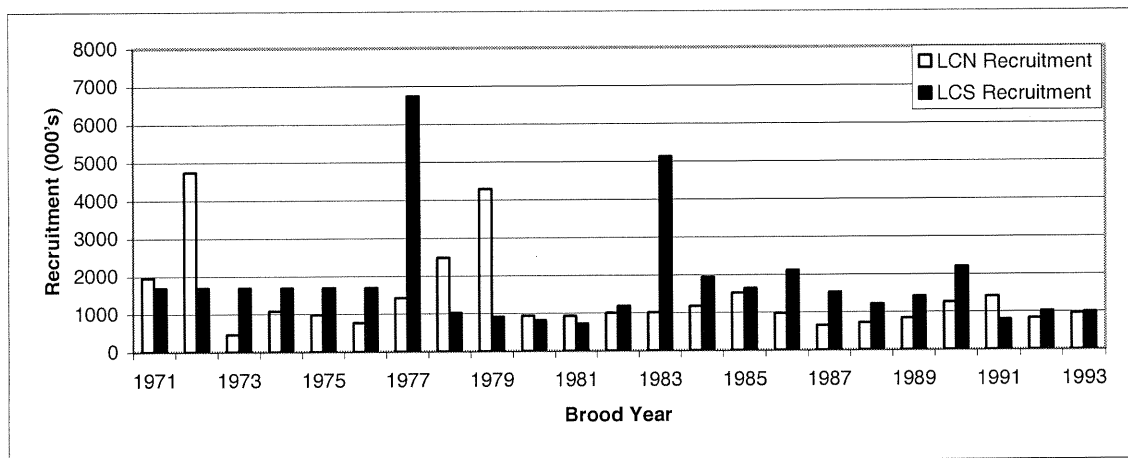


Figure 2. Distribution of Virgin Spawning Biomass (B_0) estimates for 1000 simulation runs.
Top: Northern area (LCN), Bottom: Southern area (LCS).

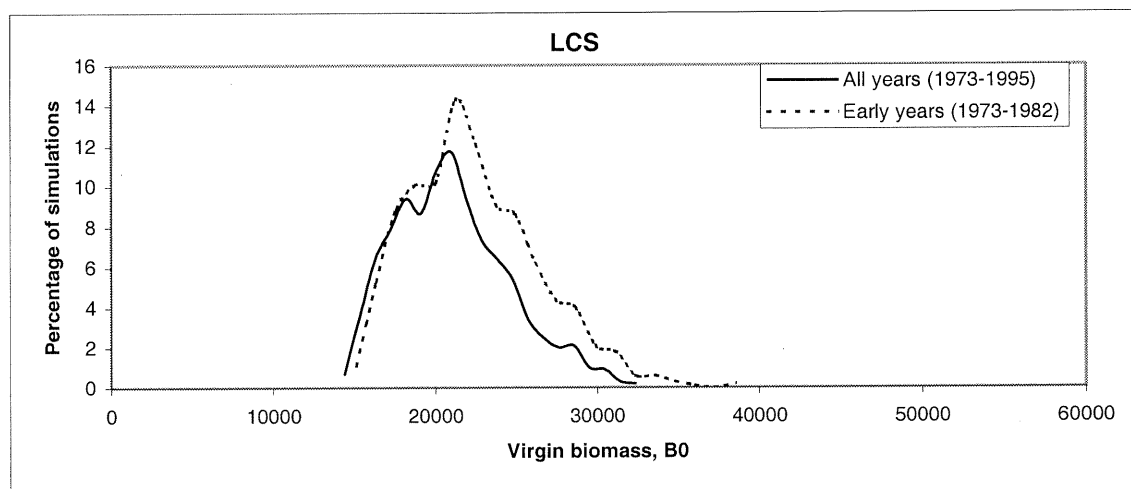
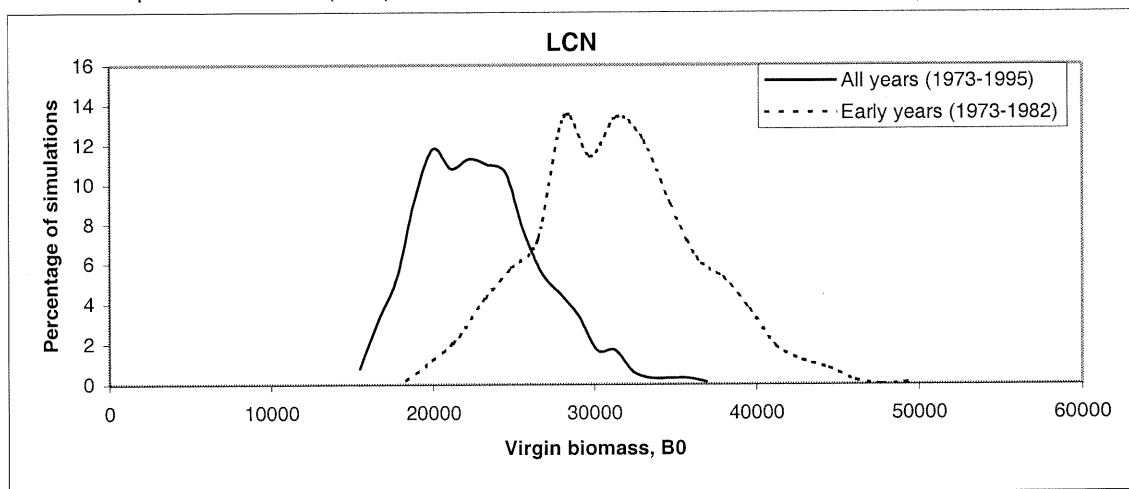


Figure 3. Recent northern area (LCN) recruitment and recruits/spawning output (R/S).

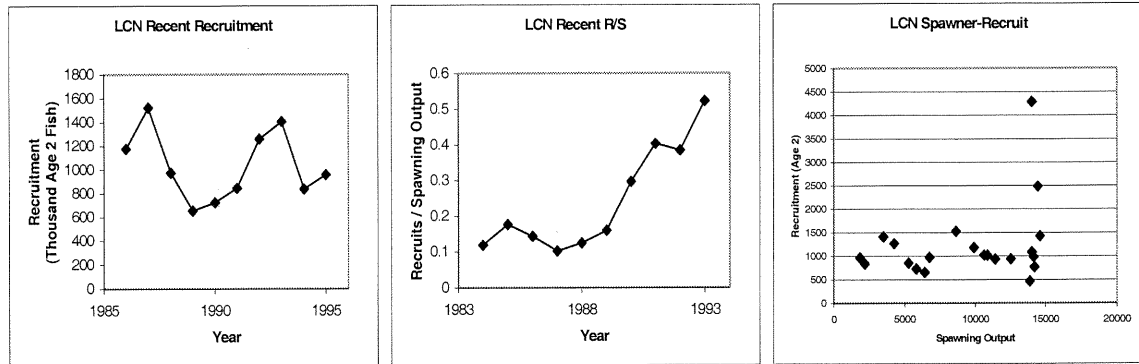


Figure 4. Recent southern area (LCS) recruitment and recruits/spawning output (R/S).

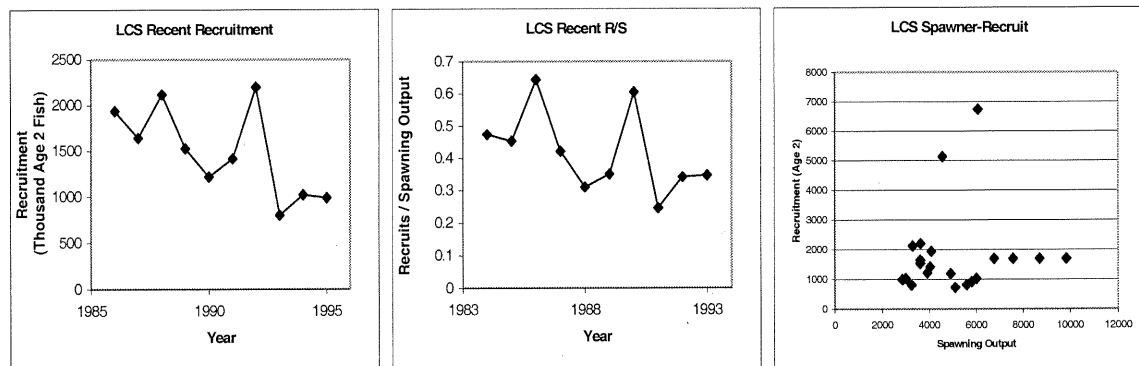


Figure 5.--Probability of limit attainment, median OY trajectories, and ratios of spawner biomass to target biomass, under six alternative harvest policies in the northern area (LCN).

