REPORT OF THE TECHNICAL SUBCOMMITTEE OF THE CANADA-UNITED STATES GROUNDFISH COMMITTEE

Appointed by the Second Conference on Coordination of Fisheries Regulations Between Canada and the U.S.

Thirty-Seventh Annual Meeting

Prepared by

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ODFW Informational Report 97-1

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Report of the Technical Subcommittee of the Canada/U.S.. Groundfish Committee

1996

EXECUTIVE SUMMARY

The Technical Subcommittee of the Canada/U.S. Groundfish committee (TSC) met May 7 and 8, 1996 in Newport, Oregon. Representatives from the Canadian Department of Fisheries and Oceans (DFO), the National Marine Fisheries Service (NMFS), Alaska Department of Fish and Game (ADF&G), Washington Department of Fisheries and Wildlife (WDFW), Oregon Department of Fish and Wildlife (ODFW), California Department of Fish and Game (CDFG), the Pacific Fishery Management Council (PFMC), the North Pacific Fishery Management Council (NPFMC), and the Pacific States Marine Fisheries Commission (PSMFC) attended. Tory O'Connell, ADF&G, served as chair and Lee Garner, Hatfield Marine Science Center (HMSC), Bill Barss (ODFW), and Tory O'Connell, acted as joint Secretaries.

During the 1996 meeting, the TSC exchanged information on research, stock assessment and management activities conducted during 1995 and work planned for 1996. The agency reports and TSC working groups reports have been collated in the accompanying document. The report contains additional information that scientists and managers may find useful including agency publication and staff lists.

Background

The Canada/U.S. Groundfish Committee (Parent Committee) was established in 1959 by the Second Conference on Coordination of Fisheries Regulations Between Canada and the U.S. and is sanctioned as an advisory group by the State Departments of both nations. The TSC was established at the first Parent Committee meeting as a technical advisory group to the Parent Committee. It is the only coast-wide forum for official exchange of information on the status of groundfish stocks and groundfish research among U.S. federal and state agencies and the DFO. The terms of reference for the TSC, which are reviewed and approved at each annual meeting, are as follows:

1. Exchange information on the status of groundfish stocks of mutual concern and to coordinate, whenever possible, desirable programs of research.

2. Recommend continuance and further development of research programs having potential value as scientific basis for future management of the groundfish fishery.

3. Review scientific and technical impacts of existing or proposed management strategies and their component regulations relevant to conservation of stock or other scientific aspects of groundfish conservation and management of mutual interest.

4. Transmit approved recommendations and appropriate documentation to appropriate sectors of Canadian and U.S. governments to encourage implementation of these recommendations.

The TSC discussed issues of concern regarding west coast groundfish with emphasis on trans-boundary stocks. Although the TSC has no regulatory authority, the group makes recommendations both to itself and to the Parent Committee. The Parent Committee has one member from each country who has the authority to contact appropriate officials in their respective countries, urging them to act on recommendations made by the Parent Committee and/or the TSC.

Working Groups

Once the TSC identifies an issue, a working group is formed to further research the issue and, if possible, recommend a solution. Three such groups are currently active. The Committee of Age Reading Experts (CARE) is an ongoing working group which meets biennially to discuss groundfish age reading issues. Their primary objective is to promote coast-wide consistency and precision in groundfish age reading. The other two are stock assessment working groups formed to address trans-boundary stock issues regarding Pacific whiting and yellowtail rockfish.

Although the sablefish working group is not currently active, the TSC received a report from former working group members on the current status of the proceedings of the 1993 Sablefish Symposium. The Sablefish Symposium was initially recommended and ultimately sponsored by the TSC. There have been considerable delays in publication of the proceedings; however, a 1996 publication date is anticipated.

Working group reports are appended to the 1996 meeting minutes.

Other Topics For Discussion

The agency overviews, stock status, and agency research and management discussions were abbreviated this year in accordance with recommendations made during the 1994 meeting. The agency reports are appended to the minutes in the form in which they were submitted to the secretary. Much of the meeting was spent discussing "Other Topics for Discussion" as follows:

1. The TSC reiterated the need for innovative management of nearshore rockfishes and will work with Stephen Phillips to submit a S-K grant to help facilitate progress on this issue.

2. Halibut and groundfish fisheries in the disputed zone in Dixon Entrance were discussed. It was agreed that Alaskan and British Columbian members will keep each other apprised of fisheries in this area.

3. The Washington representative submitted a memo expressing concern for Pacific cod stocks in Puget Sound and requesting input from Canadian scientists on the status of inshore stocks in British Columbia.

4. The TSC agreed on the need to hold a joint stock assessment review meeting for trans-boundary lingcod. The meeting will be scheduled for the fall of 1996.

5. The TSC agreed to exchange information on ongoing logbook programs utilized by each agency.

6. The TSC request that agencies involved in jack mackerel and sardine management and research begin submit a section on these species in the 1997 TSC report.

7. It was agreed formal membership will continue to be comprised of one member from each coastal state agency, NMFS, and DFO. Chairmanship will rotate among formal members or member agencies for a two-year term.

Progress on 1995 Recommendations

The two recommendations from TSC to Itself were accomplished: Mark Wilkins, NMFS, attended the CARE meeting and agencies appended summaries of user/pay and cost/recovery programs to their annual report.

1996 Recommendations

1. TSC to Itself

The lingcod stock assessment review meeting was not scheduled in 1995, and it was agreed that this meeting would be scheduled for the fall of 1996. The ADF&G representative will request a review of the evaluation procedure used by her agency's age reading lab in using otoliths instead of fin rays to age lingcod. Dr. Methot was asked to draft a letter describing the use of ageing precision information in stock assessment models for the CARE group's information. Finally, each TSC member will provide a memo detailing ongoing logbook programs in their agency and submit copies of each logbook form to TSC.

2. TSC to the Parent Committee

The TSC had considerable discussion on the need for innovative management of nearshore rockfish and the frustration with delay in implementation of such. They request that the Parent Committee assign individuals to pursue support for separate catch monitoring, research, and management initiatives for nearshore rockfish.

The TSC also requested that the Parent Committee resolve the role and sponsorship of the WA-BC Trans-boundary Committee and how this group relates to the TSC terms of reference.

The TSC again noted that combined U.S./Canadian hake harvest continues to exceed the recommended yield option and recommends bilateral negotiations be encouraged to arrive at a quick response.

3. TSC to CARE

The TSC requested the CARE chairperson forward a copy of all otolith exchange results to the TSC chair for distribution to interested members.

1997 Meeting

The 1997 TSC meeting will be May 6-8, in Sitka, Alaska (location later changed to Tiburon, CA). Mr. Barss will replace Ms. O'Connell as chair.

If you wish further information regarding the TSC, call Bill Barss (1997 TSC Chair) at (541) 867-4741 or other TSC members listed in the attached minutes.

MINUTES OF THE TECHNICAL SUBCOMMITTEE OF THE CANADA-UNITED STATES GROUNDFISH COMMITTEE

Thirty-Seventh Annual Meeting
May 7 and 8, 1996
Hatfield Marine Science Center
Newport, Oregon

Bill Barss, ODFW, welcomed everyone.
He handed out packages with local information to the group
Bill introduced Lee Garner from HMSC.
There was discussion and a decision to get minutes and executive summary out ASAP, less than 30 days.
Mark would like to look at the ship *Wecoma* (research) that's docked here, tour at 4:00 p.m. today

I. CALL TO ORDER

Chairperson, Tory O'Connell called the 37th meeting of TSC to order at 13:15 on May 7, 1996.

II. APPOINTMENT OF SECRETARY

Lee Garner from HMSC acted as recording secretary on May 7. O'Connell and Barss will both take minutes on May 8, and O'Connell will provide draft minutes to Barss who will be responsible for publishing the annual report.

III. INTRODUCTIONS

Introductions were made and an attendance list circulated (mailing list included in Attachment A).

Canada Department of Fisheries and Oceans

Mr. Mark Saunders, Pacific Biological Station
Ms. Devonna Adams, Groundfish Management Unit, Vancouver

United States

National Marine Fisheries Service
Mark Wilkins, Alaska Fisheries Science Center, Seattle, WA
Dave Clausen, Auke Bay Laboratory, Juneau, AK
Richard Methot, Northwest Fisheries Science Center, Seattle, WA

Washington Department of Fish and Wildlife
Tom Jagielo

Oregon Department of Fish and Wildlife
Bill Barss

Alaska Department of Fish and Game
Tory O'Connell

California Department of Fish and Game
Tom Moore

Pacific Fishery Management Council
Jim Glock

North Pacific Fishery Management Council
Jane DiCosimo

Pacific States Marine Fishery Commission
Stephen Phillips

IV. APPROVAL OF 1995 REPORT

Report cover page has groundfish spelled incorrectly.
Participant list - some errors, zip codes.
A motion was made to approve the 1995 report.

V. APPROVAL OF 1996 AGENDA

The agenda was approved after reordering of agenda items and addition of IX C.
Washington request to look at trans-boundary issues regarding Pacific Cod.

VI. WORKING GROUP REPORTS

A. Care

Wilkins reported on the CARE Meeting. Since CARE met last week, Betty Goetz was only able to provide a short preliminary report of the meeting. Mark handed out the two-page report and read it into the record (see Appendix 1). Question from Methot about origin of LaJolla personnel (CDFG involvement with sardines). Saunders noted the work CARE was now doing with pelagics and expressed an interest in including at least mackerels and sardines on the TSC reports as well. This prompted a discussion on the meaning of "groundfish" which is not defined in the TSC Terms of Reference. Saunders read the Terms of Reference. O'Connell read ADF&G definition of groundfish. After some more

discussion involving the need for a TSC review of SOS for pelagics and the problems with including unlimited species under our report, it was agreed this will be taken up under recommendations from TSC to itself and Parent Committee.

There was discussion on whether there had been any recommendations to CARE that should have been in the 1995 report. It was agreed the recommendations on page 16 of the 1995 report were responses to requests from CARE and that TSC had not made specific requests of CARE last year.

Saunders has the figures for the CARE manual. Wilkins stressed this is a working document from CARE (addendum in June) and should be published as a binder-type publication as soon as possible. It was agreed Mark should get bids for reproducing high-quality images and then TSC members can approach agencies for publication costs.

Saunders wanted to know if it was worthwhile for Wilkins to be at the meeting. It was agreed the CARE group appreciated a TSC representative. Jagielo also found this to be true. Mark Wilkins expressed some concern that this not become his sole responsibility since the CARE annual meeting is always held the week he prepares for TSC.

Saunders wanted to know if copies of the otolith exchanges would be provided to TSC members. Some others involved in sablefish would be interested in the information. There is not now a mechanism for dispersal among TSC members of these exchanges.

Wilkins added that CARE reports on exchanges and precision testing need more standard reporting. There was discussion on this and also on who should provide a "standard." Perhaps a TSC working group (headed by Methot) is needed for CARE's recommendations.

Use of lingcod otoliths for ageing was a concern brought up by O'Connell. She wondered if any other agency had looked at the comparison structures Kris Munk (ADF&G) used to justify the switch to otoliths. Jagielo said both structures work, but all other agencies are using spines. Inter-agency comparisons will be difficult if ADF&G is the only group using otoliths. CARE using spines, are otoliths more efficient?

B. Pacific Whiting

Saunders gave a verbal report on hake. The tri-annual survey completed, the big question pre-survey had been if the large number of fish seen in 1992 was an anomaly. The 1995 survey found even more fish: 1.8 million tons of exploitable biomass (expecting 1.2). Acoustics review was added to working group purview. Big issue has been what an appropriate target strength is. Jim Trainor for NMFS has published that the historic level may be overestimating biomass; however, he did not give a clear decision on what the appropriate target strength is. Based on the latest survey, the issue of international allocation was again a concern. Needed further study is the extent of the offshore stock. There will be another information exchange and a formal meeting in the fall (Martin Dorn currently

working on stock assessment). This year's quota based on the low-risk approach and conventional interpretation of target strength. Dorn is looking at new target strength as basis for range in latest assessment.

Methot noted there is a move to establish a formal technical committee (via state departments?) once the MOU between Canada and U.S. is established. It is unknown what relationship the formal technical committee will have to the TSC working group and if this group would supersede the WG.

C. Yellowtail Working Group Report

Deferred until later (no report available).

D. Other

1. Sablefish Symposium

Wilkins reported on the reason for continued delays in publication of this proceeding (symposium was held over three years ago). The edited proof has been sent to the publishers, and galley proofs should be available to authors soon. Hardy is promising a 1996 publication date. There was discussion on how frustrating these delays have been and how poorly this reflects on TSC. If TSC has another symposium, authors will want to know if it will take three years to put out publication.

2. Lingcod

This is not officially a working group, and no action was taken last year. Jagielo reports the three-year cycle is up for assessment, and this would be a good year to set up a meeting. Methot suggested a meeting with Canada this summer. Alaska would like to sit in.

VII. OTHER TOPICS

A. Nearshore Rockfish Research-Salstonstall-Kennedy Grant

Phillips distributed a draft proposal which chronicles TSC efforts to resolve nearshore rockfish management since 1992. Phillips feels it is possible to get funding and suggested using the S-K deadline as an incentive to get objectives and methods in grant form. He suggested getting full-time person to work on project (Elaine Stewart's name was mentioned). There was discussion on purpose and objectives. Problems raised, including the concern of some members that money alone wasn't going to solve these problems. O'Connell asked for a definition of species in question and requested Phillips provide all TSC members with agency responses to TSC's 1995 request to agencies to provide status of nearshore rockfish research and management. Methot feels there is a basic need for

information about the removals, life history, and catch trends to provide an index of abundance. This information is not available in the federal fisheries. Saunders suggested that a coastwide GIS program made available to each of the agencies might be the best approach. After much discussion this issue was tabled until tomorrow.

There was then discussion on improving electronic communications between the group. This year's chapters were not readily available on email to all members. Attachments were not working. Glock suggested in the interim the PFMC bulletin board could be used for file exchanges. This is not the best approach, but may work for the short term.

B. Impacts of International Tension on Objectives of TSC

It was agreed this was not an issue this year.

C. Pacific Cod

Jagielo distributed a memo from Greg Bargmann expressing concerns for PCOD stocks based on declining catches in Puget Sound. Saunders and Adams agreed to have the Canadian assessment scientist and Jergen Westerheim provide information on inshore stocks to WDFW.

Adjourn for afternoon at 4:05 p.m.

Wednesday, May 8 meeting commenced at 8:15 a.m.

VII.A. (continued).