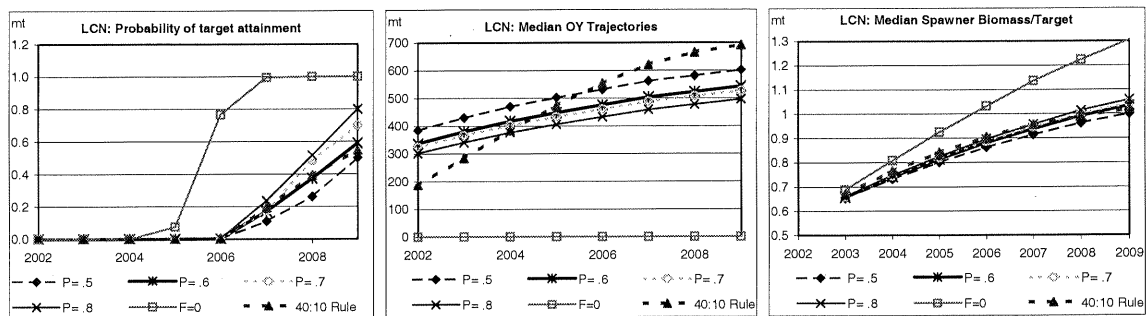


Figure 6.--Probability of limit attainment, median OY trajectories, and ratios of spawner biomass to target biomass, under six alternative harvest policies in the southern area (LCS).

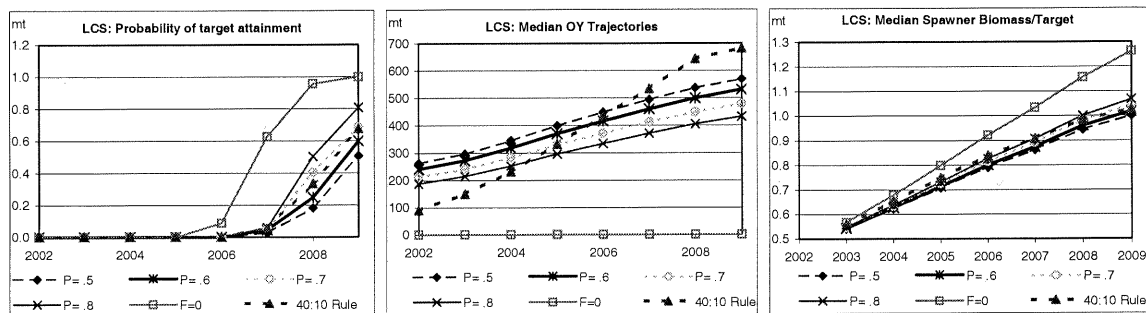


Figure 7.--Coastwide rebuilding OYs for lingcod, 2002-2008, based on the median projections, for six alternative harvest policies, and the 2000 harvest and 2001 OY.

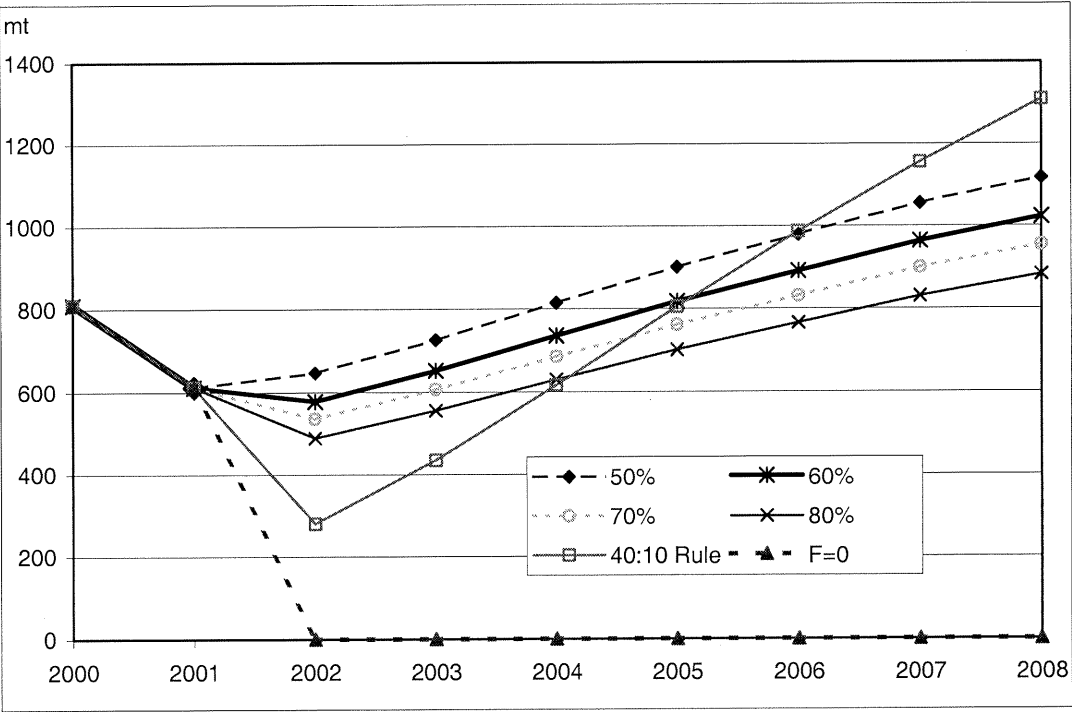
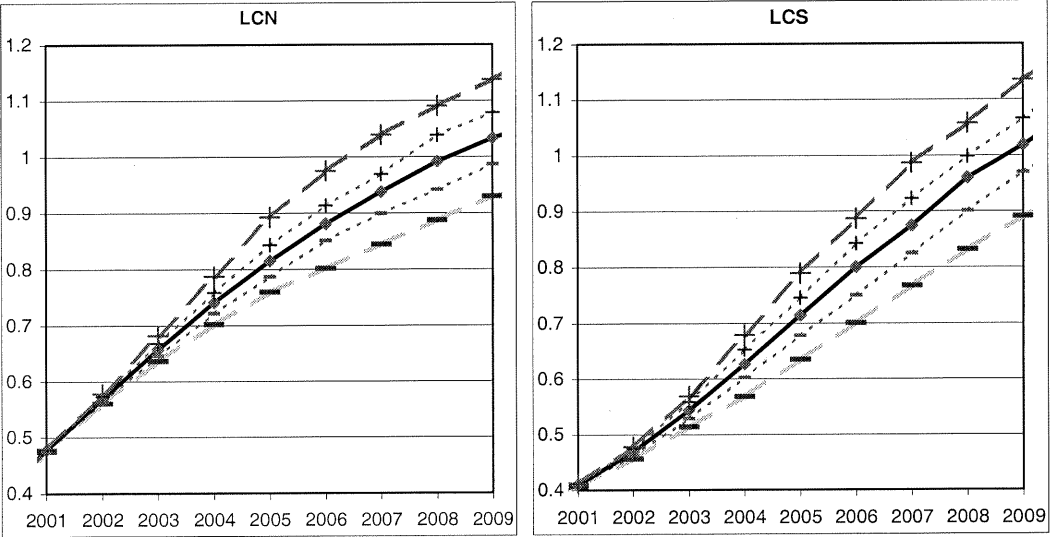


Figure 8.--Projected ratios of spawner biomasses to the targets, for the northern (LCN) and southern (LCS) areas under the 60% probability option.



Note: The central thick line represents the median ratio in each year. Other lines, from bottom to top represent the 5th, 25th, 75th, and 95th percentiles.

Revised Rebuilding Analysis for Pacific Ocean Perch

Andre E. Punt¹ and James, N. Ianelli²
(July 2001)

1. School of Aquatic and Fishery Sciences
Box 355020
University of Washington
Seattle, WA 98195-5020
Email: aepunt@u.washington.edu

2. NMFS Sand Point Laboratory
7600 Sand Point Way NE
Seattle, WA 98115
Email: Jim.Ianelli@noaa.gov

Introduction

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

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

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

Selection of the rebuilding period

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

Selection of B_0

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

Generation of future recruitment

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

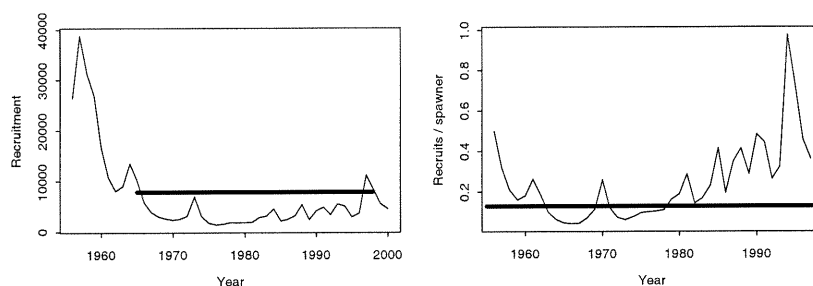


Figure 1 : Recruitment and recruits per spawner. The horizontal line in the left panel indicates the recruitment corresponding to B_0 (the range of this line indicates the years used when generating future recruitment) and that in the right panel indicates the virgin recruits per spawner ratio.

Generation time

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

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

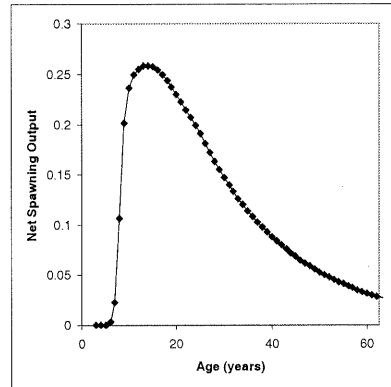


Figure 2 : Net spawning output versus age for Pacific Ocean perch.

The maximum allowable rebuild period

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

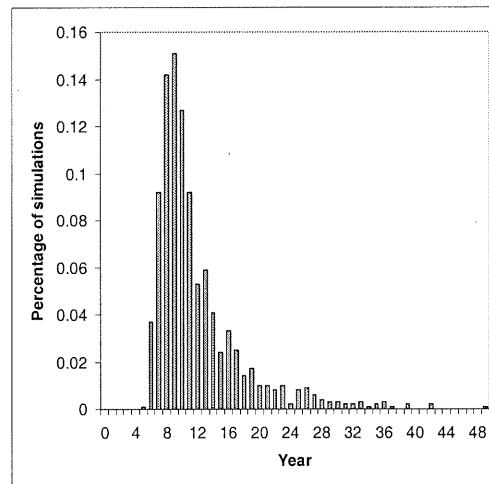


Figure 3 : Time to recover to $0.4B_0$.

Alternative rebuilding strategies

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

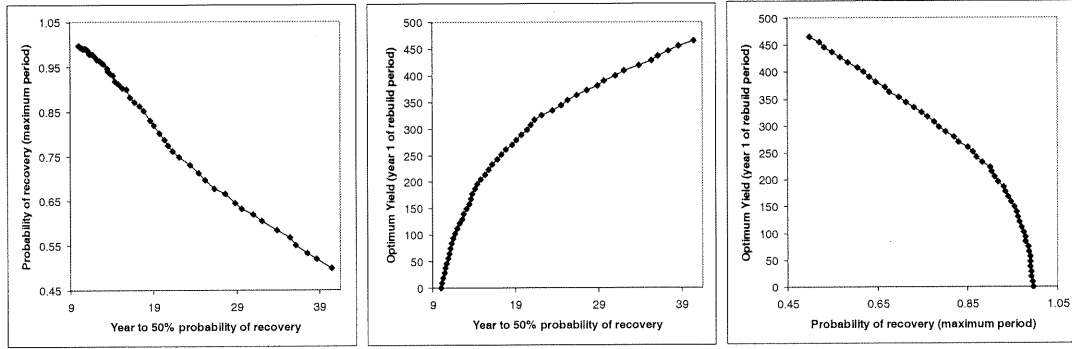


Figure 4: Plots illustrating the trade-off between the probability of rebuilding within the maximum allowable rebuild period, the time to rebuild with 0.5 probability, and the 2002 OY (in mt).

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

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

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

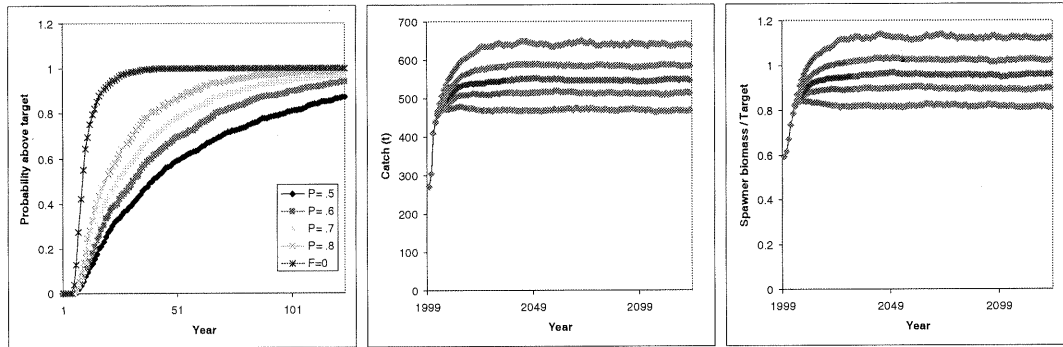


Figure 5 : Time trajectories of the probability of recovery for five rebuild strategies, of the catch for a 0.6 probability of recovery, and of the spawning output expressed relative to $0.4B_0$ for a 0.6 probability of recovery.

Sensitivity tests

Stock-recruitment relationship

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

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

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

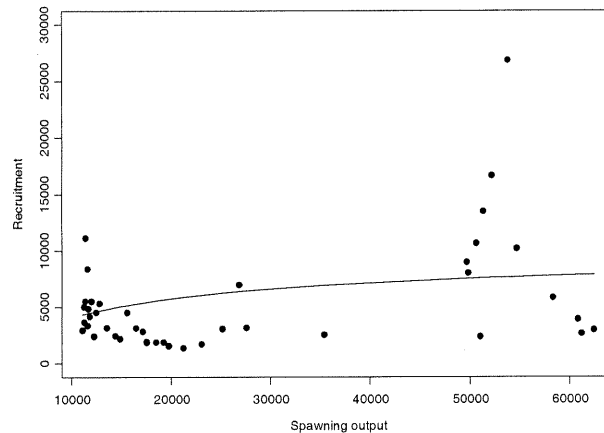


Figure 6: Fit of the Beverton-Holt stock recruitment relationship to the data for Pacific Ocean perch.

Removal of selected recruitment estimates

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

Revisions to the catch series

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

References

- Ianelli, J.N., Wilkins, M. and S. Harley. 2000. Status and future prospects for the Pacific Ocean Perch resource in waters off Washington and Oregon as assessed in 2000. In: Appendix to "Status of the Pacific coast groundfish fishery through 2000 and recommended Acceptable Biological Catches for 2001". Stock Assessment and Fishery Evaluation. Pacific Fishery Management Council. 2130 SW Fifth Avenue, Suite 224, Portland OR, 97201.
- Ianelli, J.N. and M. Zimmerman. 1997. Status and future prospects for the Pacific Ocean perch resource in waters off Washington and Oregon as assessed in 1998. In: "Status of the Pacific coast groundfish fishery through 1998 and recommended Acceptable Biological Catches for 1999". Stock Assessment and Fishery Evaluation. Pacific Fishery Management Council. 2130 SW Fifth Avenue, Suite 224, Portland OR, 97201.

- Pacific Fishery Management Council. 2000. Pacific Ocean Perch STAR Panel Report. In "Status of the Pacific Coast Groundfish Fishery Through 2000 and Recommended Biological Catches for 2001: Stock Assessment and Fishery Evaluation". (Document prepared for the Council and its advisory entities) Pacific Fishery Management Council. 7700 NE Ambassador Place, Suite 200. Portland, OR 97220.
- Punt, A.E. SSC default rebuilding analysis. Technical specifications and user manual. Ver. 1.00003. (Draft document, available from author).
- Rogers, J.B. In prep. Species allocation of 1965-1977 United States west coast foreign rockfish (*Sebastes* and *Sebastolobus* sp.) catch

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

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

Appendix 2 : Historical series of spawning output and recruitment.

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

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

```

#Title,
POP - STAR panel model (Original foreign catches),
# Number of sexes,
1,
# Age range to consider (minimum age; maximum age),
3,25,
# First year of projection,
2000,
# Is the maximum age a plus-group (1=Yes;2=No),
1,
# Generate future recruitments using historical recruitments (1), historical recruits/spawner (2), or a stock-recruitment (3)
1,
# Constant fishing mortality (1) or constant Catch (2) projections,
1,
# Pre-specify the year of recovery (or -1) to ignore,
-1,
# Fecundity-at-age
# 3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25
3.84E-06,4.03E-
05,0.000392248,0.003560962,0.028260766,0.1374925,0.273954602,0.338584679,0.375081501,0.404469053,0.430553194,0.453991276,0.47499
65,0.493739,0.510395,0.52515,0.53818,0.549655,0.559745,0.568595,0.576345,0.58313,0.589055
# Age specific information (Females then males) M; body wt; select; Numbers
# Females
0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051
268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268
0.169105,0.240603,0.317273,0.395966,0.474162,0.54997,0.62206,0.689572,0.752022,0.80921,0.861146,0.907988,0.949993,0.987478,1.02079,1
.0503,1.07636,1.09931,1.11949,1.13719,1.15269,1.16626,1.17811
0.0150383,0.0460987,0.137995,0.349401,0.696964,1.04722,1.23902,1.25075,1.22328,1.1965,1.17838,1.17032,1.16768,1.16629,1.17384,1.2012
4,1.23873,1.26485,1.26166,1.24369,1.24369,1.24369,1.24369,1.24369
4518.68,5228.16,7573.91,9524.67,2945.37,2228.92,3554.34,3637.52,2052.94,2748.15,2168.62,1151.47,2330.93,1259.57,886.926,718.926,1364.
47,860.091,706.002,439.578,381.17,349.572,5847.27
# Number of simulations
1000
# recruitment and biomass
# Number of historical assessment years
46
# Historical data
# year,recruitment,spawner,in B0,in R project,in R/S project
1955,7822.9,60212,1,0,0
1956,26451.8,53787.1,0,0,0
1957,38762.7,52200.5,0,0,0
1958,31232.9,50653.7,0,0,0
1959,26821.6,49841.3,0,0,1
1960,16650.9,49701.9,0,0,1
1961,10648.3,51349.2,0,0,1
1962,8005.34,54704.5,0,0,1
1963,8978.75,58320.8,0,0,1
1964,13485.60821.6,0,0,1
1965,10198.2,62420.6,0,1,1
1966,5828.14,61190.2,0,1,1
1967,3904.45,51034.5,0,1,1
1968,2965.33,35385.3,0,1,1
1969,2629.07,27577.3,0,1,1
1970,2356.87,26840.8,0,1,1
1971,2521.91,25157.4,0,1,1
1972,3141.36,23073.4,0,1,1
1973,6969.44,21229.5,0,1,1
1974,3046.8,19745.7,0,1,1
1975,1703.11,19235.9,0,1,1
1976,1344.54,18493.2,0,1,1
1977,1536.94,17545.6,0,1,1
1978,1859.93,17533.3,0,1,1
1979,1866.67,17131.1,0,1,1
1980,1846.92,16464.0,1,1
1981,1931.13,15572.2,0,1,1
1982,2812.19,14873.4,0,1,1
1983,3110.87,14387.5,0,1,1
1984,4498.81,13528.0,1,1