There was a long discussion on availability of S-K funds and how appropriate a proposal would be on nearshore rockfish management. Canadian participation in this proposal could be funded under IJF money. PSARC had a working group that made specific recommendations for innovative and non-standard assessment methods (Lynne Yamanaka is the DFO contact for this). Methot asked if the SE center could be brought in to the discussion as they and CDFG have done some work on area refuge approaches. Members expressed frustration on how slow the response has been to this particular problem and want to ensure more focus is given to this topic. There was agreement that any approach will need to include and encourage participation by industry. We need to have clear goals for data collection with timely use of data and educate fishermen about these goals. For example, implementation of a logbook/catch reporting program should have industry input. Given the reef- specific nature of the fishery, what information would match their fishing experience? Again, the need for habitat assessment was discussed and how a GIS would interface with catch/effort, biological data, and habitat data. Perhaps PSMFC could warehouse a coastwide GIS database to help scientists with GIS approach.

It was decided that Phillips, with help from Saunders and Jagielo, would put together the framework for a first-step proposal that would allow us to get our foot in the door. A draft

proposal will be ready for review by next Friday. It was also agreed a recommendation will be made to the Parent Committee stressing the urgency of this issue.

VIII. REVIEW OF AGENCY GROUNDFISH RESEARCH, ASSESSMENT AND MANAGEMENT

A. Agency Overviews

1. California

None.

2. Oregon

Hal Weeks is now working in Newport and is the new Bycatch Project Leader. Elaine Stewart will be leaving her position as Finfish Assessment Project Leader on June 1.

3. Washington

None.

4. Canada

DFO merged with Coast Guard in 1995.

5. Alaska

Margaret Cartwright was appointed to the Region 1 Assistant Groundfish Project Leader position.

B. Overview by Species

1. Multispecies

Saunders was interested in types of developing fisheries plans each agency has. He was also specifically interested in the blue shark fishery in Oregon. The southeast region of Alaska has an emerging fisheries policy. There was also discussion on exchanging logbook pages so each agency was aware of types of data being collected by other agencies. Methot pointed out non-trawl logbooks are not accessible on any data system. O'Connell said NMFS Alaska Fisheries Science Center (AFSC) has collected longline logbooks for years from the sablefish fishery, but has never entered the data. The State of Alaska requires logbooks in the DSR, lingcod and flatfish fisheries and has

a proposal to require them in all groundfish fisheries. They require the completed logbook be attached to the fish ticket at the time of landing.

Jagielo reported on several multispecies programs conducted by Washington, including beach surveys of spawn deposition for sandlance and a herring acoustics survey.

O'Connell asked if others had hagfish fisheries and/or stock assessments. ADF&G has been requested to grant an experimental fishery permit for hagfish in southern southeast Alaska. Moore said there had been an 800,000-lb fishery out of Fort Bragg, but there are signs of localized depletion. Canada has a stock assessment in place and has seen localized depletion with expansion of the fishery (inlet-specific).

NMFS: Personnel discussed the bottom trawl survey of the Gulf of Alaska (GOA): 75 days and three boats May-July; also, there is an annual crab/groundfish assessment in the Bering Sea (BS) for 75 days using two boats. Methot reported they plan to augment sampling on the west coast by chartering for a slope survey in October-November, along with the six-week Miller Freeman cruise. There will also be a hydroacoustic survey for pollock in the BS (across outer shelf to Cape Navona).

PFMC: Glock discussed some changes in management of the trawl fishery 1) now a two-month trip limit with provisions that up to 60% can be taken in either month. This is an attempt to provide a 10% overage in either month to decrease discarding. The Makah tribe wants a whiting allocation for trawling which will mean a federal regulatory process for determining allocation.

NPFMC: a regulation to require electronic reporting passed at the last NPFMC meeting (Kia Brix contact). California uses an optically scanned receipt that allows 3,000 tickets to be entered each day. There was discussion regarding pros and cons of electronic reporting. It was agreed the point of entry is critical, as most records need editing. Processor entry was strongly discouraged.

2. Shelf Rockfish

California: Pilot program with refugia at the lower end of Big Sur. The Big Creek area is not accessible by beach and is closed to all removals, no anchoring, etc. This was a voter initiative. Current studies include mapping nearshore bathymetry, estimating immigration and emigration. CDFG is also involved in a tagging program of rockfish and lingcod which includes OTC validation.

Canada: The nearshore rockfish plan is the same for 1996 as it was in 1995. They are in the process of long-term management planning including allocation between gear groups, ITQs, area licensing, and stacking licenses.

NPFMC: Currently an attempt to remove dusky rockfish from the PSR group and turn management authority over to the state (similar to DSR). Other species of PSR are not adequately assessed via the trawl survey, and there are conflicting issues of nearshore overharvest in some areas, and in other areas the offshore dusky fishery pre-empts the nearshore fishery.

3. Slope and Thornyhead

Oregon: New ageing group may look at darkblotch. Thornyhead are being sampled for size, but no ageing structures taken.

Canada: Trawl fishery developing for longspine thornyheads. Also, an experimental hook and line rockfish seamount fishery has begun, mainly targeting rougheye, but also taking amounts of shortraker, yelloweye, thornyheads, and sablefish. Bruce Leaman has received funding to continue his Pacific ocean perch (POP) work, this time looking at the larval distribution and abundance in Goose Island Gully during July. Finally, a trawl survey for rockfish will be conducted north of 54°.

Alaska: Some of the DSR fishermen through the Alaska Longline Fishermen's Association have petitioned the NPFMC to limit entry in the DSR fishery. There are problems here with implementation between state and federal waters and also whether a federal program could legally be implemented in state waters.

NMFS: Dan Ito was chief scientist on an 18-day cruise this winter to evaluate the new footrope gear (heavy duty) on the rockfish trawl. He also implemented a fishing-down experiment for shortraker/rougheye, making 17 tows then returning one week later for an additional 14 tows. Shortspine thornyhead displayed the predicted decline in abundance, the trend was less obvious with rougheye, and halibut actually increased in abundance.

California: Mickey Eldridge is working on life history and biological information for shortbelly rockfish in the Gulf of Farallones.

PFMC: Open-access fishery took their thornyhead allocation in about one month (4 mt). Shortspine thornyhead is the weak link in the deep-water/slope complex. Jean Rodgers is looking at the entire set of Sebastes records to try and detect changes through the assessment surveys and support separation of the shelf and slope group for assessment and management. Shelf and slope are not differentiated in PFMC.

4. Sablefish

California: In Fort Bragg there was a 300-lb/daily trip limit which resulted in significant harvest. Now there is a 2,100 lb/month limit. The department believes the fleet is hygrading as no small fish are coming in.

Canada: Ray Hillborn and Carl Schwartz were hired to review assessment and tagging data. DFO would like to separate northern and southern BC assessment because they show differing recruitment pools. Plan to undertake a large tagging program in 1996 to obtain abundance estimates as well as understand the link between BC and U.S. stocks.

Alaska: Clarence Strait area is currently being surveyed. Dixon Entrance stations were added this year to reflect changes in fishery distribution. The fishery will open on June 8 this year. The state is currently working on age-structured models for sablefish in Chatham Strait and may conduct a fishing-down/tagging experiment there this summer.

NMFS: GOA assessment shows stocks in decline, primarily because of lack of strong recruitment. No strong year class after 1984. ABL has been experimenting with using a small mesh gillnet to fish at night during their longline cruise to capture young sablefish. Fairly successful, so plan to expand this project. The 1996 longline survey will expand into the Aleutian Islands (AI) area this year. There was discussion of problems with overlap in the commercial fishery and survey. Clausen felt the situation was better than expected last year and they plan to increase awareness this year.

PFMC: Fixed-gear ITQ plan is on hold pending reauthorization of the Magnuson Act. Cumulative limits, equal share, and percent based on history are all under consideration. There is currently a five-day derby-style fishery starting September 1. There has been growth in the open-access fishery with large excesses in quotas occurring.

5. Flatfish

Oregon: Hal Weeks is working with the International Pacific Halibut Commission (IPHC) on bycatch of halibut in the trawl fishery and is involved in producing a videotape outlining release and handling to reduce mortality of bycatch (educational). The sand dab fishery continues to grow, and ODFW is now ageing sand dab otoliths.

Canada: There has been a developing live sole fishery targeting rock sole and lemon sole.

NMFS: Methot reported on Ageing Group at Newport. They are now looking at Dover sole in terms of depth-specific age data from surveys. Nearshore flatfish are the fifth major assemblage for management on the west coast, and there is currently a need for resource survey and new efforts to calibrate logbook data for this group (English sole, petrale sole, sand dab, and arrowtooth flounder).

6. Lingcod

Oregon: Cooperative programs with industry (fishermen's marketing association in Eureka). Plant personnel will now take port samples (ageing structures). This is to increase sampling opportunity because encounter rate for port samplers is low.

PFMC: The size limit for lingcod was set arbitrarily at 22 inches. There is a 100-lb/trip allowance on trawlers for undersized fish. Glock brought up information by Dave Gordon that documented differential shrinkage rates depending on processing type. There is concern this is not well documented for other fish, and the Alaska sample (very small) was the only evidence supporting this phenomena. There was discussion of other evidence of shrinkage (i.e., negative growth in tag returns etc.).

Alaska: Main shrinkage difference was between iced and slush-iced fish (headed and gutted). ADF&G has initiated a tagging study to document direction and distance of movement. During initial phases of this study it was discovered that the nearshore lingcod catch rate is well below average, and although females were abundant in the winter longline fishery, the department has closed one-half of the CSEO management area until further survey work is completed. The East Yakutat area experienced a large increase in effort and catch from the directed dinglebar fishery in 1995, with over 300,000 round lb of lingcod taken from this area.

C. Other Related Studies

Oregon: Market demands for skate wings have increased, with most landings being Big Skate or Longnose Skate. They are working on determining a conversion factor for skate wings to round. O'Connell, Adams, and Jagielo are all interested in the Oregon work, as there is increasing interest in skate fisheries in other areas as well.

Washington: WDFW conducted a biometric review of their entire marine project. This document is finished and ready for review.

Canada: Canada is now using an Integrate Data System and LAN on their vessels. It has been very successful, as it allows scientists to access any data subset from their portable (METNAV system). Adams reported on the new weight validation program in place for U.S. vessels landing in Prince Rupert. These vessels are charged 3.5 cents/lb for the service.

Alaska: The southeast region is continuing with their rockfish/habitat assessment, this year with the use of an AMS -150 sidescan imaging system that will collect imagery, swath bathymetry and sub-bottom profiling simultaneously. They plan to survey two blocks, about one-third the entire management area. These data will be used to produce detailed habitat maps of these areas which will allow quantification of rockfish habitat for use in biomass estimation of DSR. O'Connell reminded TSC the West Coast National Undersea Research Center has a call for proposals out with a September 1 deadline.

NMFS: Methot reported on several ongoing projects including English Sole in Puget Sound. The Environmental Conservation Division is applying whole life models. Increasing mortalities at various life stages may apply to this species given multiple stresses (including environmental).

NPFMC: There is ongoing assessment of the IFQ program for Governor Knowles, results of which will be reported at the Sitka NPFMC meeting in September.

PFMC: Redoing whiting allocation with a three-way split and seasonal differences for different sectors. Permits will be transferable or leasable in-season with some caveats that transfers must wait one month to go through, and each permit is limited to one transfer/year.

D. Other Items

Saunders requested the latest statistics on the Puget Sound hake resource. He also announced the pending retirement of their dogfish age-reading expert and suggested that the time to do comparative work is limited.

IX. PROGRESS ON 1995 RECOMMENDATIONS

A. From TSC to Itself

1. Wilkins attended the CARE meeting, and it was agreed a TSC member would continue to be present during the bi-annual meeting.

2. Agencies appended summaries of user/pay and cost/recovery program in commercial fisheries to their reports.

B. From Parent Committee to TSC

Response to Parent Committee: The TSC notes both Canada and the U.S. adopted 265,000 mt at the coastwide acceptable biological catch (ABC) for Pacific whiting (hake) in 1996. The U.S. has adopted 212,000 mt as its harvest guideline, and Canada has adopted 91,000 mt as its total allowable catch (TAC). Thus, total expected coastwide harvest is 303,000 mt, or 38,000 mt over the ABC. The TSC also notes the two nations met formally in April 1996 to discuss management of this stock. It appears the negotiation process has moved beyond the TSC and Parent Committee forum, and that a draft MOU is under consideration by the two countries. The TSC remains willing to provide technical assistance in this process; however, a separate technical committee may be established under the MOU, which could supersede TSC.

C. From CARE to TSC

All 1994 recommendations were completed.

X. 1996 TSC RECOMMENDATIONS

A. TSC to Itself

1. The TSC recommends Canadian and U.S. scientists hold a meeting in late summer/early fall to consult on assessment of lingcod in the coastal trans-boundary area in PSMFC areas 3A, 3B, and 3C to (1) evaluate evidence supporting the trans-boundary nature of the stock to help clarify the operational stock unit, (2) exchange data to facilitate future assessments, and (3) review modeling procedures.

2. The TSC recommends each TSC member provide the chairman with a memo detailing ongoing logbook programs with examples of logbook pages. The chair will then distribute these memos to TSC members.

3. The TSC recommends the ADF&G representative request a report from the ADF&G age lab documenting the comparison study undertaken for evaluating cleared otoliths versus spines which led to their decision to use otoliths as their lingcod ageing structure. Specifically, there is concern the structure used historically by all other agencies is the dorsal spine, and use of another structure by ADF&G may preclude coastwide comparisons of age and growth.

4. The TSC requests a TSC member (Dr. Methot) draft a description of the use of ageing precision information in stock assessment models. This report will be forwarded by the chair to CARE and TSC members.

B. TSC to Parent Committee

1. During the 1990s substantial quantities of mackerels and sardine have been encountered in fisheries from California to southern Canadian waters. The TSC asks the Parent Committee request from each agency a submission to the May 1997 TSC meeting documenting research, stock assessment, and management for Pacific and jack mackerels and sardines.

2. The TSC requests the Parent Committee resolve the role and sponsorship of the Washington-British Columbia Trans-boundary Committee and report back to TSC on how they relate to our terms of reference.

3. In 1995 the Parent Committee received from the TSC details of historic and current management strategies for nearshore rockfish. Based on these findings, the Parent

Committee determined a management workshop was not warranted in 1995. The TSC feels there is still a need to move quickly on developing assessment and management techniques for nearshore rockfish. The TSC recommends the Parent Committee assign individuals to pursue support for separate catch monitoring, research, and management initiatives for nearshore rockfish.

4. The TSC wants to express to the Parent Committee their frustration that the Proceedings of the International Symposium on the Biology and Management of Sablefish, which was held in April 1993, have still not been published. We recognize many factors have contributed to this situation. We fear the failure to have published these Proceedings in a timely manner will hinder our ability to successfully sponsor future symposia. We request the Parent Committee bring to bear what pressures they can to ensure the Proceedings are published in 1996.

5. The TSC notes the combined Canadian/U.S. harvest of hake continues to exceed the adopted yield option and recommends to the Parent Committee that bilateral negotiations be encouraged to arrive at a quick response.

C. TSC to CARE

The TSC requests CARE send a copy of all otolith exchange results to the TSC chair for distribution to interested TSC members.

XI. SCHEDULE AND LOCATION OF NEXT MEETING

The 1997 annual meeting will be held on May 6-8 in Sitka, Alaska. Bill Barss, ODFW, was appointed Chairman for the years 1997-1998.

XII. ADJOURNMENT

It was noted members preferred discussing "Other Topics for Discussion" prior to the agency reports as it allowed for more discussion of these items. The meeting was adjourned at 16:15.

Attachment A

PARTICIPANTS AT THE 1996 TSC MEETING

Ms. Devona Adams
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Attachment B

CARE REPORT TO TSC

ANNUAL REPORT OF THE ACTIVITIES OF THE COMMITTEE OF AGE READING EXPERTS (CARE)

To: Technical Subcommittee of the Canada-United States Groundfish Committee

From: CARE Meeting April 30-May 3, 1996, Betty Goetz (chairperson, AFSC)

Date: May 3, 1996

Subject: Preliminary Report of Proceeding of April 30-May 3,1996 CARE Meeting

The eighth biennial meeting of CARE was attended by representatives from ADF&G/Juneau (Kristin Munk, William Foster), WDFW (Sandra Rosenfield, John Sneva), ODFW/Newport (Bob Mikus, Joe O'Malley, Bruce Pedersen, Marion Mann), Pacific Biological Station (Shayne MacLellan, Diana Little), CDFG/PSMFC (Rachael Miller, Tom Barnes, Marci Yarenko), IPHC (Cal Blood, Joan Forsberg, Thomas Kong), and AFSC (Betty Goetz (chair), Craig Kastelle, Delsa Anderl, Julaine Lyons, Nancy Roberson, Charles Hutchinson, Jill McKay, Mark Blaisdell, Chris Johnston). Mark Wilkins represented the TSC. Observer: Dan Kimura (AFSC Age & Growth Task Leader).

Since representatives from two new ageing facilities (Newport, OR and La Jolla, CA) were present, much discussion focused on description and clarification of collection, ageing and data management protocol.

Topics of Discussion

1. Ageing Manual status and revision of terminology regarding summer/winter growth to fast/slow growth zones and revision/addition of several terms. Incorporation of additional addendum describing effects of both transmitted and reflected light on ageing structures. These changes will be drafted in committee and completed by early June 1996.

   a. Committee: Craig Kastelle/Shayne MacLellen: addendum to describe transmitted vs. reflected light and effects on ageing structures.

   b. Committee: Kris Monk, AFSC, Shayne MacLellan: to revise Glossary.

2. Description of agency protocol to include sample collection methods, storage procedures and media, data recording, precision testing, content of reports to End Age Users. (Written reports by agency will follow to include examples of precision testing results.)

3. Subsampling considerations. Martin Dorn (AFSC) discussed various factors used to select subsamples for stock assessment purposes.

4. Number of otoliths aged by species/agency. To be summarized in CARE minutes.

5. Revision/review of Appendix 3: Summary of Age Reading Methodology (by species/agency).

Work-in-Progress Reports (detailed reports to follow)
Rachael Miller reported on results of a bocaccio otoliths exchange with Kris Monk. Kris Monk reported on results of a multi-agency sablefish exchange. Delsa Anderl (for Kent Scott) reported on studies involving rock sole and yellowfin sole speciation. Jill McKay reported on work involving incidence of crystallization in pollock otoliths. Shayne MacLellan reported on ICES redfish group meeting she attended. Craig Kastelle reported on current radiometric age validation of rockfish species.

Ageing Workshop
Structures from a number of species to include sablefish, Dover sole, pollock, sharpchin rockfish, shortraker rockfish, rougheye rockfish, shortspined thornyheads, lingcod, sardine, Pacific mackerel, bocaccio, Pacific cod, etc. were examined and discussed during a four-hour hands-on ageing workshop.

Recommendations to CARE from CARE
Work to distribute Rapporteur duties amidst various agencies involved in CARE.

Recommendations from CARE to TSC
1. In light of recommendation from the TSC to CARE encouraging incorporation of precision testing in standard agency protocol, how are these precision results being utilized by agency biometricians/stock assessment personnel? What is considered acceptable error by agency biometricians?

2. TSC needs to proceed with final arrangements for publication and distribution of the Ageing Manual. New revisions will be complete by early June 1996. We would like some commitment on this or indication that we need to explore other avenues. We have multiple requests for access to this document.

Chairperson for next cycle: Cal Blood (IPHC)
Vice chairperson for next cycle: Kristin Monk (ADF&G, Juneau)
Rapporteur for next cycle: Bob Mikus (ODFW, Newport)

Attachment C

HAKE WORKING GROUP REPORT

The Pacific hake working group was active during 1995. Activities included the following:

1. Exchange of 1995 fishery catch, catch-at-age, and growth data.

2. 1995 status of stocks. M. Dorn of the AFSC conducted population modeling of the combined Can./U.S. data sets. Results of the assessment work were reported in separate Canada and U.S. documents and are detailed in the Canada and U.S. sections of the TSC. Both countries agreed on the status of the stock and the coastwide yield options.

3. Joint survey. Canada and the U.S. conducted a joint hydroacoustic assessment survey of the Canadian zone using the CCS W.E. RICKER and the NOAA Ship *Miller Freeman.*

4. Review of 1995 survey results. Two meetings were held to discuss results of the 1995 triennial survey (minutes of meeting attached). More fish than predicted were encountered and there are preliminary indications that it is due to the 1993 year-class. Target strength data published during 1995 by J. Traynor were reviewed by the group, and implications are that previous values may have overestimated stock sizes.

5. Interim assessments incorporating survey and target strength results were produced by both countries. Modeling was conducted by M. Dorn. Yield estimates were up considerably based on new survey results. Canada and the U.S. did not agree on the range of yield options to present. Canada's options included the low end of estimates derived using the more conservative target strength model.

6. Advice was provided to a formal Canada/U.S. hake negotiation meeting. A Memorandum of Understanding (MOU) on Hake Allocation is under consideration by both countries, and a condition of the MOU will have a formal hake working group established which may supersede the TSC working group. No agreement was reached on the allocation issue.

Attachment D

REVIEW OF AGENCY GROUNDFISH RESEARCH ASSESSMENTS, AND MANAGEMENT: AGENCY REPORTS

1. ALASKA

A. AGENCY OVERVIEW

1. Description of State of Alaska Groundfish Program

The ADF&G has jurisdiction over all groundfish fisheries within internal waters of the state and to three miles offshore along the outer coast. A provision in federal GOA Groundfish Fishery Management Plan (FMP) gives the State of Alaska limited management authority for DSR in federal waters east of 140° W. longitude. The state also manages the lingcod resource in both state and federal waters of Alaska. Other groundfish fisheries in Alaskan waters are managed by the federal government or in conjunction with federal management of the adjacent Exclusive Economic Zone (EEZ). Information related in this report is from the state-managed groundfish fisheries only.

The State of Alaska is divided into three maritime regions for marine fisheries management. The Southeast Region extends from the EEZ (Equidistant line) boundary in Dixon Entrance north and westward to 147° W. Longitude. The Central Region includes internal waters of Prince William Sound, Cook Inlet, and Bristol Bay and the Outer District off Kenai Peninsula. The Westward Region includes all territorial waters of the GOA west of Cape Douglas, Kodiak Island, the AI, and the BS.

a. Southeast Region

During 1995 the Southeast Region Commercial Fisheries Groundfish Project underwent significant changes in staff with the retirement in July of longtime project leader Barry Bracken Victoria O'Connell was appointed to the groundfish project leader position, and a new port biologist, Cleo Brylinsky, and new assistant project leader Dave Gordon were hired. All three positions are located in Sitka. Seasonal port samplers were employed in Petersburg, Ketchikan, and Craig. The project also received biometrics assistance from the regional office in Douglas.

The Southeast Region's groundfish project has responsibility for research and management of all commercial groundfish resources in the territorial waters of the Eastern GOA. The project also cooperates with the federal government for management of the waters of the adjacent EEZ and the project leader participates as a member of the NPFMC's GOA Groundfish Plan Team.

Project activities center around fisheries monitoring, resource assessment, and in-season management of the groundfish resources. In-season management decisions are based on data collected from fisheries and resource assessment surveys. Primary tasks include fish ticket collection, editing, and data entry for both state- and federal-managed fisheries; dockside sampling of lingcod, Pacific cod, and rockfish landings; skipper interview and logbook collection and data entry; and biological studies of important commercial species. Five resource assessment surveys were completed during 1995. Regulation development and review and information dissemination also require considerable staff time.

b. Central Region

In 1995 the Central Region reorganized the groundfish staff. Existing shellfish staff based in Homer and Cordova assumed the management portion of the groundfish duties. Research duties were absorbed by the Lower Cook Inlet Research Biologist who will now be responsible for Central Region groundfish and shellfish research. Groundfish management responsibilities include sablefish, rockfish, pollock, and lingcod in Prince William Sound, and sablefish rockfish, and lingcod in both Cook Inlet and the North Gulf District. Fish ticket data entry is handled by the regional groundfish management biologist in Homer.

c. Westward Region

The Westward Region Shellfish/Groundfish biologist is responsible for supervising fish ticket data entry and analysis of groundfish data collected from crab stock assessment surveys. The Kodiak staff continues to monitor developing black rockfish fisheries within the region. Additionally the Dutch Harbor staff has been monitoring the state-water sablefish fishery in the AI.

d. Headquarters

ADF&G personnel continued to enter fish tickets from all shore-based groundfish landings from Alaskan waters during 1995 under a renewed cooperative agreement with the NMFS. Fish tickets from all shore-based groundfish fisheries were collected, edited, and entered on microcomputers in five coastal communities. A programmer analyst working in Juneau was responsible for setting up and maintaining the master state-wide groundfish fish ticket database and providing summary groundfish catch information to NMFS, ADF&G, and PacFIN.

e. Sport Fish Division

Recreational fisheries for groundfish primarily occur within state waters. As a result, the Division of Sport Fish has primary responsibility for managing these fisheries. In recent years, the Division has taken a more active role in monitoring recreational groundfish fisheries and has several biologists assigned this effort. In the North GOA, Doug Vincent-Lang (stationed in Anchorage) is the management biologist for groundfish and Scott Meyer (stationed in Homer) provides research support. In southeast Alaska, no biologists are specifically assigned to groundfish, rather groundfish activities are incorporated into various area management biologists' duties. Names, titles, and addresses for contact biologists are provided in Appendix 1.

Although many groundfish species are targeted by recreational anglers, most management and research effort is directed at halibut, rockfish, and lingcod, given these are the primary species targeted by recreational anglers. Halibut are the focus of a statewide research and management effort. Fishery and stock data are collected as part of a port sampling effort and are provided annually to the IPHC and NPFMC. Rockfish and lingcod fisheries are growing in popularity and have become an increased focus of research and management effort. Both fishery and stock information are collected on these species in the North GOA. Seasons and bag and possession limits for rockfish and lingcod are most restrictive on the west coast.

B. BY SPECIES

1) Pacific Cod

a. Research

Catch rate and biological information are gathered from fish ticket records, port sampling programs, and during stock assessment surveys for other species. A voluntary logbook program was initiated for state waters of SE Alaska in 1992 to provide a relative index of CPUE. Commercial landings in SE are sampled for length, weight, sex, and stage of maturity.

b. Management

Regulations adopted by the Alaska Board of Fisheries during November 1993 established guideline harvest range (GHR) of 340 to 570 mt for Pacific cod in the internal waters of SE Alaska. The GHR was based on average historic harvest levels rather than on a biomass-based ABC estimate.

Cod along the outer coast are managed in conjunction with the TAC levels set by the federal government for the adjacent EEZ. However, there are gear restriction in state waters in lower Cook Inlet and around Kodiak Island to reduce crab bycatch.

c. Fisheries

Most of the Pacific cod harvested in Southeast Alaska, Prince William Sound, and the North Gulf District is taken by longline gear. Pots are the dominant gear in Cook Inlet. Prior to 1993 much of the cod taken in Southeast was utilized as bait in fisheries for other species. Cod harvested since that time is roughly evenly divided between bait use and human consumption. In other areas of the state, Pacific cod are harvested in both state and federal waters and utilized primarily as food fish. Harvests of Pacific cod totaled 150 mt in the SE state-managed fisheries during 1995. 3,600 mt of Pacific cod were taken in the Cook Inlet/North Gulf District, and 677 mt were taken in Prince William Sound; however, cod in these areas are managed under the federal TAC.

2) Rockfish

Shelf rockfish are managed under two assemblages: demersal shelf (DSR), pelagic shelf (PSR), and slope rockfish. DSR include the following species: yelloweye, quillback, china, copper, rosethorn, canary, and tiger. Redbanded rockfish was removed from the DSR assemblage in 1995 and placed in the slope rockfish assemblage. PSR

include dusky, black, blue, yellowtail, and widow. Slope rockfish contain all other *Sebastes* and *Sebastalobus* species.

a. Research

ADF&G port sampling, skipper interview, and logbook programs for shelf rockfish fisheries continued in Southeast Alaska through 1995. The logbook and interview programs are designed to furnish detailed catch and effort information, estimate at-sea discards, and obtain more detailed information regarding specific harvest location. The port sampling program provides species composition from the landed catch and an opportunity to collect biological samples. Otoliths were obtained from principal DSR species and black and dusky rockfishes and sent to the age-reading laboratory in Juneau for age determination. Data from these programs are entered on a microcomputer in Sitka. (Contact Victoria O'Connell, ADF&G, 304 Lake St. Room 103, Sitka, AK 99835)

The Division of Sport Fish collects harvest and fishery information on rockfish as part of an ongoing port sampling program in the North GOA. Objectives of this program are 1) to estimate species, age, sex, and size compositions of rockfish harvests at select North GOA ports and 2) to characterize the recreational groundfish fisheries that occur at these select ports. Ports currently sampled in the North GOA include: Seward, Valdez, Kodiak, Homer, and Deep Creek/Ninilchik. In combination, these ports represent the primary areas of recreational groundfish harvest in the North GOA. Although some slope rockfish are recreationally harvested, the primary species caught in the recreational fishery belong to the DSR and PSR assemblages. Primary species harvested include black, dusky, and yelloweye rockfish. There is no similar program focused on recreational groundfish fisheries ongoing in southeast Alaska. (Contact: Doug Vincent-Lang, title and address provided in Appendix 1)

b. Stock Assessment

Three rockfish surveys were conducted during 1995. The *F/V Ida June* was again contracted to index annual CPUE and collect biological data in the EYKT and CSEO Sections of the Southeast Outside Subdistrict. The submersible *Delta* was operated under contract to conduct stock assessment transects in the CSEO and EYKT sections of the Southeast Outside Subdistrict. Preliminary results of this work were analyzed and used to recommend harvest levels for DSR in the Southeast Outside Subdistrict for 1996. Several changes were made to survey design including the addition of a forward-mounted video camera to insure the critical 100% detectability assumption needed for line transects. We found that up to 12% of the fish on the line were unseen by the observer. Consequently density (and associated biomass estimates) estimates for yelloweye rockfish in 1995 (used in the 1996 TAC) were higher than previously reported. For example in the CSEO section, density of adult yelloweye was estimated to be 2,929/km^2 resulting in

biomass estimate of 13,167 mt (lower 90% CI) for this area compared to the 1994 estimate of 7,583 mt (Contact Victoria O'Connell, ADF&G, 304 Lake St. Room 103, Sitka, AK 99835).

c. Management

DSR assemblage is the only component of the rockfish complex actively managed by the state in Southeast Alaska at this time. Rockfish management for this group is based upon a combination of GHRs, gear restrictions, and trip limits. The state has management authority for DSR in both state and federal waters of Southeast Alaska. Directed harvest of DSR is restricted to hook-and-line gear. Separate harvest ranges have been established for each of six Southeast Alaska management areas based upon best available information on condition of rockfish stocks in each area. Regulations adopted in 1994 include reduced GHRs in internal waters, reduced weekly trip limits from 7,500 lb per vessel to 6,000 lb per vessel (12,000 lb in EYKT), and added a requirement that logbook pages must be submitted weekly with fish tickets from each fishing trip. The 1995 TAC for DSR was 580 mt in Southeast Outside. A significant portion of the harvest is taken as bycatch mortality during the halibut fishery, therefore only 250 mt was released for harvest by the directed fishery. Additionally 50 mt were released in the SE inside waters.