```

```

1985,2165.78,12801.2,0,1,1
1986,2440.4,12242.8,0,1,1
1987,3157.47,11814.4,0,1,1
1988,5316.72,11668.7,0,1,1
1989,2394.87,11597.9,0,1,1
1990,4138.59,11371.2,0,1,1
1991,4841.48,11250.2,0,1,1
1992,3350.57,11095.4,0,1,1
1993,5512.09,11272.9,0,1,1
1994,5011.27,11394.6,0,1,1
1995,2936.13,11594.2,0,1,1
1996,3646.31,11997.5,0,1,1
1997,11141.9,12457.3,0,1,1
1998,8399.49,13039.4,0,1,1
1999,5504.47,13725.2,0,0,0
2000,4518.68,14249.6,0,0,0
# Number of years with pre-specified catches
2
# catches for years with pre-specified catches,
2000,270,
2001,303,
# Number of future recruitments to override,
0
# Process for overriding (-1 for average otherwise index in data list)
# Which probability to product detailed results for (1=0.5; 2=0.6; etc.)
2
# Steepness,sigma-R,
0.5,0.5,
# Target SPR information: Use (1=Yes), target SPR rate,power
0,0.7,20
# Discount rate (for cumulative catch),
0.1,
# Truncate the series when 0.4B0 is reached (1=Yes),
0,
# Set F to FMSY once 0.4B0 is reached (1=Yes)
0
# Percentage of FMSY which defines Ftarget
0.9
# Conduct MacCall transition policy (1=Yes)
0
# Defintion of recovery (1=now only;2=now or before)
2
# Produce the risk-reward plots (1=Yes)
1

```

Appendix 4 : The envelopes (5%, 25%, 50%, 75% and 95% distribution points) for the annual catch and the annual ratio of the spawner output to $0.4B_0$.

Year	Spawner output / $0.4B_0$					Annual catch (t)				
	5%	25%	50%	75%	95%	5%	25%	50%	75%	95%
2000	0.592	0.592	0.592	0.592	0.592	270	270	270	270	270
2001	0.619	0.619	0.619	0.619	0.619	303	303	303	303	303
2002	0.669	0.669	0.669	0.669	0.669	410	410	410	410	410
2003	0.733	0.733	0.733	0.733	0.733	437	438	438	438	440
2004	0.785	0.785	0.785	0.785	0.786	456	457	458	460	465
2005	0.818	0.819	0.820	0.821	0.826	466	469	472	476	487
2006	0.834	0.838	0.842	0.849	0.870	470	475	481	488	506
2007	0.839	0.848	0.858	0.872	0.910	471	480	489	500	522
2008	0.840	0.856	0.873	0.893	0.936	471	485	496	511	536
2009	0.840	0.863	0.884	0.913	0.960	472	489	503	520	548
2010	0.839	0.870	0.896	0.928	0.979	473	493	509	528	559
2011	0.840	0.877	0.905	0.940	0.997	474	497	515	534	569
2012	0.839	0.880	0.913	0.949	1.014	475	500	520	539	577
2013	0.836	0.882	0.922	0.956	1.026	477	503	525	547	584
2014	0.835	0.884	0.926	0.966	1.036	479	507	530	553	591
2015	0.836	0.887	0.929	0.971	1.045	479	508	532	557	596
2016	0.834	0.887	0.932	0.977	1.051	479	509	534	559	600
2017	0.833	0.889	0.936	0.982	1.055	476	510	535	563	604
2018	0.829	0.890	0.936	0.988	1.065	475	510	536	565	606
2019	0.827	0.891	0.939	0.992	1.069	474	510	537	567	610
2020	0.825	0.892	0.940	0.996	1.073	473	512	539	570	614
2021	0.825	0.894	0.942	0.999	1.078	473	512	538	572	617
2022	0.823	0.895	0.942	1.003	1.085	472	511	539	573	621
2023	0.821	0.893	0.944	1.004	1.089	471	510	539	575	625
2024	0.821	0.893	0.944	1.006	1.099	470	510	539	576	632
2025	0.820	0.891	0.945	1.010	1.108	469	511	539	577	636
2026	0.813	0.892	0.945	1.009	1.116	469	510	540	575	635
2027	0.818	0.891	0.944	1.008	1.116	469	509	541	578	634
2028	0.817	0.891	0.946	1.013	1.115	469	510	543	578	635
2029	0.817	0.891	0.949	1.014	1.117	467	510	543	578	636
2030	0.815	0.892	0.950	1.015	1.115	467	511	543	580	636
2031	0.814	0.894	0.950	1.016	1.121	469	512	544	581	639
2032	0.817	0.894	0.950	1.017	1.119	469	512	543	580	641
2033	0.818	0.894	0.950	1.019	1.129	469	511	543	581	643
2034	0.818	0.893	0.951	1.019	1.127	470	513	545	582	641
2035	0.821	0.895	0.955	1.021	1.125	471	515	547	582	638
2036	0.821	0.897	0.956	1.021	1.120	470	515	547	581	639
2037	0.820	0.900	0.957	1.021	1.121	471	515	547	584	641
2038	0.821	0.900	0.957	1.023	1.126	471	514	548	586	639
2039	0.821	0.898	0.958	1.025	1.123	470	515	548	587	639
2040	0.818	0.899	0.959	1.025	1.120	470	514	548	587	639
2041	0.818	0.897	0.958	1.029	1.125	468	514	551	588	643
2042	0.817	0.898	0.960	1.032	1.129	469	514	550	589	645

Year	Spawner output / $0.4B_0$					Annual catch (t)				
	5%	25%	50%	75%	95%	5%	25%	50%	75%	95%
2043	0.817	0.897	0.961	1.031	1.136	468	514	551	588	648
2044	0.815	0.897	0.964	1.031	1.137	468	514	552	589	648
2045	0.819	0.897	0.963	1.031	1.139	468	513	552	588	648
2046	0.816	0.897	0.965	1.028	1.136	469	514	550	589	649
2047	0.819	0.899	0.964	1.032	1.132	469	514	552	589	646
2048	0.817	0.897	0.964	1.031	1.134	469	515	552	589	645
2049	0.817	0.898	0.966	1.029	1.129	468	514	553	589	642
2050	0.814	0.898	0.966	1.034	1.126	468	515	553	589	642
2051	0.817	0.899	0.968	1.033	1.125	468	515	552	589	641
2052	0.814	0.899	0.965	1.033	1.127	469	515	550	590	642
2053	0.816	0.900	0.963	1.032	1.126	466	517	550	587	643
2054	0.814	0.902	0.960	1.029	1.126	467	517	549	587	640
2055	0.813	0.903	0.959	1.029	1.122	468	517	550	586	641
2056	0.815	0.904	0.960	1.025	1.120	469	517	550	586	639
2057	0.819	0.902	0.962	1.025	1.121	470	517	550	587	637
2058	0.820	0.903	0.962	1.026	1.115	470	517	549	586	634
2059	0.817	0.903	0.960	1.028	1.113	471	519	550	587	634
2060	0.822	0.905	0.962	1.029	1.117	470	519	550	586	637
2061	0.820	0.906	0.963	1.024	1.119	470	518	550	585	638
2062	0.821	0.905	0.962	1.026	1.120	472	518	550	586	638
2063	0.823	0.905	0.962	1.025	1.119	471	516	549	585	640
2064	0.822	0.902	0.960	1.025	1.123	473	516	548	586	642
2065	0.827	0.901	0.958	1.026	1.129	474	517	547	586	644
2066	0.827	0.902	0.958	1.026	1.135	473	517	547	586	646
2067	0.825	0.903	0.958	1.027	1.130	472	517	547	585	642
2068	0.825	0.903	0.956	1.025	1.129	471	516	548	585	644
2069	0.823	0.900	0.957	1.025	1.132	473	514	548	585	645
2070	0.825	0.899	0.959	1.025	1.135	473	513	548	586	647
2071	0.824	0.896	0.958	1.026	1.136	471	514	548	584	646
2072	0.824	0.896	0.959	1.023	1.139	471	514	548	585	650
2073	0.821	0.899	0.958	1.023	1.137	472	514	547	583	645
2074	0.822	0.898	0.956	1.022	1.133	473	513	547	584	644
2075	0.825	0.896	0.955	1.021	1.130	472	513	546	584	643
2076	0.823	0.895	0.957	1.023	1.130	474	513	547	585	646
2077	0.824	0.897	0.955	1.026	1.135	474	513	547	585	643
2078	0.824	0.894	0.957	1.024	1.129	472	512	547	586	641
2079	0.825	0.893	0.958	1.023	1.126	472	511	547	587	638
2080	0.822	0.892	0.956	1.024	1.120	471	514	547	587	638

Revised Rebuilding Analysis for Widow Rockfish

Alec D. MacCall¹ and Andre Punt² 5/17/01

1. NMFS Santa Cruz Laboratory
110 Shaffer Rd.
Santa Cruz, CA 95060

email: Alec.MacCall@noaa.gov

2. School of Aquatic and Fishery Sciences
Box 5020
University of Washington
Seattle, WA 98195-5020
email: aepunt@u.washington.edu

Introduction

In 1998, the PFMC adopted Amendment 11 of the Groundfish Management Plan, which established a minimum stock size threshold of 25% of unfished biomass. Based on the most recent abundance estimates (Williams et al. 2000), widow rockfish has been declared formally to be overfished, thereby requiring development of a rebuilding plan. This rebuilding analysis provides information needed to develop the rebuilding plan for widow rockfish, and is in accord with the SSC Terms of Reference for Groundfish Rebuilding Plans.

The 2000 widow rockfish stock assessment included rebuilding projections, but those calculations contained an error and that analysis should be discarded. This rebuilding analysis supersedes the rebuilding analysis in the stock assessment document.

The stock has declined since fishing began in the late 1970's (Table 1). The relative decline in overall biomass has been somewhat less than that for spawning output (the best measure of stock reproductive potential). Older, larger fish have a higher fecundity per body weight than do young fish. Widow rockfish bear their offspring live as larvae, and spawning output is measured in million fertilized eggs, at a stage prior to parturition of larvae.

Table 1. Current status of widow rockfish relative to pre-fishery years.

	Age 3+ Biomass (mt)	Spawning Output (million eggs)
Avg. 1968-79	197998	33490
1999	60551	8223
percentage	30.6%	24.6%

Data and Parameters

This analysis uses both the SSC Default Rebuilding Analysis developed by Andre Punt and the rebuilding simulation developed by Alec MacCall for previous analyses. Stock and recruitment histories are taken from the assessment by Williams et al. (2000). Life history parameters are a simplification of the two-area, two-sex model, time-varying selectivity model used in the assessment. The model is tuned to the most recent three years of the assessment, and achieves a close match to the characteristics of the original assessment model (Appendix 1).

Management Reference Points

B_{msy}: The rebuilding target is the spawning abundance level that produces MSY. This cannot be determined easily, but experience in other fisheries has shown that B_{MSY} is often near 40% of the average initial unfished spawning abundance (B_0), and this value ($B_{40\%}$) is used as a proxy for B_{MSY} (see the SSC's Terms of Reference). Spawning abundance is measured in units of spawning output. Values of B_0 are estimated by dividing mean recruitment by the spawning output per recruit at $F=0$ (1.057 million eggs of spawning output per thousand recruits). Two estimates of B_0 were developed, based on use of pre-fishery recruitments (1965 to 1979 yearclasses) and all recruitments (Table 2). There is a strong statistical difference between pre-fishery (pre-1982) recruitments and post-fishing-down (post-1982) recruitments, as shown by a t-test (one-tailed, $P=0.002$). This difference is presumably due to the decline in spawning abundance, but also may be associated with a less favorable climate in the later period.

Table 2. Calculation of B_0 and rebuilding targets of spawning output (million eggs).

Source of recruitments	Pre-exploitation (1965-79)	All years
Mean recruitment	39615	31570
Estimated B_0	41872	33369
Rebuilding target	16749*	13348

* default target

Simulation of an unfished resource by re-sampling recruitments from the respective data sets provides frequency distributions of initial abundance that can be compared with the early abundances estimated in the stock assessment (Figure 1). The range of pre-exploitation biomasses given by the stock assessment is consistent with either frequency distribution, but the values from the assessment are somewhat low given the estimated sizes of pre-exploitation recruitments. Several explanations can be considered. Foreign fishing for whiting during the 1960s and 1970s probably had an incidental take (perhaps several hundred tons annually) of widow rockfish, so population biomasses estimated for the early (pre-exploitation) years of the assessment may not truly reflect pre-exploitation conditions. Low frequency climate variability could also have generated somewhat lower recruitment levels prior to 1965. Also, the initial conditions and earliest years of recruitments in the assessment model are prone to model mis-specification and may be less reliable than values estimated for later years.

The relationship between current stock status and the rebuilding target is shown relative to the historical stock-recruitment relationship in Figure 2. The rebuilding target of 16749 is similar to the stock status at the end of the 1980's, and tended to produce somewhat higher recruitments than have been seen recently.

Mean generation time: If the stock cannot be rebuilt in ten years, then the maximum time allowed for rebuilding is the length of time required to rebuild at $F=0$ plus one generation time. Mean generation time can be estimated from the net maternity function (product of survivorship and fecundity at age, Figure 3), and for widow rockfish is estimated to be 16.4 years, which is rounded to an integer value of 16 years.

Simulation Model

The simulation model tracks abundances at age, with an accumulator at age 20+. Values of weights at age, selectivity and fecundity are given in Appendix 1. Population simulations begin with the 1999 age composition estimated by the stock assessment (age 3 and older). Recruitments for birth years 1997 and 1998 are treated differently from later years. The 1997 value (recruited at age 3 in 2000) is based on the average value of the source data (recruits or recruits-per-spawning output). The 1998 value corresponds to an El Niño year, and is treated as equivalent to the corresponding value from 1992, another recent El Niño year. Subsequent recruitments or recruits per spawning output values are generated in two alternative ways. In the “R” simulations, recruitment values themselves are drawn randomly from those estimated for the spawning years 1983 to 1996. In the “R/S” method, recruitments are generated by a random draw of one of the historical values of R/S from the same years, which is multiplied by current spawning output (S) to obtain the following year’s recruitment. One hundred simulations were conducted for each management scenario, using the same sets of random numbers across alternative model formulations in order to maximize comparability.

Tmax (Time to Rebuild at $F=0$): Four sets of simulations were run following the logical classification in the SSC’s Terms of Reference, corresponding to the two alternative $B_{40\%}$ rebuilding targets in Table 2 and use of the “R” vs. “R/S” simulation approaches. Results are summarized in Table 3.

Table 3. Median rebuilding times for the case of $F=0$ (* indicates default case).

	$B_{40\%}=16749$ (early years)	$B_{40\%}=13348$ (all years)
Recent R/S	median T = 22yr*	median T = 14yr
Recent R	median T = 12yr	median T = 7yr

The “S/R” simulations have much longer rebuilding times than the “R” simulations. This is due to the effect of the currently low biomass, which results in much smaller recruitments in the initial years of rebuilding. The recent history of R/S has been stable, whereas recruitments themselves have been declining (Figure 4). The tendency for R to decline in more recent years (and at lower spawning abundances) is reason to reject the right-hand and lower cases in Table 3. Based on a median time of 22 years to rebuild, the maximum allowable median time to rebuild (Tmax) is 38 years.

Rebuilding Projections

Constant rate policies

Rebuilding projections used $B_{40\%}=16749$ as the rebuilding target, and the “R/S” simulation method. Three constant fishing rate policies are presented, corresponding to 50%, 60%, 70% and 80% probabilities of reaching the rebuilding target in 38 years (Figure 5, Table 4). Increasing the rebuilding probability is equivalent to setting a slightly earlier median time to rebuild. The envelope of rebuilding trajectories is shown in Figure 6 for spawning output, and optimum yields. One half of the results fall between the 25 and 75 percentile lines, and 90 percent of the results fall between the 5 and 95 percentile lines. The highest fishing rate allowable has a 50% probability of success within the time limit.

Table 4. Alternative constant rate rebuilding policies.

Fishing rate	0.0288	0.0268	0.0243	0.0227	0
OY ₂₀₀₂ (mt)	921	856	777	726	0
Prob. rebuild by Tmax (38yr)	50%	60%	70%	80%	100%
Median time to rebuild (yr)	38	37	35	34	22

Transition policies

The constant rate policies maintain a low harvest rate until rebuilding is achieved, and then abruptly increase the harvest rate to F_{msy} . Transition policies allow an increase in harvest rate as the stock rebuilds, so that the final change to F_{msy} is relatively small. Two important principles apply to transition policies. The first is that, in order to achieve rebuilding within the required time limit, any transitional increase in harvest rate at higher abundances must be balanced by a reduction in harvest rate earlier in the rebuilding process. The second principle is that if the transition harvest rate is too close to F_{msy} as the rebuilding target is approached, further average population growth rate tends to cease, hindering final completion of rebuilding except as a random effect.