Implementation of the federal IFQ fishery for halibut impacted the directed DSR fishery. Previous to 1995 DSR were managed based on three seasonal allocations: January, July, and October. Because of the bycatch provisions inherent in the IFQ fishery, ADF&G does not allow directed fishing for DSR during the IFQ season, March 15 - November 15. The directed DSR fishery quota is now allocated with two-thirds of the quota apportioned to the January 1 - March 15 season and one-third of the quota apportioned to the November 16 - December 31 season.(Contact Victoria O'Connell, ADF&G, 304 Lake St., Room 103, Sitka, AK 99835)

Given the lack of quantitative stock assessment information for much of Alaska, managers have established conservative harvest strategies for recreational rockfish fisheries. Recreational seasons and bag and possession limits for rockfish in Alaska are the most restrictive on the west coast. (Contact: Doug Vincent-Lang, title and address provided in Appendix 1)

Rockfish management plans adopted and implemented for the Prince William Sound and the North Gulf Coast Districts during 1993 were fully implemented in 1995. Provisions of the plan place a trip limit on all landings and a provision which reverts the fishery from directed to bycatch status when an annual harvest limit has been reached. (Contact Al Kimker, ADF&G, 3298 Douglas St., Homer, AK 99603)

In Southeast Alaska slope rockfish are managed as part of the "other rockfish" complex under an area-wide annual harvest limit of 500 mt. In the Central Region slope rockfish and shelf rockfish are managed as a single complex. Slope rockfish are included in trip limits and annual harvest objectives under the Central Region's Rockfish Management Plan.

d. Fisheries

Harvest of rockfish from state-managed commercial fisheries totaled 785 mt in 1995. DSR accounted for 385 mt of this, with the remainder primarily black rockfish in the Central and Western Districts and shortraker, rougheye, and shortspine thornyheads in the SE district. Virtually all rockfish harvested in state-managed fisheries is taken by hook-and-line gear, either in directed fisheries or incidental to fisheries for other species.

3) Sablefish

a. Research

An intensive skipper interview program is conducted during the Southeast Alaska area's two internal water fisheries. The objective is to obtain detailed catch and effort information from the participants. This program also provides an opportunity to collect tags recovered during the fisheries.

b. Stock Assessment

Sablefish stock assessment surveys were conducted in each of the two Southeast Alaska inside management areas for the eighth consecutive year during 1995. The surveys use snap-on longline gear set at stations randomly selected during the first year of the project. Gear is allowed to soak for a standardized fishing period of one hour. Results are utilized to determine inter-annual changes in relative abundance. These surveys are also designed to provide biological samples from sablefish populations within each area. Every tenth fish captured is sampled for AWL, sex, and maturity. Otoliths taken during these surveys are sent to the ADF&G age-reading laboratory in Juneau for age determination. In 1995 a soak time study was conducted to determine if catchability increases with increased soak time (one hour vs. three hours). Results were not conclusive.

Preliminary results of the surveys show there has not been a significant linear trend in abundance in either area over the duration of the surveys. There has been a decline in CPUE in both the survey and the fishery since 1994. Between year differences in numbers of fish were noted in both areas, but differences in kg per hook were insignificant.

Cost of these surveys is offset by sale of fish caught. Fish are dressed and iced according to industry standards, and the state receives all revenues from sale of the fish. (Contact Meg Cartwright, ADF&G 304 Lake St., Rm. 103, Sitka, AK 99835).

c. Management

There are three separate internal water areas in Alaska managed exclusively by the state. The Northern Southeast Inside Subdistrict, the Southern Southeast Inside Subdistrict, and the Prince William Sound District each have separate seasons and GHRs. Although the North Gulf District and the Aleutian Island District are not classified as internal waters in the strictest sense, the state manages the sablefish fishery within the three-mile limit in these areas under an open-access fishery.

An annual harvest objective is selected within the GHR for each area, based on best available information on current stock condition. In the Southeast areas, season length is set prior to the opening according to estimated time required by the existing fleet to reach the harvest objective.

Since 1985 both Southeast Inside Subdistrict sablefish fisheries have been managed under a license limitation program. Because of increased vessel efficiency the season for the NSEI Subdistrict has been reduced to a 24-hour per year "derby" style fishery since 1987. Even in that short season, pre-season harvest objectives set by ADF&G have been consistently exceeded. Beginning in 1994 a new harvest strategy was adopted for the NSEI Subdistrict sablefish fishery. In response to a concern for potential over-exploitation, the Board of Fisheries adopted regulations which restrict harvest to no more than 3,000,000 dressed weight for the 1994, 1995, and 1996 seasons. To assure the newly adopted quota is not exceeded, the annual harvest objective is equally divided among eligible permit holders. The season was extended from 24 hours to 30 days to provide for a more rational and manageable fishery. For the 1995 season each of 121 eligible permit holders was allocated 24,500 lb dressed weight. The season started noon September 13 and continued until noon October 13. Although there was an initial outburst of complaints and concern, comments received from industry after the second year have been generally quite favorable. The 1995 SSEI fishery opened on June 20 for 48 hours with a harvest of 316 mt.

The season framework in both of the Southeast Inside management areas allows for some flexibility in starting dates to avoid conflicts with other fisheries and periods of large tides. This is done because large tides tend to concentrate effort and result in more lost gear.

Limited entry was adopted for Prince William Sound sablefish in 1995 and will be implemented for the 1996 season.

The offshore sablefish fisheries (0-3 miles) are managed in conjunction with the federally managed fishery in the EEZ. In some areas of the Gulf the state opens the fishery concurrent with the EEZ opening. These fisheries are open access in state waters, as the state cannot legally implement IFQ management at this time. Quotas are based on historic catch averages and closed once these have been reached. There is no open-access sablefish fishery in the Southeast Outside district as there are extremely limited areas that fall inside state waters and are deep enough to support sablefish populations.

d. Fisheries

In the Northern Southeast Inside Subdistrict, 121 vessels harvested approximately 2,117 mt round weight during a 30-day season opening September 13. In the Southern Southeast Inside area, 30 vessels harvested approximately mt round weight in a 48-hour fishery beginning June 20.

Although both of the Southeast Alaska inside area fisheries are under limited entry, the number of vessels participating in each area greatly exceeds the target number established by the program. This factor is compounded because there are currently no regulations controlling vessel size or amount of gear each vessel can use. As a result, individual fishing power of the vessels has increased dramatically in recent years. Much of this problem was alleviated by permit harvest limits implemented in the NSEI area, but still remains a problem in the SSEI area.

The Prince William Sound fishery was opened for 48 hours on May 1, 1995, with 260 mt taken. The North Gulf District opened in conjunction with the offshore waters of the GOA on March 15. Effort and harvest were low, with a total of 15 mt taken. (Contact Al Kimker)

4) Flatfish

a. Research

No research was conducted on flatfish species by the State of Alaska during 1995. A mandatory logbook program in effect for this fishery provides information on CPUE of target species and an estimate of at-sea discards.

b. Management

Trawl fisheries for flatfish are allowed in the internal waters of Southeast Alaska only under a special permit issued by the department. Permits are generally issued for no more than a month at a time, specify the area fished, and may restrict type of gear used. Mandatory logbooks are required, and some areas cannot be fished unless there is an ADF&G observer on board. This restrictive management is necessary because of reduced flatfish stocks and a history of very high prohibited species bycatch rates, particularly crab and halibut, in flatfish trawl fisheries conducted in internal waters of the state.

New regulations adopted in November 1993 implement a 20,000-lb maximum weekly trip limit in the trawl fishery. The new regulation went into effect in 1994.

c. Fishery

The Southeast Alaska inside area flatfish trawl fishery was restricted to three small areas during the 1994-95 season with a harvest objective set for each area. Approximately 7 mt of harvest was reported from Southeast Alaska and less than 3 mt from Prince William Sound during 1995. Most of the Southeast harvest is starry flounder, while the Prince William Sound harvest is a mixture of shallow-water species.

5) Pollock

a. Research

A hydroacoustic cruise and mid-water trawl survey were run in January and February 1995 in PWS. In addition, 1994 spring NMFS assessment data were reviewed. The 1995 biomass was projected to be 24,328 mt (Contact Bill Bechtol, ADF&G, Homer).

b. Management

The GHR for pollock in PWS was 950-2,000 mt for mid-water trawl gear, based on an exploitation rate of 10-20 % of the 1989 biomass estimate (9,500 mt).

c. Fisheries

The fishery harvest was 2,900 mt of pollock in 17 days during January and February. An additional 100 mt were taken as bycatch in other fisheries.

6) Dogfish

a. Research

Relative catch rate of dogfish is monitored in the Southern Southeast Inside area in conjunction with the annual sablefish survey in that area. Commercially landed dogfish are sampled for length, weight, sex and spines taken for aging.

b. Management

There are no seasons, gear restrictions, or harvest limits for dogfish in territorial waters of the state at this time. Directed fisheries for dogfish were very limited in state waters during 1995.

7) Lingcod

a. Research

Two lingcod research surveys were conducted during 1995 - one in May and one in September. Survey objectives were to collect age structures (otoliths) and determine inter-annual comparative catch rates in off-shore waters near Sitka using "dinglebar" troll gear. (Contact Victoria O'Connell, ADF&G Sitka)

The ADF&G age-reading laboratory now uses cleared otoliths to age lingcod. (Contact Kris Munk, ADF&G Douglas) .

The Division of Sport Fish collects harvest and fishery information on lingcod as part of an ongoing port sampling program in the North GOA. Objectives of this program are 1) to estimate the age, sex, and size length compositions of lingcod harvests at select North GOA ports and 2) to characterize the recreational groundfish fisheries that occur at these select ports. Ports currently sampled in the North GOA include Seward, Valdez, Kodiak, Homer, and Deep Creek/Ninilchik. In combination, these ports represent the primary areas of recreational groundfish harvest in the North GOA. The Division of Sport Fish also collects fishery-independent stock assessment data on lingcod in North GOA to assess recruitment. Time-series information suggests that recruitment is highly variable and has not occurred at a rate necessary for replacement. There are no similar programs focused on recreational groundfish fisheries ongoing in southeast Alaska. (Contact: Doug Vincent-Lang ADF&G Anchorage)

b. Management

New regulations adopted for the Central Region in 1993 included 1) a complete area closure from January 1 through June 30, and 2) a minimum size limit

of 35 inches (89 cm) overall or 28 inches (71 cm) from the front of the dorsal fin to the tip of the tail. These regulatory changes continue to reduce harvest and effort from previous levels in the Central Region.

A lingcod management plan was adopted for the Southeast Alaska Region during 1993 went into effect until April 1994. Main elements of the plan include 1) extension of the winter closure outward from the surf line to three miles from shore, 2) modification of the winter spawning closure period by one month to December 1 through April 30, 3) establishment of GHRs for all six of the Southeast Region management areas based on one-quarter to one-half mt per nautical mile of rocky habitat inside 100 fm within each area, and 4) apportionment of the fishery seasonally and among user groups in the two management areas where the fishery is fully utilized. The 27-inch (69 cm) minimum size limit remains in effect in the Southeast District.

A portion of the CSEO section was again closed to harvest of lingcod in an attempt to prevent localized depletion in an area of historic fishing pressure. Because of increased effort in the EYKT subdistrict in 1995, local areas were closed in-season to distribute harvest.

Given lack of quantitative stock assessment information for much of Alaska, managers have established conservative harvest strategies for recreational lingcod fisheries. Recreational seasons and bag and possession limits for lingcod in Alaska are the most restrictive on the west coast. (Contact: Doug Vincent-Lang, title and address provided in Appendix 1)

c. Fishery

Lingcod are the target of an expanding "dinglebar" troll fishery in Southeast Alaska. Dinglebar troll gear is salmon power troll gear modified to fish for groundfish. Additionally lingcod are landed as significant bycatch in the DSR longline fishery and as limited bycatch in the halibut fishery.

For the first time there was a significant directed fishery for lingcod in the EYKT subdistrict of the SE District. Twenty vessels landed 141 mt closing the fishery on August 15. This compares with a 1994 directed harvest of nine vessels landing 40 mt. A total of approximately 408 mt round weight of lingcod was harvested by all gear types in state-managed fisheries during 1994. Ninety five percent of this was taken from Southeast Alaska.

8) Other Species

There were no state regulations in effect for other species of groundfish in state-managed fisheries during 1995. Most of the harvest in state waters is taken as bycatch in fisheries for other more valuable groundfish and halibut. Reported landings during

1995 were approximately 52 mt. An "emerging fisheries" policy is being developed for new fisheries which will reduce the possibility that a fishery can escalate beyond management control before regulations can be developed.

C. OTHER RELATED STUDIES

State groundfish fisheries are managed by the Department of Fish and Game under regulations set triennially by the Board of Fisheries. The department announces open and closed fishing periods consistent with established regulations, and has authority to close fisheries at any time for justifiable conservation reasons. The department also cooperates with NMFS in regulating fisheries in offshore waters.

By regulation, fish tickets are required for all shore-based landings in Alaskan ports and for all landings from state-managed fisheries. Catch data from fish tickets are used as the primary means of tracking the in-season harvest levels. Groundfish fish tickets are collected from as many as thirty or more processors within the state. Fish tickets are edited for accuracy, and data are entered on microcomputers in Petersburg, Sitka, Ketchikan, Homer, Kodiak, and Dutch Harbor. Because of the intensity of many of the groundfish fisheries, a "soft data" accounting system using processor contacts is also utilized, when necessary, to track landings during a fishery.

User Pay/Test Fish Programs

The State of Alaska Department of Fish and Game receives receipt authority from the state legislature that allows us to conduct stock assessment surveys by recovering costs through sale of fish taken during the surveys. Receipt authority varies by region. In Southeast Alaska we have several projects funded through test fish funds (total allocation approximately 300k), notably sablefish longline assessments, king crab survey, and herring fishery and dive surveys. Also in 1995 the Southeast Region was given a separate receipt authority for $250,000 to conduct sea urchin research using test fish funds. In the case of sea urchins, industry placed bids on the right to harvest and market sea urchins. The low bidder was responsible for paying the department's expenses in research and management of this fishery and was limited to a 12% profit after state expenses were paid.

REPORTS COMPLETED DURING 1995

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Vincent-Lang, D.S. 1995. Area management report for the North Gulf of Alaska recreational groundfish fisheries. Alaska Department of Fish and Game, Fishery Management Report No. 95-1, Anchorage.

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APPENDIX I

ALASKA DEPARTMENT OF FISH AND GAME
PERMANENT FULL-TIME GROUNDFISH STAFF DURING 1994

COMMERCIAL FISHERIES MANAGEMENT AND DEVELOPMENT DIVISION

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2. OREGON

A. AGENCY OVERVIEW

The new Enhanced Data Collection Project began in 1995. Under that project, Keith Matteson filled the new Assistant Project Leader position effective 1995, while Jodene Summers filled the new Data Technician position. Hal Weeks was appointed the new Project Leader position for the new Pelagic and Bycatch Studies Project effective April 1996. See APPENDIX A for Marine Finfish Program personnel.

B. MULTISPECIES STUDIES

1) Staff participated in RecFIN committee work and planning. Sampling was conducted in 1995 and continues in 1996. Linda Zumbrunnen became the new project coordinator, effective April 1996.

2) Coastwide species composition sampling continues on recreational catches.

3) Species composition sampling of rockfish and thornyheads continues on commercial trawl landings. Species composition samples have been taken from commercial fixed gear landings.

4) Monthly cumulative trip limits were used in 1995. Industry favors bimonthly limits for 1996. For more information contact Mark Saelens (541) 867-4741

5) Finfish Excluder Project

Shrimp project staff completed an 18-month Saltonstal-Kennedy funded research project evaluating effectiveness of finfish excluders in the pink shrimp fishery. In general, devices were all to be very effective at excluding fish; however, shrimp loss was higher than hoped and quite variable. A follow-up study is being proposed to test some design modifications that may reduce shrimp loss. A short videotape summarizing project findings is available. A final report is expected to be available soon (Hannah, et al., 1996).

For more information contact Bob Hannah at (541) 867-4741.

6) The Pacific whiting shoreside observation program continued in 1995. ODFW coordinated sampling of bycatch and data analysis from shoreside landings of Pacific whiting. Observers and staff obtained age samples from 591 yellowtail rockfish, 600 widow rockfish, 210 sablefish, 690 jack mackerel, 240 Pacific mackerel and 1,197 Pacific whiting. Additional length frequency samples were taken on 2,094 Pacific whiting.

For more information contact Bill Barss (541) 867-4741.

7) Enhanced Data Collection Project (EDCP)

The EDCP began as an effort by the Oregon Trawl Commission (OTC) during the summer of 1994. OTC approved a collection fee of 0.5% of the ex-vessel value of all groundfish and shrimp landed by trawl fisheries in Oregon in September 1994. This fee was initiated to generate a fund to support fisheries research efforts, and is being used to fund the EDCP. Phase I of this program is designed to be the "pilot" phase of a three-year program that will focus on trying to determine discard rates brought about by trip limit management. In addition the program will collect information on salmon and halibut bycatch rates, survival likelihood of halibut encountering trawl capture, and biological parameters (age, length, sex, etc.) for species, sizes, depth intervals or areas that are not readily available to port sampling programs. OTC agreed to fund about $82,000 for additional staff and equipment for the program and $106,000 to pay observer wages, vessel insurance and food. Additional staff funding was needed to provide the resources needed for ODFW to coordinate the program in Washington, Oregon, and California.

During August 1995, ODFW and NMFS agreed to provide matching funds of $106,500 each to also pay for observers.

The first "shakedown" trip occurred aboard the *F/V Excalibur I* (Newport) during November (one trip only). Following this trip observers were placed aboard the *F/Vs Jamie K* (Charleston), *Capt. Jack* (Charleston), *Miss Mary* (Astoria) and *Karina* (Westport). A total of 31 trips have been observed aboard these four vessels. In addition the vessels *Billie Jean* (Charleston), *Miss Linda* (Charleston) and *Pacific Queen* (Astoria) are operating with "enhanced" logbooks - discard information is recorded, but no observer is aboard. An additional 6-10 vessels have expressed interest in carrying an observer, and several vessels remain to be set up with enhanced logbooks.

Details of the program are presented in Research Proposal Submitted to the OTC by ODFW, EDP - Phase I, June 14, 1995.

For more information, contact Mark Saelens (541)867-4741

8) CORE Studies

The Cooperative Reef Ecosystem(CORE) study continued work on subtidal rocky bottom habitats off the Oregon coast near Cape Blanco and Port Orford. ODFW divers completed three primary tasks during 1995. The first was completion of a third year of a dive survey to characterize sea urchin populations at Orford Reef. The second was development of habitat maps on Orford Reef and two nearby rocky reefs using side-scan sonar. We completed the mapping as a cooperative project with the Geologic Survey of Canada. The third task was to test SCUBA diver sampling methods for sampling fish and invertebrates. The second and third tasks represent the beginning of a long-term

project to examine possible impacts of kelp harvest. Reports summarizing the second and third tasks will be available during spring 1996.

For information, contact Dave Fox or Jim Golden (541)867-4741.

9) Recreational Angler Survey

A pilot survey of recreational anglers was conducted in 1995. Anglers were questioned for their knowledge of bag limits, species identification, response to bag limit changes and preferences for future regulations. The survey continues in 1996.

For more information contact Jerry Butler at (541) 867-4741.

10) Developmental Fisheries Project

Developmental Fisheries is a new project for the Marine Resources Program; 1995 was the first year permits were required for developmental fisheries species. Administratively, the project is in the shellfish program; however, it deals with finfish as well as shellfish.

The 1993 Oregon Legislature created the Developmental Fisheries Program to allow for controlled development of new fisheries. Legislation created the Developmental Fishery Board, made up of nine members and five ex-officio members from a broad range of fishing interests. Under the legislation, the Developmental Fisheries Board annually recommends to the Oregon Fish and Wildlife Commission a list of food fish species that are considered to be developmental and a harvest program which includes a limited entry system.

In 1995 a total of 203 permits were issued for all species; 93 permits for finfish species. The main finfish interest was for swordfish, which had nine permits issued for longline gear, ten permits for unlimited landings with gillnet gear, and 44 permits for single delivery landings with gillnet gear. Other species for which we issued permits were hagfish (14), blue shark (6), anchovy/herring (7), smelt (1), and pomfret (2).

The majority of landings of developmental species was as bycatch in other established fisheries. In directed fisheries, there were seven landings of hagfish (2,166 lb) and two landings of swordfish (5,530 lb) in Oregon in 1995.

Some gear conflicts occurred in 1995 between the deep-water trawl fishery and the developmental fishery for Tanner crab. In an effort to reduce conflicts, in 1996 Tanner crab harvesters will be required to send out notices of fishing activity to notify everyone where gear is located.

Contact Jean McCrae for more information, (541)867-4741.

11) Pelagic and Bycatch Studies Project

The 1995 Oregon Legislature approved a special Pelagic and Bycatch Studies Project with two-year funding. This project was intended to both replace some pelagic species working ability lost earlier, and to institute new work addressing fisheries bycatch issues. We intend to mesh work under this project with that of the OTC Cooperative Project.

Contact Jerry Butler for more information (541) 867-4741.

12) Cooperative Ageing Unit

Managers and researchers have often reported the frustration of the "bottleneck" created by a general lack of ageing capability over the last several years. Staff reductions and shifting duties have resulted in minimum ageing capability dissolving into inadequate ageing capability. A substantial remedy to this situation was creation of a cooperative ageing unit funded by FAM and supervised/operated by ODFW. Three additional ageing technicians were hired last fall to focus on ageing a collection of Dover sole and sablefish otoliths collected during NMFS surveys, and to age port-collected sablefish otoliths back to 1991. To date the survey Dover sole otoliths have been aged and the between reader bias is currently under evaluation. Initial training to age sablefish has been completed, and technicians will next focus on production ageing. If some level of funding can be maintained for this unit beyond the initial support level which ends in October 1996, we should be able to avoid such serious backlogs in the future. It is hoped this unit will also be able to provide ageing support for a variety of rockfish species which have been identified for new assessment efforts.

Contact Mark Saelens for more information (541)867-4741.

13) Logbooks

a. Revised Coastwide Logbook

The current coastwide trawl logbook has been revised to more closely reflect current groundfish trawl operations - a set of coastwide species or market categories have been developed (based on PacFIN coding). Fishing strategies have been reviewed and revised and will be added as an element, and some other minor revisions have occurred as well. These changes will be reflected in the next printing of the logbook which will occur sometime this year as the supply of the current logbook is nearly exhausted. WDFW took the lead on this effort and ODFW participated in this development.

Contact Mark Saelens for more information (541) 867-4741.

b. Logbook Development Using EDCP

Participation in the EDCP (including industry funding mechanism in WA and CA) requires a major commitment from industry volunteers, but also results in acquiring some portion of all the different categories of badly needed fishery data including discard rate, species composition, length and age, geographic distribution, catch-per-unit-effort, etc. To date many vessels have already begun participating in the project, as reported above; however, additional participants are needed. In particular there is no limit to the number of vessels which may be issued instructions to begin maintaining an enhanced logbook for recording discard and bycatch. Placing observers aboard vessels has a more finite funding source. Currently some of the money received from FAM is being utilized to begin placing observers in Washington and California; however, industry in these states will need to develop a way to fund their own observers if the program is to be a success. A fee collection schedule based on the amount of catch delivered, or on value of the delivery has been used successful in Oregon.

Successful use of enhanced logbooks during this program could result in development of what has been referred to as the "super" logbook. But first, the enhanced logbook must become commonly utilized and accepted as the manner in which industry desires to capture information to assist with accurate fisheries management.

The "enhanced" logbook is utilized in the pilot groundfish EDCP. It is not a different physical logbook, but rather a series of instructions on how cooperating fishers should fill out the logbook. The major addition is capturing discarded catch estimates - including salmon and halibut. Salmon biological information is collected, and then fish are turned over to a foodbank. Halibut are measured, weighed and given a visual inspection for survival likelihood. Supplemental "logbook" information collected by the vessel may include species composition of rockfish, average weight, etc., and a more complete description of fishing strategy.

c. Super Logbook

This term is applied if we envision the enhanced logbook eventually becoming the logbook required by all trawl vessels. The idea is to sell the value of such a logbook during our enhanced study and eventually to have most, if not all, of the fleet maintaining a more detailed logbook. This logbook is also likely to contain detailed information on how gear is deployed, weather conditions (current, swell, etc.) and more detailed information on fishing strategy.

d. Electronic Logbook

Microcomputer technology could be utilized to replace any of the above logbooks in an electronic form. The obvious advantage to an electronic logbook is the ability to

improve agency processing time by avoiding the data entry stage. Another advantage is the ability to record location of tow and depth much more frequently. If we are successful in our efforts to develop a super logbook, an electronic form of it will be almost essential to facilitate processing in a timely fashion.

C. BY SPECIES

1) Pacific Cod

No work was conducted on Pacific cod. Few fish were found in the trawl landings. Total Oregon Pacific cod landings were only 177,067 lb (80.3 mt) in 1995 compared to 376,053 lb (170.5 mt) in 1994.

2) Shelf Rockfish

a. Black Rockfish

1) A draft Regulatory Impact Review/Environmental Assessment of commercial fishery restrictions for black rockfish harvest was delivered to PFMC in June 1995. Fishery regulations were approved by PFMC in March 1994, but have not yet gone to NMFS/Washington D.C. for final approval.

2) Coastwide sampling continues on recreational catches of black rockfish. Sampling includes biological sampling for age, length, sex and maturity. Age determination is done by ODFW. In addition, tissue samples were collected for genetic stock identification from four locations along the Oregon coast in September 1995. Work was conducted in cooperation with WDFW, who collected samples in Washington.

3) Total commercial Oregon landings were 220,190 lb (99.9 mt), which was similar to 1994 landings.

Contact Jerry Butler for more information at (541) 867-4741.

b. Widow Rockfish

Coastwide sampling continues for age, length and sex. Age determination is done by NMFS, Tiburon. Oregon landings in 1995 were 8,584,713 lb (3,894 mt), which was about a 12% decrease from 1994.

c. Canary Rockfish

Coastwide sampling continues for age, length and sex. Age determination is done by ODFW. Landings of canary rockfish were reported by species in 1995, and Oregon processors reported receiving 1,166,173 lb (529 mt).

A stock assessment is planned for 1996 Regarding stock assessment, contact David Sampson, HMSC, OSU (541) 867-0100 .

d. Yellowtail

Coastwide sampling continues for age, length and sex. Age determination is done by WDFW. Oregon landings were 6,743,494 lb (about 3,059 mt), which was similar to 1994 landings.

3) Slope Rockfish

Most sampling is limited to species composition sampling. Length frequency samples were taken on selected species (darkblotched, rougheye, yellowmouth, splitnose, redstripe and sharpchin rockfish, and POP).

4) Thornyheads

Sampling included species composition sampling and length frequency sampling. Oregon processors reported landings by species in 1995, and 5,787,500 lb (2,625 mt) of longspine thornyhead and 1,561,535 lb (708 mt) of shortspine thornyhead were reported.

5) Sablefish

Routine age samples were obtained on sablefish. Otoliths were sent to NMFS for age determination. Oregon landings were 6,986,152 lb (3,169 mt), which was down 23% from 1994.