A “segmented” transition policy is considered here (Figure 7). The transition policy consists of an initial “setaside” fraction of the potential catch that is not taken in order to speed rebuilding. When abundance reaches a “transition abundance,” harvest rate rises with further increases in abundance to a maximum rate that is 90% of F_{msy} , where estimated $F_{msy}=0.06$. Two sets of policies are presented, corresponding to 50% and 70% probabilities of rebuilding within the time limit of 38 years (Table 5). The constant harvest rate policy is equivalent to a fraction set aside of zero. The “median years to transition” indicates how soon the fraction set aside would begin to pay off in increased harvest rates. Small amounts of fraction set aside do not result in sufficient rebuilding to have the median years to transition be much sooner than the

corresponding value under the constant harvest rate policy. Envelopes of rebuilding trajectories for an example transition policy are shown and are compared with the median trajectory of the corresponding constant harvest rate policy in Figure 8.

Table 5. Performance of alternative transition policies.

FRACsetaside	50% probability			70% probability		
	Btrans	OY ₂₀₀₂ (mt)	median years to transition	Btrans	OY ₂₀₀₂ (mt)	median years to transition
0.0	0.40	920	38	0.40	777	35
0.2	0.37	737	31	0.39	623	31
0.3	0.36	646	26	0.38	546	28
0.4	0.32	554	19	0.36	468	23
0.5	0.28	462	13	0.33	391	19

Long-term outlook

The stock-recruitment data used in this analysis indicate that the rebuilt resource will be able to sustain an annual harvest of about 3300mt at a harvest rate of approximately $F=0.06$, near an SPR of 70%. This estimate is not very reliable, but will improve as we track stock productivity during rebuilding. Nonetheless, current information indicates that the resource is incapable of sustaining $F_{50\%}$ at recent biomass levels and under recent environmental conditions. The resource would decline further at that fishing rate. It is widely suspected that the weak recruitments during the 1990's have been associated with unusually warm environmental conditions and low plankton abundances. Present understanding of environmental influences is severely limited, and the reliability of climate forecasts for the next few decades is insufficient to allow an environmentally-tuned rebuilding plan. However, if future decades are more favorable than the past decade for widow rockfish reproduction, higher productivity will result both in an earlier transition to normal harvest levels, and in higher sustainable yields once the stock is rebuilt.

References

Williams, E. H., A. D. MacCall, S. V. Ralston, and D. E. Pearson. 2000. Status of the widow rockfish resource in Y2K. In: Appendix to Status of the Pacific coast groundfish fishery through 2000 and recommended acceptable biological catches for 2001. Stock assessment and fishery evaluation. Pacific Fishery Management Council. 2130 SW Fifth Avenue, Suite 224, Portland, OR, 97201.

Appendix: Data used in rebuilding analysis (REBUILD.DAT file)

```
# Number of sexes
2
# Age range to consider (minimum age; maximum age)
3 20
# Is the maximum age a plus-group (1=Yes;2=No)
1
# Generate using historical recruitments (1) or historical Recruits/Spawner (2)
2
# Fecundity by age
# 3 4 5 6 7 8 9 10
5.71571E-05,0.000192238,0.014959075,0.06416152,0.161188109,0.276595084,0.36866541,0.4
41150816,0.508537268,0.566615354,0.618765039,0.665202145,0.706388539,0.74275911,0.774
748748,0.802838386,0.827408957,0.883903028
# Age specific information (Females then males), M, weight, selectivity and numbers
# Females
0.150000 0.150000 0.150000 0.150000 0.150000 0.150000 0.150000 0.150000 0.150000
0.150000 0.150000 0.150000 0.150000 0.150000 0.150000 0.150000 0.150000 0.150000
0.260608092 0.382403028 0.516070194 0.654578339 0.792170662 0.924895027 1.049946766
1.165864012 1.271881655 1.367769472 1.453797243 1.530488701 1.598486647 1.658533881
1.711419248 1.757704614 1.798297893 1.89163453
0.000593893 0.005686670 0.054780300 0.362629000 0.846479000 0.998077000 0.963625000
0.904980000 0.847668000 0.793880000 0.743284000 0.695263000 0.649123000 0.604100000
0.559340000 0.513919000 0.466977000 0.41801300
2958.5 7588.5 6246.5 6863.0 2061.5 5577.5 2272.0 1669.5 1646 1334.5 542.5 675 517 141 171
386.5 239 935
# Males
0.150000 0.150000 0.150000 0.150000 0.150000 0.150000 0.150000 0.150000 0.150000
0.150000 0.150000 0.150000 0.150000 0.150000 0.150000 0.150000 0.150000 0.150000
0.303357216 0.410118829 0.515691806 0.615331188 0.706167139 0.787117388 0.857984578
0.919248338 0.971690941 1.016243337 1.053962138 1.085701311 1.112314822 1.134579656
1.153172796 1.168719902 1.181646637 1.20887895
0.000590021 0.005633680 0.054211900 0.359841000 0.844941000 0.998171000 0.962820000
0.902934000 0.844470000 0.789659000 0.738174000 0.689400000 0.642654000 0.597194000
0.552196000 0.506774000 0.460107000 0.41171100
2958.5 7588.5 6246.5 6863.0 2061.5 5577.5 2272.0 1669.5 1646 1334.5 542.5 675 517 141 171
386.5 239 935
# Number of simulations
1000
# Recruitment and Spanwer biomasses
# Number of years
32
```



```

# Year, Recruitment, Spawner biomass, Used to compute B0, Used to project based
# on R, Used to project based on R/S
1968 29603 30662 1 0 0
1969 39748 30664 1 0 0
1970 37990 30668 1 0 0
1971 47532 30716 1 0 0
1972 39929 30910 1 0 0
1973 112579 31371 1 0 0
1974 42955 32096 1 0 0
1975 20667 33298 1 0 0
1976 11070 35254 1 0 0
1977 23596 37731 1 0 0
1978 39407 39189 1 0 0
1979 02219 39316 1 0 0
1980 73666 38032 1 0 0
1981 48325 32253 1 0 0
1982 24940 25329 1 0 0
1983 47876 19457 0 0 0
1984 62307 17592 0 0 0
1985 21667 17055 0 0 0
1986 13094 16665 0 1 1
1987 32540 16481 0 1 1
1988 28129 15782 0 1 1
1989 16110 14978 0 1 1
1990 29622 13019 0 1 1
1991 25813 11553 0 1 1
1992 18452 11079 0 1 1
1993 18265 10632 0 1 1
1994 31413 09860 0 1 1
1995 8327 09533 0 1 1
1996 21956 08985 0 1 1
1997 16901 08664 0 1 1
1998 17637 08261 0 1 1
1999 5917 08223 0 1 1
# Number of years with pre-specified catches
3
# catches for years with pre-specified catches
1999 4363
2000 4033
2001 2300
# Number of future recruitments to override
2
# Process for overriding (-1 for average otherwise index in data list)
2000 -1
2001 28
# Which probability to product detailed results for (1=0.5,2=0.6,etc.)
2

```

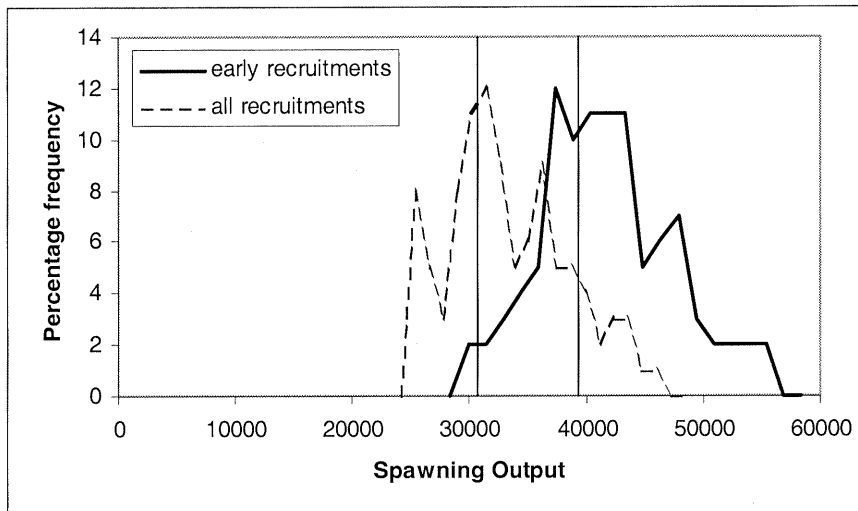


Figure 1. Simulated frequency distributions of unfished spawning output based on either pre-fishery recruitments or all recruitments. Vertical lines represent the range of pre-fishery spawning abundances estimated by the stock assessment.