6) Flatfish

a. Age sampling continued on Dover sole, English sole, petrale sole and Pacific sand dab. Ages were determined at ODFW for Dover, English sole and Pacific sand dab. ODFW also provides age determination for some Dover sole samples taken by CDFG and some English sole and Dover sole samples taken by WDFW. ODFW is also helping train three PSMFC agers. Contact Bob Mikus for additional information on ageing (541) 867-4741.

Oregon landings were 7,805,497 lb (3,541 mt) for Dover sole, which was down 9% from 1994. Landings of English sole were 689,048 lb (313 mt) and down 13% from 1994. Landings of petrale sole were up 29% from 1994 at 1,756,316 lb (797 mt).

b. Pacific Halibut

1) ODFW participated in weekly catch monitoring of the recreational fishery for quota tracking purposes.

2) Newport again led the state in recreational landings with 49% of the total. Other ports and landing shares were: Garibaldi (37%), Depoe Bay (8%), and Charleston (5%).

3) Oregon commercial landings were 542,915 lb (246 mt).

Contact Jerry Butler for more information (541)867-4741.

7) Pacific Whiting

ODFW with cooperation from PSMFC, NMFS, PFMC, CDFG, WDFW and the fishing industry, continued to conduct an observation program to sample the bycatch of landings made to shoreside processors.

Oregon sampling sites were Astoria and Newport. Sampling was also conducted in Ilwaco and Westport, Washington through WDFW and Crescent City and Eureka, California through CDFG. A sampling rate of 15% for shoreside observations was selected to insure a minimum of 10% rate was achieved. Sampling was conducted form April until the season's end in July. Two Washington, three California and six Oregon processors, and their vessels participated in the observation program. Experimental Fishing Permits were issued by NMFS through ODFW and CDFG to participating vessels so they could land unsorted catches containing prohibited species (salmon and halibut) and trip limit overages. Any prohibited species and the ex-vessel value of trip limit overages were given to the state of landing (ODFW in Oregon, WDFW in Washington and CDFG in California).

Thirty-five mid-water trawlers targeted on Pacific whiting and most participated in the observation program. Thirty of these vessels landed fish in Oregon ports. About 74,000 mt of whiting was delivered to shoreside processors which was up slightly from the 72,000 mt landed in 1994. About 66,000 mt was landed into Oregon ports (65,000 mt to Oregon in 1994). Overall, 14% of trips targeting whiting were observed shoreside. Overall salmon catch rate was 0.032 (number of salmon per mt of Pacific whiting compared to 0.008 salmon per mt of Pacific whiting in 1994. There were 327 salmon (301 in Oregon ports) seen in the 187 observed trips (167 trips in Oregon). The highest observed bycatch was for jack and Pacific mackerel (81,709 lb), yellowtail rockfish (81,376 lb) and widow rockfish (35,382 lb).

For more information, contact Bill Barss (541)867-4741.

8) Dogfish

No work was conducted on dogfish. Only 110,742 lb (50 mt) were landed, which was down 28% from 1994.

9) Lingcod

Age samples were collected and sent to NMFS, Tiburon for age determination. Oregon landings were 1,422,814 lb (645 mt), which was down 25% from 1994.

10) Other

a. Surfperch

Extensive biological sampling continued along the southern Oregon coast. Special emphasis was again on redtail surfperch. Volunteers have helped tag surfperch and collect carcasses for sampling. Samples were collected from 1,772 redtail, 320 striped, 124 pile, 95 walleye, 49 white and 14 silver surfperch. There were 978 surfperch tagged in 1995, and recovery rate was about 5.6%. Age determination was done by ODFW.

Processors reported receiving 2,471 lb (1.1 mt) of surfperch, which was about double the landing in 1994.

For more information contact Darrell Pruden (541) 888-5515.

b. Pacific Herring

The Yaquina Bay roe herring fishery operated under a quota of 50 tons in 1995. Fishing occurred from February 28 through March 6; landings totaled 53.7 tons.

Contact Jerry Butler for more information (541) 867-4741.

c. Hagfish

Only 2,174 lb (1 mt) of Pacific hagfish were landed.

APPENDIX A

Marine Finfish Program

Jerry Butler, Program Leader	Newport
Bill Barss, Project Leader, Field Operations	Newport
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Gary Hettman, Port Biologist	Newport
Mike Hosie, Port Biologist	Charleston
Tom Preston, Port Sampling EBA	Astoria
Rhonda Haynes, Port Sampling EBA & Pelagic Fish	Newport
Lisa Johnson, Port Sampling EBA	Charleston
Darrell Pruden, Sportfish Biologist	Charleston
Mark Saelens, Project Leader, Tech.Services	Newport
Keith Matteson, Biologist, OTC Project Coordinator	Newport
Mark Freeman, Data Coordinator Biologist	Newport
Carol Perkins, Data Management Technician	Newport
Kathy Murphy, Data Entry EBA	Newport
Bob Mikus, Age-reading Specialist	Newport
Elaine Stewart, Finfish Assessment Project Leader	Newport
Vacant, Bycatch Project Leader	Newport
David Sampson, Consultant, OSU	Newport
Clayton Creech, Consultant, OSU	Newport

Publications

Kramer, D.E., W.H. Barss, B.C. Paust and B.E. Braken. 1995. Northeast Pacific flatfishes, families Bothidae, Cynoglossidae, and Pleuronectidae. Alaska Sea Grant, Marine Advisory Bulletin No. 47. 104p.

Hannah, R.W., S.A. Jones and V.J. Hoover. 1996. Evaluation of fish excluder technology to reduce finfish bycatch in the pink shrimp trawl fishery. Oregon Dept. Fish Wildlife., Information Rept. Ser., Fish. No. 96-4. 46 p.

Hannah, R.W. 1995. Variation in geographic stock area, catchability and natural mortality of ocean shrimp (*Pandalus jordani*): some new evidence for a tropic interaction with Pacific hake (*Merluccius productus*). Can. J. Fish. Aquat. Sci. 52:1018-1029.

3. WASHINGTON

A. AGENCY OVERVIEW

Groundfish are managed under the Marine Resources Division of the Fish Management Program.

1) Coastal Groundfish Management

Coastal Groundfish Management occurs within the coastal section of the Marine Resources Division, which is responsible for management and research of groundfish in all coastal waters and in the outer Strait of Juan de Fuca. The coastal section also handles all issues requiring interstate, regional, federal or international cooperation. Responsibilities include membership on the Groundfish Management Team (GMT) of the PFMC, membership on the groundfish plan team of the NPFMC, membership on the Science and Statistical Subcommittees (SSC) of the Pacific and North Pacific Fishery Management Councils, multi-jurisdictional management and stock assessment of groundfish stocks in state waters (0-3 miles) and in the Fisheries Conservation Zone (3-200 miles) adjacent to Washington, and joint research with other agencies or institutions on questions of mutual interest.

Management of coastal groundfish stocks is primarily accomplished through membership on the GMT which develops annual estimates of "ABC" for major species/species groups and proposes management strategies to the PFMC. Division personnel implement PFMC decisions by drafting state regulations and coordinating state enforcement regarding groundfish management. Personnel are stationed in major ports of landing to collect catch and biological data and other fishery related information.

Contact: Brian Culver (360)586-1929.

2) Puget Sound Marine Fish

The Puget Sound Marine Fish section is responsible for those waters east of the Sekiu River including the Strait of Juan de Fuca. Marine Fish activities occur in four units: Forage Fish Unit, Groundfish Recreational Assessment Unit, Groundfish Management Unit, and Puget Sound Water Quality Authority Unit.

Contact: Greg Bargmann (360)902-2825.

Forage fish are a key component of the coastal and Puget sound ecosystems. Primary objectives of the Forage Fish Unit are to: 1) protect forage fish spawning habitat and productivity, 2) quantify stock abundance to evaluate stock condition, and 3) develop and implement fisheries if stock abundance is sufficient to support harvest.

Within the Puget Sound Region, eighteen herring stocks have been identified which are directly assessed each year by either hydroacoustic or spawn deposition survey techniques. Stock status is reported biennially through a status report series. Herring are an adjudicated species and are managed with the tribes through technical teams to determine forecasts, seasons, and harvest quotas. Surf smelt and sand lance assessment activities are presently directed toward documentation of intertidal spawning habitats. To date approximately 60% of the intertidal shoreline of Puget Sound has been surveyed, yielding in excess of 200 miles of surf smelt and 100 miles of sand lance spawning habitat.

Contact: Norm Lemberg (360) 428-1009.

The Groundfish Recreational Assessment Unit performs analysis of fishery and biological data from regional field surveys and historical databases to evaluate stock trends and identify resource conservation problems. With consideration of these trends, a management plan is developed, implemented and evaluated.

Contact: Bob Pacunski (360) 902-2844

The Groundfish Management Unit seeks to maintain sustainable yields of groundfish species while minimizing conflicts between user groups. The unit is subdivided in regional management units which are responsible for management and operations in their region. These units perform field sampling and analysis of fishery and biological characteristics in order to insure orderly harvest. This section is responsible for development and evaluation of management strategies, usually gear and time/area restrictions.

Contact: Wayne Palsson (206) 775-1311.

The Puget Sound Water Quality Authority Unit administers the Puget Sound Ambient Monitoring Project (PSAMP), which is part of a multi-agency effort to characterize the health of Puget Sound, monitor environmental trends and investigate potential human health issues.

Contact: Sandie O'Neill (360) 902-2843.

B. BY SPECIES

1) Shelf Rockfish

Black rockfish is the major target species of the coastal Washington recreational bottomfish fishery. The trend in the nearshore fishery for black rockfish appears to be toward increasing effort and decreasing availability. Research is currently directed at identifying stock boundaries for coastal black rockfish. In 1995 work continued to determine population structure using allozyme analysis. Tissue samples were collected

and analyzed using electrophoretic techniques to determine: 1) the best tissue/buffer combinations to resolve enzymes, 2) the amount of electrophoretically detectable genetic variation, and 3) if allele frequency differences existed between collections. Allelic frequency differences between California and Washington collections were significant (X2, P <0.001), suggesting that samples may not come from a single interbreeding population. There were also unique alleles found in each of the collections (five from California and seven from Washington). Although rare in occurrence (frequencies <=0.05), this supports the hypothesis that collections represent two different subpopulations. To corroborate these initial findings, GSI sampling and electrophoretic analysis will continue into 1996 with the goal of getting a better understanding of genetic population structure of coastal Washington's black rockfish.

Contact: Farron Wallace (360)249-4628

2) Lingcod

A tagging study designed to estimate selectivity and interaction of coastal sport and trawl fisheries harvesting lingcod entered the write-up phase. Results of a coastwide (Alaska to California) Genetic Stock Identification study were published in *Transactions of the American Fisheries Society*. An ongoing study designed to monitor year-class strength in the nearshore waters of Cape Flattery entered its third year.

Contact: Tom Jagielo (360) 902-2837; tjagielo@aol.com

C. OTHER RELATED STUDIES

1) Biometric Review

A quantitative review and accounting of methods used in monitoring, assessment, and research in the Marine Resources Division was completed in April 1996. Purpose of the review was to 1) provide an overview of quantitative methods used in monitoring, assessment, and research, 2) identify each project's quantitative objectives, 3) summarize methods currently being used to meet the objectives, 4) evaluate whether or not methods currently employed are adequate to meet the objectives, and 5) develop a list of recommended priority tasks for each project.

Contact: Jack Tagart (360) 902-2855 or Tom Jagielo (360) 902-2837; tjagielo@aol.com

2) PSAMP

This project is part of a multi-agency effort to characterize the health of Puget Sound, monitor environmental trends, and investigate potential human health issues. Survey work was conducted by WDFW during 1995 at 17 sites distributed throughout

Puget Sound to examine English sole for liver disease due to contaminated sediment exposure. Muscle and liver tissue specimens were analyzed for chemical contaminants of PCBs, pesticides, heavy metals and various organic compounds. Survey work was also conducted for contaminants in rockfish muscle tissue at five Puget Sound locations. An overview paper summarizing findings for 1989-1993 and a report on mercury and PCB contamination in rockfish is currently available.

Contact: Sandie O'Neill (360)902-2843 or Jim West (360)902-2842

3) Puget Sound Recreational Species Assessment

Primary work included special studies on assessing and managing lingcod and rockfish populations in Puget Sound. In 1995 the Video-Acoustic Technique (VAT) was used to survey fish populations living in the shallow waters (to 39 m) of Puget Sound from Port Townsend to Olympia. The VAT uses a black-and-white television camera to quantitatively estimate densities of fish living within 2 m of the bottom. Standard scientific echosounding techniques estimate pelagic fishes living above the reef, and these results are added to the video survey results. A stratified, systematic survey design was used to assess fish living in habitats having high, medium, and low chances of supporting reef fishes. Videotapes are being reviewed during 1996, but most rockfish and lingcod were encountered on high relief natural reef, artificial reefs, wrecks, and other manmade structures.

Videotapes from the 1994 VAT survey of northern Puget Sound were completed. During this year, the San Juan Archipelago was sampled for the second consecutive year, but with twice the sampling effort as the first year.

For most rockfish, the 1994 survey estimates were double those of the previous year, and coefficients of variation were halved. In 1994, 313,000 lingcod (*Ophiodon elongatus*), 1.8 million quillback rockfish (*Sebastes maliger*), and 3.6 million copper rockfish (*S. caurinus*) were estimated for the San Juan Archipelago with C.V.s of 31.6%, 32.0%, and 23.5%, respectively.

For nearshore waters of the Strait of Juan de Fuca, only 532,000 copper rockfish were estimated, 127,000 lingcod, and no quillback rockfish.

A secondary activity has been a comparative study of fished rocky reefs and marine protected areas. Several years of scuba surveys have been conducted at seven sites in the San Juan Archipelago and Puget Sound which include two marine protected areas. In comparing the 25-year marine protected area at Edmonds, Washington to nearby fished sites, we found dramatic differences in size distribution, densities, and reproductive output that were consistent among sites, seasons, and years. These results were presented at the 1995 Puget Sound Research Conference in January at Bellevue, Washington.

Other activities included estimating harvest and effort in the lingcod fishery at Tacoma Narrows. This springtime fishery harvests several hundred lingcod during approximately a thousand fishing trips. Catch rate estimates resulting from the creel survey were slightly higher in 1995 than during the previous seven years, indicating the six-week season, slot size limits, and one-fish-per-day limits have been effective at maintaining a stable fishery and population in the southern region of Puget Sound.

Annual recreational harvest and effort estimates were made for 1994 and integrated into a comprehensive database of recreational and commercial catch statistics which includes fishery data to 1970. Recreational effort for bottomfish and bottomfish catch were about half the previous several years. 1994 was the first year when wide scale closures of the recreational salmon fishery occurred. The recreational estimation scheme depends upon having open salmon seasons and returns of catch record cards as estimate expansion factors. Without these, the future of valid catch and effort estimates is doubtful.