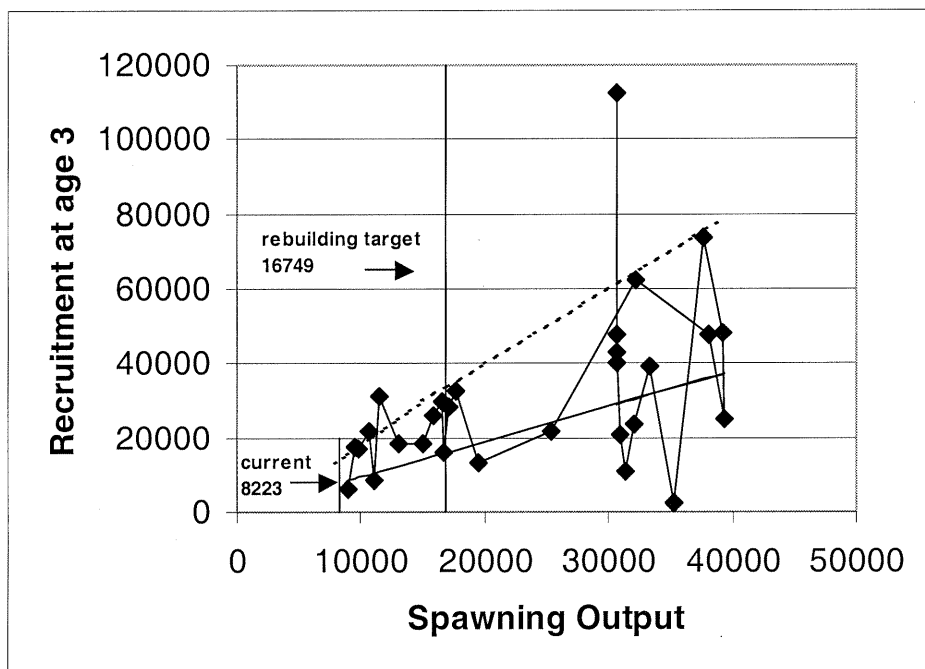


Figure 2. Historical stock-recruitment relationship for widow rockfish, showing relationship of rebuilding target ($B_{40\%}$) to current spawning abundance. Solid diagonal line is replacement level of recruitment at $F=0$; dashed diagonal line is replacement level of recruitment under $F_{50\%}$ policy with 40-10 adjustment.

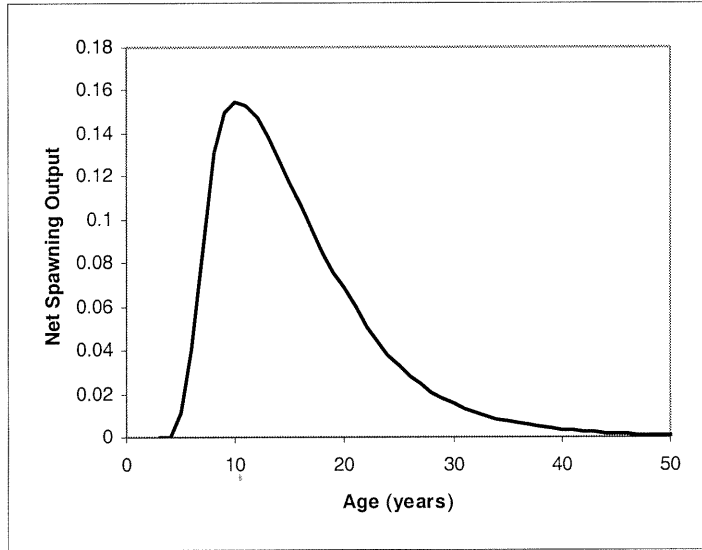


Figure 3. Net maternity function for widow rockfish.

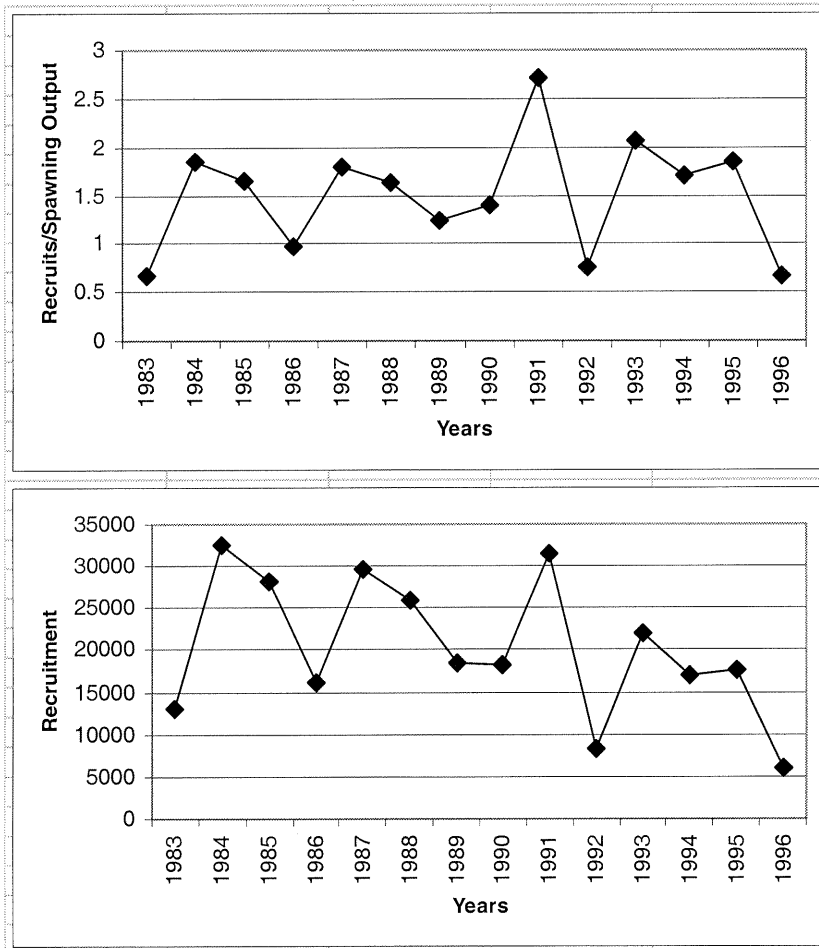


Figure 4. Recent trends in recruitment rates of widow rockfish.

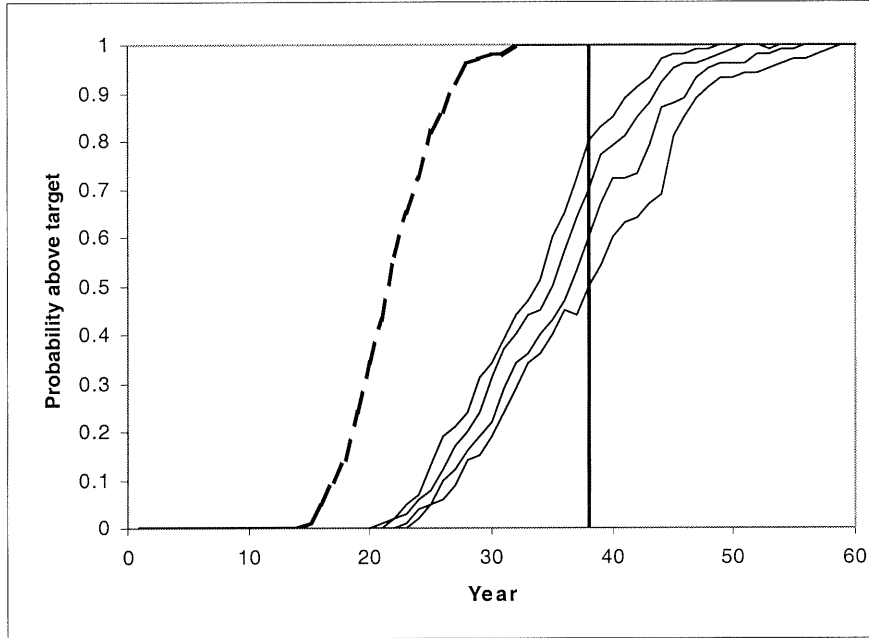


Figure 5. Probability of rebuilding at alternative constant harvest rates. Dashed line is $F=0$, thin solid lines are 80%, 70%, 60% and 50% from top to bottom. Vertical line is maximum median rebuilding time, $T_{max}=38$ years.

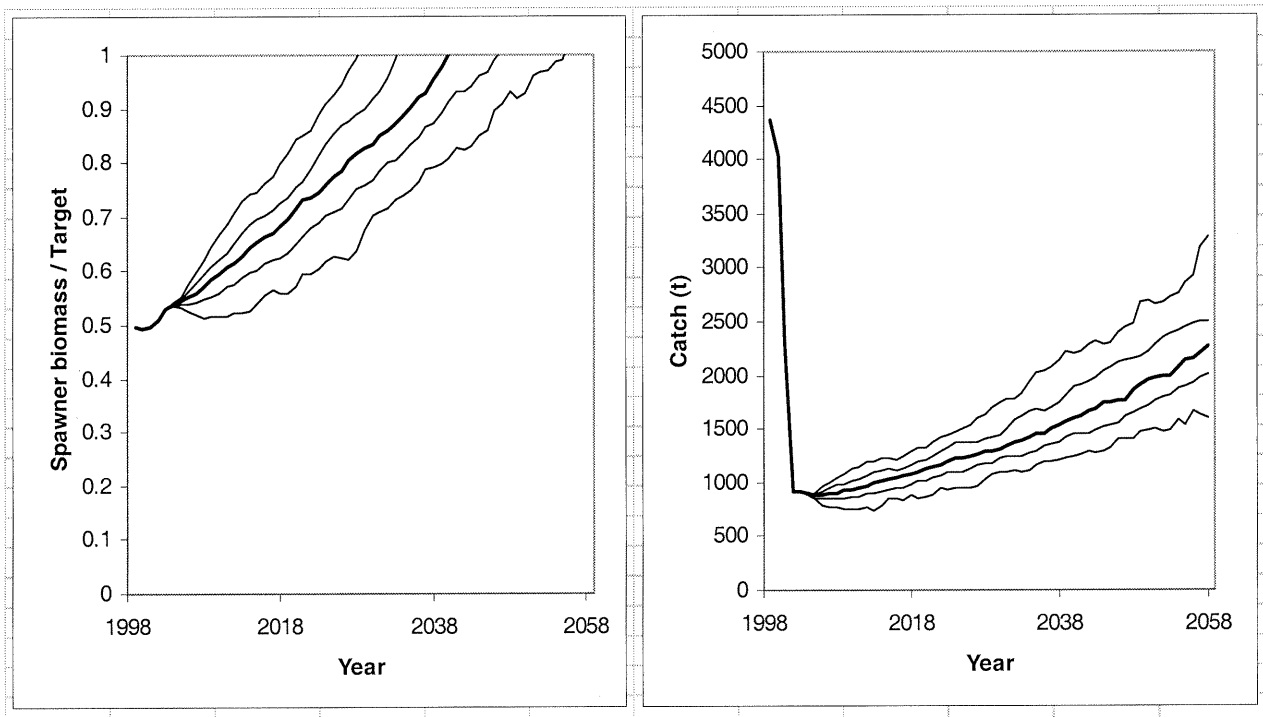


Figure 6. Envelopes of rebuilding trajectories for spawning output (left) and OY (right) under a constant harvest rate policy with 50% probability of rebuilding by $T_{max}=38$ years. Lines are 5, 25, 50 (median, dark line), 75 and 95 percentiles of values in the given year.

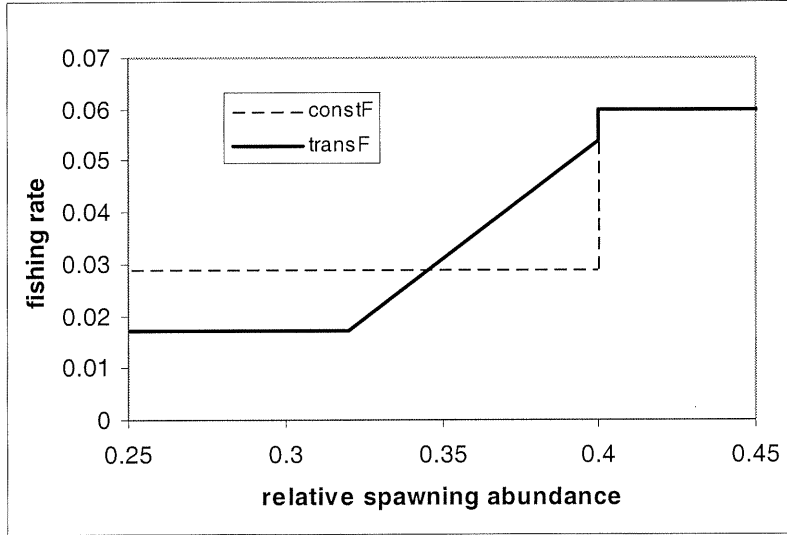


Figure 7. Comparison of fishing rates under constant harvest rate policy and segmented transition harvest rate policy

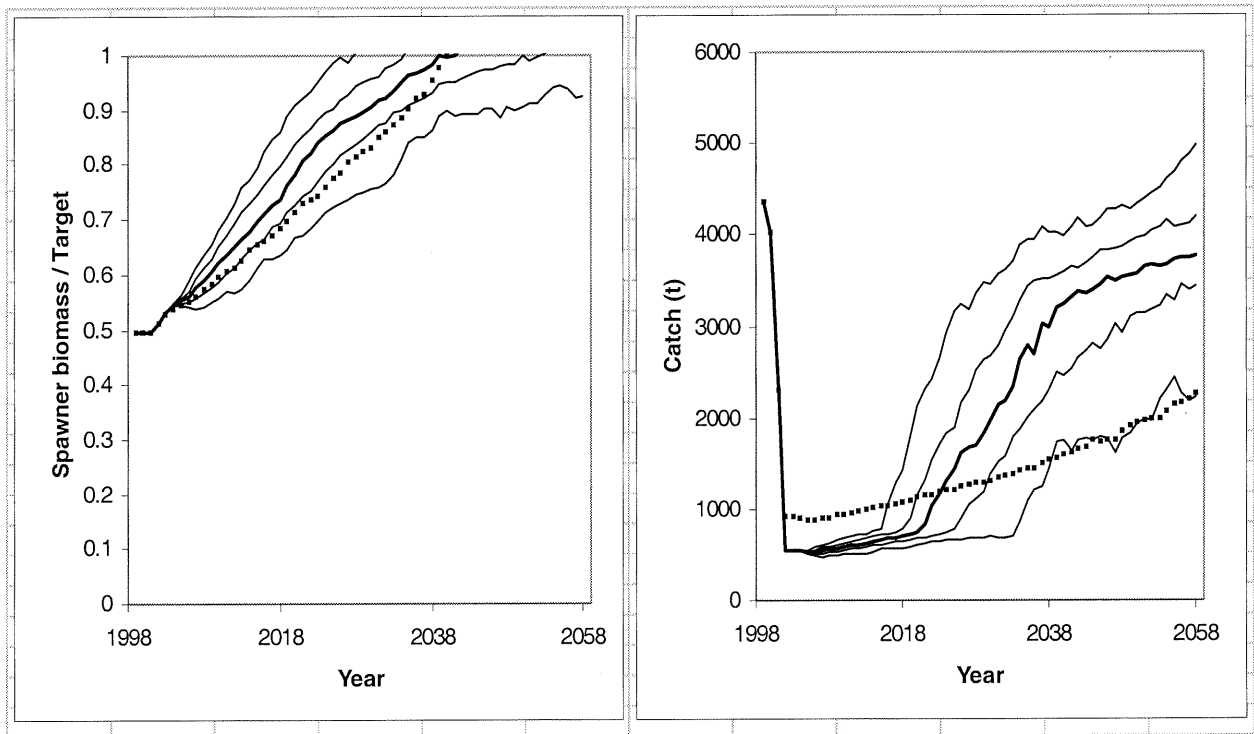
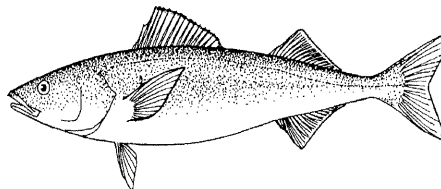
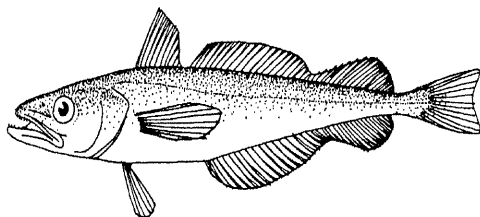
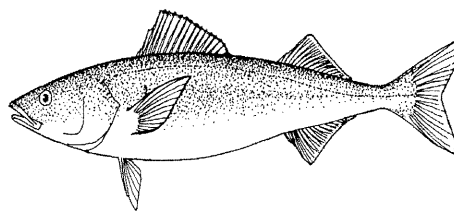
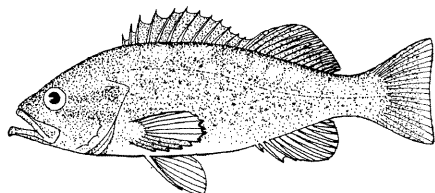


Figure 8. Envelopes of rebuilding trajectories for spawning output (left) and OY (right) under a segmented transition policy (probability=50%, FRACsetaside=0.4, Btrans=0.32). Lines are 5, 25, 50 (median, dark line), 75 and 95 percentiles. Dotted line is median from corresponding constant harvest rate policy.

APPENDIX

STATUS OF THE PACIFIC COAST GROUND FISH FISHERY THROUGH 2001 AND ACCEPTABLE BIOLOGICAL CATCHES FOR 2002 STOCK ASSESSMENT AND FISHERY EVALUATION



Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, OR 97220-1384
(503) 820-2280
www.pcouncil.org

JULY 2002



A report of the Pacific Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award Number NA17FC2235.

APPENDIX: STOCK ASSESSMENTS

List of Stock Assessments

Stock Status of Dover Sole off the U.S. West Coast in 2000

David B. Sampson, Oregon State University
Claire Wood, Oregon State University

Status of the Sablefish Resource off the U.S. Pacific Coast in 2001

Ray Hilborn, University of Washington
Juan L. Valero, University of Washington
Mark Maunder, University of Washington

Status of the Sablefish Resource off the U.S. Pacific Coast in 2001

Michael J. Schirripa, National Marine Fisheries Service
Richard Methot, National Marine Fisheries Service

Stock Status of Shortspine Thornyhead off the Pacific West Coast of the United States in 2001

Kevin Piner, National Marine Fisheries Service
Richard Methot, National Marine Fisheries Service

Pacific Whiting Assessment Update for 2000

Thomas E. Helser, National Marine Fisheries Service
Martin W. Dorn, National Marine Fisheries Service
Mark W. Saunders, Department of Fisheries and Oceans - Canada
Richard D. Methot, National Marine Fisheries Service

Status of the Yelloweye Rockfish Resource in 2001 for Northern California and Oregon Waters

Farron R. Wallace, Washington Department of Fish and Wildlife