Much of the above work is documented in an annual report by the U.S. Fish and Wildlife Service, reporting the annual job performance in accordance with the Federal Aid in Sport Fish Restoration Act, Grant Agreement F-110-R for Washington. Copies are available upon request.

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4. CALIFORNIA - MULTISPECIES STUDIES

A Pacific whiting observation program, established in 1992, to monitor bycatch of salmon and other species in shoreside landings of the whiting fishery, continued through 1995. The California salmon bycatch rate was 0.017 salmon per mt of Pacific whiting, a slight increase from last year's 0.012 rate. All salmon observed were chinook (*Oncorhynchs tshawytscha*). Non-salmon bycatch rate in observed landings for 1995 was 28.8 lb per mt of whiting.

5. CANADA

A. AGENCY OVERVIEW

During 1994 the Canadian federal government conducted a national program review to ensure programs were focused on departmental mandates. Results of that review are being used to facilitate a major downsizing of the civil service announced with the federal budget in February 1995. Details of cuts and the impact on groundfish assessment and research programs are still not known.

A major reorganization of DFO science programs was implemented in April 1995. Research Divisions are structured by function, and site directors have been eliminated. Science divisions in Pacific region, which include the Pacific Biological Station, Institute of Ocean Sciences (Sidney, B.C.), and West Vancouver Lab include;

Stock Assessment Division	Dr. M. Henderson
Marine Environment and Habitat Sci.	Dr. R. Wilson
Ocean Science and Productivity	Dr. J. Garrett

Each of these division heads reports to Dr. John Davis, the Regional Director of Science (RDS). The head of the Pacific Stock Assessment Review Committee (PSARC), Dr. J. Rice, also reports to the RDS.

Groundfish research will be conducted primarily through the Stock Assessment Division. Within the Stock Assessment Division, two sections divide up groundfish responsibilities;

Fish Population Dynamics	Sandy McFarlane
Assessment Methods	Laura Richards

The Assessment Methods section includes Fish Ageing Lab staff.

Management of marine fish falls under the Fisheries Branch of Fisheries and Oceans. Mr. Bruce Turris is the groundfish coordinator responsible for groundfish management. Managers receive scientific advice from the Stock Assessment Division through PSARC.

B. MULTISPECIES STUDIES

1) Hecate Strait Survey

Hecate Strait is an area of variable topography with a variety of bottom habitats, which supports an important mixed-species groundfish fishery. To date seven research surveys have been conducted, from 1984-1995, to obtain species abundance estimates and information on assemblages. Previous analyses have identified three characteristic assemblages of groundfish species. Recently, relationships between the dominant species of these assemblages and environmental conditions in early summer 1989 and 1991 have been identified. The environmental factors examined were bottom type and depth (invariant conditions), and temperature (a variable condition). Three categories of species were identified: 1) those consistently associated with particular depths and temperatures between years, 2) those with variable depth and temperature associations, and 3) those with no apparent relationships to depth, temperature or sediment type. Category 1) was dominated by flatfish, and could be further separated into groups associated with deep and cool, shallow and warm, and intermediate depth and temperature conditions. Category 2) included groundfish plus Pacific halibut, and were widely distributed. At least one species (Pacific cod) tended to maintain a particular temperature range while changing its depth range between years. Identification of significant associations between fish species and habitat conditions is the first step towards incorporating environmental information into survey abundance indices and reducing bycatch problems.

A survey is planned for June of 1996.

2) La Perouse Program

This program was continued in 1995.

This project is a multidisciplinary, multi-species investigation conducted by the Pacific Biological Station and the Institute of Ocean Sciences in support of long-term management of major fish stocks off the west coast of Vancouver Island. Initiated in 1985 following the large 1982-83 El Niño event in the Pacific Ocean, primary focus of the La Perouse/MASS program has been directed toward describing and understanding causes of annual and interannual variability of fish and zooplankton stocks over La Perouse Bank on the southwest portion of the shelf. Located within the coastal upwelling production zone that extends from northern Vancouver Island to Baja California, La Perouse Bank is an extremely productive fishing area.

Considerable progress has now been made toward identification of the dominant physical processes affecting circulation and water property structure, to quantifying the statistical variability of seasonal and inter-annual cycles and toward direct estimation of the impact of inter-annual fluctuations on the planktonic food web.

C. BY SPECIES

1) Pacific Cod

a. Research Programs

A Pacific cod survey in Hecate Strait using commercial fishing vessels is being designed for implementation in 1996. Intent of the survey is to obtain a CPUE index that is comparable to previous commercial-based indices.

b. Stock Assessments

A catch-at-length model, MULTIFAN CL, was developed for the 1995 assessment of Pacific cod stocks. The model uses catch, length-frequency and effort data from the commercial fishery for the period 1956-1994. The stock reconstruction indicates that both the Hecate Strait and west coast Vancouver Island stocks are at historically low spawning levels.

A significant concern with data used in the stock reconstruction results from changes in mesh size regulations for vessels fishing in Hecate Strait. Voluntary compliance with a larger cod-end mesh size had been requested from the fleet since 1990 and was legislated for the 1994 fishery. This change decreased catch rates and thus biases effort data used in the stock analysis. For the 1996 stock assessment a CPUE index based on fish greater than a minimum specified size will be developed and incorporated into the catch-length analysis.

c. Management

For 1996, retention of Pacific cod in the groundfish fishery is permitted as a bycatch only. Bycatch limits apply with options for vessel-specific bycatch limits and for fleet-specific bycatch limits.

2a) Rockfish - Offshore

a. Research Programs

A bottom trawl survey for rockfish was conducted by two commercial fishing vessels, *Goose Island Gully* and *Queen Charlotte Sound*, during September 1995. Objectives of the survey were to compare catch rates between vessels and to estimate relative biomass of the POP stock in Goose Island Gully. In addition,

biological information was collected for POP (*Sebastes alutus*), yellowmouth rockfish (*S. reedi*), redstripe rockfish (*S. proriger*), and shortspine thornyhead (*Sebastolobus alascanus*) caught during the surveys. There were no differences in catch rates between the two vessels, with relative biomass estimates of 26,634 tonnes (CV 16%) and 25,041 tonnes (CV 13%). The biomass estimate was not significantly different from a 1994 survey (16,583 tonnes; CV 10%) in the same area.

b. Stock Assessments

1. Slope Rockfish

An interim assessment for slope rockfish (POP, redstripe rockfish, yellowmouth rockfish, rougheye rockfish, shortraker rockfish and thornyheads) was conducted in 1995. There were no changes to recommended yields, which were based primarily on catch histories. However, catch caps determined from the mean of the 1993-94 catch were recommended for both shortraker rockfish and thornyheads, which had not been included in previous assessments. Coastwide catches of POP and yellowmouth rockfish increased 21% and 8% in 1994, respectively, while coastwide catches of redstripe rockfish and rougheye rockfish decreased 28% and 32%, respectively, reflecting combined effects of rockfish aggregate management and port monitoring introduced in 1994. Overall, effort increased 6% in 1994, resulting in the highest values recorded, while the number of rockfish trips dropped by 22%.

The most recent major assessment was completed in 1993, including catch-age analyses of POP in Goose Island Gully from 1963-92 and in Moresby Gully from 1978-92. These analyses identified large uncertainties in estimates of current biomass and potential yield. New survey data were included in the 1995 assessment from a commercial charter conducted in Goose Island Gully in 1994; no statistically significant difference in CPUE was found between the 1994 survey and a similar survey conducted by commercial charter in 1984. The updated catch-age analysis resulted in a survey biomass estimate of 25,200 tonnes, with corresponding yields as specified in previous assessments (350-1,800 tonnes). Unknown levels of dumping and/or discarding also compromised the assessment.

2. Shelf Rockfish

Interim assessments were conducted for shelf rockfish during 1995 (Stanley 1995). Silvergrey and canary rockfishes were managed under aggregate management in 1995 and suffered overruns of individual recommended yields of 213% and 145%, respectively. Recommended 1996 yield options for silvergrey rockfish were lowered slightly for all areas, primarily in response to these large overruns in 1995 and chronically low

CPUE for this species. In contrast, canary rockfish recommended yields increased slightly for 1996. Assessment for this species suggests recent years of declining CPUE may simply reflect a "fishing-down" effect, and present mortality rates may represent full exploitation. The assessment cautions that no detailed age-structured analyses for this species have been conducted due to data limitations. Yellowtail and widow rockfish assessments remained largely unchanged although increased occurrence of yellowtail rockfish in the offshore hake fishery, particularly in Area 3D, was

c. Management and Regulations

See 1996 groundfish trawl management plan.

2b) Rockfish - Inshore

a. Research Programs

Biological sampling continued for the major fishing areas coastwide. Onboard observers will be used in 1996 to obtain biological samples from set locations in each of the five management areas on the coast.

b. Stock Assessment

Coastwide commercial hook and line rockfish catch was 1956 t in 1993, and preliminary figures for 1994 are slightly lower at 1942 t. Catches declined off the west coast of Vancouver Island and north coast areas and increased in the Strait of Georgia and off the Queen Charlotte Islands, relative to 1993. In general, stock condition is poor in the Strait of Georgia, and unknown in other areas. Yield levels (tonnes) for each statistical area were determined, as in the past, by multiplying ratios of catch to habitat (tonnes per km2) by size of the rockfish habitat within each statistical area (km2).

c. Management and Regulations

The hook and line rockfish fishery is managed by limited entry area licensing. Landings are monitored through a use pay dockside program. License holders are required to choose among landing options that differ in number of landings allowed in a fishing period (30 days) and the magnitude of trip limits on seven different species aggregates and yelloweye rockfish. Species aggregate and yelloweye rockfish quotas are defined for all five management areas on the coast. Fishery openings in each region are staggered throughout the year.

The recreational fishery is managed by a daily limit of five rockfish per day in the Strait of Georgia and eight per day outside of the Strait of Georgia.

3) Sablefish

a. Research Programs

In 1995 a total of $286,000 of cost-recovered funding was allocated to cover salaries, contracts and purchases for research projects that were approved by the Sablefish Finance Committee and the Biological Sciences Branch of the Department of Fisheries (DFO) and Oceans. The committee consists of industry and DFO representatives whose mandate is to ensure research is conducted in a cost-effective manner. Secondarily, industry representatives have provided input regarding direction of the proposed research.

1. Trap Survey

Trap surveys of the south, central and north coasts were conducted during October/November by *FVs Ocean Pearl*, *Victor F* and *Viking Sunrise*, respectively. The goal of the surveys was to monitor age composition of the population and tag fish for studies of migration and abundance. Sets were made at discrete depths (100 fm intervals between 150 and 650 fm) at pre-selected stations. Each vessel occupied 7-8 stations offshore. Four inlet stations on the central coast were surveyed by the *Victor F* and the *Viking Sunrise*, while the *Ocean Pearl* conducted mortality studies (see below). A total of 15,908 fish was tagged, and 3,197 were sampled for length, sex, maturity and otoliths collected for ageing. Ageing of the samples is underway, and results will be incorporated into the 1996 assessment.

2. Longline Time Series

Data from longline logbooks from 1997-94 were coded and keypunched. Assessments have used the time series of CPUE from the trap fishery as an index of abundance for the stock. Trap CPUE increased dramatically in 1987-88, and there is no indication of strong recruitment during that period. There has been some speculation baiting practices may have changed during this period and the increase does not reflect a change in abundance. It is hoped the longline (hook) CPUE time series will shed some light on this issue, i.e., assuming there was no change in longline fishing practices, there should not be an increase in longline CPUE in 1987-88 if the trap CPUE change was due to altered baiting practices. Analysis of these data will be conducted as part of the 1996 assessment.

3. Abundance from Tag Data

An investigation of the potential for estimating current stock size of sablefish using tag and recovery data from 1991 and 1992 was initiated. We conducted a qualitative examination of dispersion of sablefish from these

releases and generated preliminary estimates of abundance for northern stock. Lack of effort in the south during the 1990s resulted in low recoveries and precluded any analysis for this area.

Our qualitative examination of dispersion indicated fish appear to disperse from the discrete tagging sites rapidly enough to allow recoveries from the first year at large to be used to estimate abundance. We also found that fish tagged in surveys during November were rarely, if ever, caught in the Canadian zone during summer months despite significant effort in the Canadian zone. There were recoveries however in Alaska during these months, which suggests a seasonal component to migration. If true, abundance estimates from these taggings would overestimate stock size. A spring/summer tagging trip is planned for 1996, which should help answer this question.

Abundance estimates were variable, ranging from 28,401 t to 66,165 t. In 1996 we will continue to develop this method and utilize additional data from 1993 and 1994 releases, as well as recoveries from 1994 and 1995. Numbers of fish released in the two new years were almost double the 1991-92 levels, which should improve estimates.

4. Quantification of Otolith Growth Patterns

Recent growth studies of sablefish indicate that sablefish inhabiting deep canyon areas grow slower than fish in the shallows. Otoliths from these fish have narrow bands (annuli) reflecting slow growth. If we can measure the width of these annual zones over the life of individual fish, we could use resulting individual growth curves to begin quantitatively addressing the following:

a) Are slow-growing fish in the deep small because of environmental or genetic differences?

b) Do changes in growth rate correlate with indices of ocean productivity or stock abundance?

c) Do fish move among depth zones and if so how frequently?

During 1995 we began to examine feasibility of using current camera/computer systems (OPTIMUS software) to allow us to capture images of otoliths and measure width of zones. We determined it was possible to do so for the faster-growing fish, but a higher resolution video camera is required for slow-growing fish. OPTIMUS software was not appropriate for use with otoliths without modification. Software was developed by GeoSpatial Systems of Nanaimo, which can be applied if we are successful in collecting images of

slow-growing fish. During 1996 we will review cameras available and propose further work in 1997 if appropriate hardware is found.

5. Physiological Effects of Handling and Effect of Depth of Capture

Survey work in the early 1990s suggested survival of sablefish may be reduced with increasing depth of capture. If true, there are assessment implications with respect to discard survival rates and to estimates of dispersion and abundance based on depth-specific tagging.

Three days of sampling were conducted aboard the *F/V Ocean Pearl* in November to begin examining physiological indicators of stress affecting sablefish captured from deep (>450fm) and shallow (<250fm) depths. Samples collected from the fish included histological, electrophoretic, and blood for examination of pH, glucose, lactate, chloride and cortisol. Further work was done with enclosures, similar in dimension to Alaska King Crab pots, to examine survival of fish returned to their respective depths. With limited time and enclosures, only two treatments were possible, shallow and deep. Fish from the shallow all survived, while fish from the deep were all dead. Enclosure work was hampered by sea lice which, undoubtedly contributed to the result in the deep. Results of lab work will be available in early 1996, and a report will be prepared summarizing results and containing recommendations for further research.

6. Size Selectivity Through Use of Escapement Rings in Sablefish Traps

There was interest within the fleet in using escape rings to allow smaller fish to escape at depth. An unpublished data set collected during 1980 and 1981 by observers was assessed and analyzed. Three ring sizes were used. After a thorough examination of the study we determined that only a small subset of data were collected in a suitable manner. These data in turn were hampered by small sample size, and the two smallest diameter rings showed no detectable effect. The largest ring (89mm) allowed some proportion of the fish between 50 and 64 cm to escape with 50% retained at approximately 56cm. Further work is required if escape rings are to be adopted using several ring sizes and larger numbers of traps deployed.

b. Stock Assessment

A major stock assessment analysis was completed and presented to the Pacific Stock Assessment Review Committee (PSARC). Dr. Ray Hilborn (University of Washington) conducted an independent assessment using the DFO model and another catch-at-age model utilizing the same input data. He confirmed that our implementation was not in error, however his model estimated considerably higher

stock sizes, ~55,000t compared with ~24,000t based on the DFO model. Both analyses indicated the stock is in decline, a result of poor recruitment in recent years. Both results were viewed as valid and given uncertainty in the estimate of current stock size (24,000-55,000t) and declining abundance, a minor reduction in quota from the 1995 quota be adopted. It was agreed research effort must be focused on better determination of adult stock size and using tagging data to estimate stock size was the most promising approach. As a result, a doubling of tagging effort is planned for 1996.

We continued to endorse the presence of northern and southern stocks for assessment purposes, and management and industry are looking at options for ensuring a more even split in effort between north and south. This is particularly critical if estimates of abundance from tagging are to be successful.

c. Management and Regulations

Sablefish are managed by quota with a 3,525 t coastwide quota in effect for 1996. Quota is split between trawl (8.75%) and longline/trap (91.25%) vessels. Both trawl and longline licenses are limited entry.

In 1996 longline/trap license holders are again entitled to an individual vessel quota. Fishers are entitled to a proportion of quota rather than a permanent tonnage. Allocation of quota is based on a combination of vessel size criteria and landings prior to inception of IQs. Quota is transferable for the current fishing year only and reverts back to the original license holder for the following year. In 1996 a cost recovery program initiated in 1994 remains in effect, with revenue from the fishery used to fund research, enforcement, management and verification of landings.

4) Flatfish

a. Research Programs

Abundance surveys were carried out for Dover sole off the west coast of Vancouver Island and for English and rock sole in Hecate Strait. No measurable change has occurred in the mean catch-rate for Dover sole during biomass surveys conducted off the west coast of Vancouver Island 1981 and 1995. However, significant declines in mean size and age have occurred over the same period. This may represent a decline in recruitment between the two periods, but more data are necessary to confirm this. Hecate Strait survey CPUE dropped 60% for rock sole and 54% for English sole between 1993-95. The proportion of young fish in the catch decreased as well. This is consistent with a decrease in recruitment for both species and may be the result of the El Niño temperature regime which occurred during the late 1980s.

Monitoring of halibut bycatch in the B.C. trawl fishery continued in 1995. Ten observers made 35 trips aboard 31 vessels and monitored 799 tows in the B.C. trawl fishery in 1993. Monitoring was focused primarily on the west coast of Vancouver Island fishery where 229 tows were monitored (2.3% coverage). Mean CPUE for halibut caught during the summer and winter fisheries were 18.6 kg/h and 28.6 kg/h, respectively. Both the mean CPUE for halibut and the ratios of halibut/target species were down substantially from 1994. Halibut/target species ratios were highest off the west coast of Vancouver Island for flatfish species. Ratios were lowest for rockfish species. Mortality of halibut caught was 53.6% and 37.4% for the winter and summer fisheries, respectively. Halibut bycatch caps are in place in 1996 for trawl fisheries in Hecate Strait and off the west coast of Vancouver Island.

b. Stock Assessment

Catch-age analysis was updated for flatfish stock assessments in 1995. Declines in recruitment occurred for Hecate Strait English and rock soles. Yield for these two species has been substantially reduced for the 1996 fishery. Abundance of Dover sole remained fairly stable between 1993-95. Petrale sole stocks remained at a low level of abundance in 1995 with no sign of a recruitment increase.

c. Management

Flatfish in British Columbia are managed using area-specific quotas in 1996. Currently, vessel trip limits are being applied until quotas set for the 1996 fishery are reached. Only incidental landings of petrale sole are permitted in 1996 due to low abundance of these stocks. Observer coverage of the trawl fishery will be near 100% for the 1996 fishery. Detailed information on discards is being collected during the 1996 fishery. This information will be incorporated into stock assessment in the near future.

5) Pacific Hake

a. Research Programs

Monitoring of catch, estimation of species composition, and biological sampling in the Vancouver area fishery was continued through extensive offshore observer and shoreside monitoring programs.

Trawl and hydroacoustic studies examining relative abundance and distribution of Pacific Hake in the Vancouver area, including northern Vancouver Island, were continued. In particular, survey of the Canadian zone was conducted cooperatively with NMFS staff aboard the NOAA ship *Miller Freeman* and DFO personnel aboard the *CSS W.E. Ricker*. Side-by-side comparison of the two acoustic systems and target strength studies was conducted. Further details are reported in the

NMFS report. Hydroacoustic assessment of hake in the Canadian zone and further target strength studies are planned for August 1996.

The tenth annual species interaction trawl survey was conducted in August to assess impact of Pacific hake and other predators on herring survival and recruitment.

b. Stock Assessment

1. Strait of Georgia

The fishery in the Strait of Georgia increased in 1994 to 9,631 t from 4,368 t in 1993, and in 1995 the full 11,000 t quota has been taken. Stock is estimated to be in good condition based on results of a hydroacoustic survey conducted during March 1993 that found a total of 245 Kt throughout the Strait of Georgia. These estimates are higher than previous surveys conducted during 1981 and 1988, although we caution that sources of error, including species identification and incorrect target strengths for juvenile fish, could lead to an overestimation of stock size. The 1993 survey had a strong showing of one- and two-year olds, which have continued to show in fishery samples through 1995. Yield options for the Strait of Georgia remain unchanged from the previous assessment conducted using Virtual Population Analysis (VPA) and a forward simulation model that indicated yields up to 14,000 t may be sustainable. Detailed survey and analytical effort are warranted for future assessments given size of the fishery and uncertainty associated with the current assessment.

2. Offshore

Since 1968 more Pacific hake have been landed from the offshore stock than from any other species in the groundfish fishery on Canada's west coast. Coastwide catches of Pacific hake increased from 200 Kt in 1993 to 359 Kt in 1994, a result of increased biomass found during the 1992 triennial survey. Increase was due to expansion of the survey offshore of previous designs and not due to recruitment. Presence of hake on selected offshore U.S. and Canadian transects was verified during a cruise during July 1994. The all-nation-catch in the Canadian zone was 106,172 t in 1994, up from 58,783 t in 1993. The approach taken in the assessment was similar to that of the previous one, using catch-at-age analysis tuned to independent Canadian and U.S survey estimates to assess current status of the stock, and using an age-structured forward simulation model to examine long-term (equilibrium) production and short-term (look ahead) yield options. The deterministic modeling of recruitment in short-term projections using median recruitment was replaced with a more realistic stochastic model that uses existing recruitment time series.

Yield options developed in mid-1995 for 1996 were revised in late 1995 to incorporate results of the 1995 triennial hydroacoustic survey and recent target strength studies. The survey indicated a strong showing of 1990 and 1993 year classes and resulted in a substantial increase in the estimate of current stock size. The survey found 1.88 million t of exploitable hake compared with an expected biomass of 1.12 million t. Coastwide yield options ranged from 154-456 thousand t (low to high risk). The wide range is largely a result of uncertainty over an appropriate target strength value. Given this, and the few observations of the 1990, 1993 and 1994 year classes, managers were urged to adopt a conservative quota.

c. Management and Regulations

Hake off the west coast of Vancouver Island are managed by annual quota. A proportion of the quota is retained for domestic fisheries and in 1995 as in previous years, the remainder was allocated to a joint-venture fishery. Each country participating in the joint-venture fishery negotiates for an allocation. The 1995 quota was 66.5 thousand mt. It is anticipated that joint venture fishery during 1996 will represent less than 35% of hake landed as domestic demand continues to increase.

In the Strait of Georgia the 1996 quota is 11,000 mt.

6) Dogfish

a. Research Programs

Processing and analysis of dogfish tag recoveries was continued. The purpose of this experiment is to assess long-term movements, in particular rate of exchange between the Strait of Georgia and offshore stocks.

b. Stock Assessment

A major assessment of dogfish has not been conducted for more than five years although catches have been monitored. Landings, in particular hook and line, have increased in recent years although current harvests levels are below optimal yield in both areas.

c. Management and Regulations

Dogfish are managed by annual quota with separate quotas in place for the Strait of Georgia (3,000 mt) and the remainder of the coast (15,000 mt).

7) Lingcod

a. Research Programs

None.

b. Stock Assessment

Offshore lingcod stocks were assessed for northwest and southwest coasts of Vancouver Island, Queen Charlotte Sound, Hecate Strait and the west coast of the Queen Charlotte Islands. Interpretation of stock condition relies on recent trends in catch statistics due to a lack of biological data series for all areas. Off the southwest coast of Vancouver Island (Area 3C) CPUE declined through 1994, however no additional biological information was available to estimate stock size. The historical ageing series for this area is being re-read to account for shifts in application of ageing criteria in the early 1990s. CPUE off northwest Vancouver Island (Area 3D) suggests stock abundance is average, however catches have been above quota in recent years, and an increasing proportion of the quota originates from hook and line vessels. Yield options remained unchanged for the west coast of Vancouver Island. Recent declines in CPUE for Queen Charlotte Sound (Areas 5A-5B) may indicate stocks are slightly below

c. Management and Regulations

The commercial lingcod fishery closure in the Strait of Georgia, initiated in 1990, will continue through 1995. The recreational fishery remains open between June 1 and September 30, with a minimum size limit of 65 cm, bag limit of one per day, possession limit of two, and an annual limit of ten which must be recorded on the angler's license.

Lingcod are managed by annual quota for the southwest and northwest coast of Vancouver Island, Area 3C and 3D respectively; and Queen Charlotte Sound (Area 5A-B). Annual quotas were 2,700 t and 1,650 t, respectively. Fishery effort in Hecate Strait (Area 5C-D) has recently undergone a dramatic increase in effort, but there is little biological information available to guide yield recommendations. A recommended yield level of 1,000 t is provided out of concern for sensitivity of the species to exploitation and rapid expansion of the fishery.

8) Walleye Pollock

a. Research Programs

Monitoring of catches and collection of biological samples were conducted during 1995 for pollock stocks in northern Hecate Strait/Dixon Entrance, Queen Charlotte Strait, the southwest coast Vancouver Island and the Strait of Georgia.

b. Stock Assessment

The coastwide catch of walleye pollock decreased substantially from 8,709 t in 1993 to 4,230 t in 1994 due to decreased demand. The 1994 incidental catch in the joint-venture hake fishery decreased to 130 t from 552 t in 1993. Range of sustainable yield options based on Gullands (1983) MSY model is 630 to 2,350 t for the Strait of Georgia (excluding area 12) and 440 to 1,760 t for Dixon Entrance/Hecate Strait. A precautionary quota of 1,000-2,450 t is recommended to cap the yield in Queen Charlotte Strait (Minor area 12) until a detailed assessment can be conducted. Yield options are not proposed for stocks off the west coast of Vancouver Island. Given the size of Dixon Entrance/Hecate Strait and Minor area 12 fisheries, detailed surveys and assessments of these stocks are warranted.

c. Management and Regulations

Pollock are managed by annual quota in the Strait of Georgia (1,490 mt), Queen Charlotte Strait (1,898 mt), and Hecate Strait/Dixon Entrance (3,190 mt). Yield is not restricted off the west coast of Vancouver Island where the majority of catch is incidental to the hake fishery.

C. OTHER RELATED STUDIES

1) Statistics and Sampling

Principal activities in 1995 included maintenance of the trawl and trap catch and effort database, and biological sampling of commercial landings. A total of 259 samples was collected from commercial landings. Work continued on the ORACLE-based relational database system for groundfish biological data, GFBIO, and backfilling of historical data is ongoing.

Staff participated in regional database initiatives, particularly in the design of a comprehensive ORACLE-based relational database system for groundfish catch and effort data. Development of this system will result in a single catch and effort database for the region.

APPENDIX 1.
REVIEW OF CANADIAN GROUNDFISH FISHERIES

1. Commercial Fisheries

Canadian domestic trawl landings of groundfish (excluding halibut) in 1995 were 99,567 t, an increase of 24% above the 1994 catch. This increase was mainly due to the increase in domestic hake landings. The major species in the trawl landings were Pacific hake (56%), POP (6%), pollock (4%), Dover sole (4%) and yellowtail rockfish (4%). Principal areas of trawl production were 3C (43%), 4B (21%), 5B (8%), 3D (7%), 5A (7%) and 5D (7%).

Canadian landings of groundfish caught by gear other than trawl in 1995 totaled 8,850 t. Trap gear accounted for 3,154 t (98% sablefish). Longline, handline and troll gear accounted for 5,694 t (47% rockfish, 29% dogfish and 18% lingcod). Catches incidental to shrimp trawl totaled 3 t (63% lingcod and 33% dogfish).

2. Recreational Fisheries

Each year DFO conducts creel surveys of the recreational angling fishery in the Strait of Georgia. Principal target species are chinook and coho salmon. In 1994 these surveys covered only the months of March to October. Provisional estimates of 1995 catches for this eight-month period were 5,134 fish for lingcod, 110,775 fish for all rockfish species and 1,862 fish for dogfish. There was also an estimate of 32,014 fish for other finfish which includes greenlings and sculpins, as well as other species such as herring.

3. Joint-Venture Fisheries

In 1995 forty-three Canadian catcher vessels delivered Pacific hake and incidental species to three processing vessels in cooperative fishing arrangements. These fisheries take place off the southwest coast of Vancouver Island (Area 3C). A total of 26,580 t of Pacific hake was processed by three Russian vessels. Quotas and catches are outlined below:

Nation Species	Quota (t)	Catch (t)
Russia Hake	26,500	26,580
Pollock	incidental	tr.
Rockfish	incidental	191

4. Foreign Fisheries

There were no national or supplemental fisheries for Pacific hake off southwest Vancouver Island (Area 3C) in 1995.

APPENDIX 2

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APPENDIX 3
MARINE FISH DIVISION STAFF IN 1995

P. Aubry	Stock assessment computer programs
W. Andrews	Sablefish, hake, dogfish and pollock
K. Charles	Fish ageing technician
K. Cooke	Population hydroacoustics estimation
G. Kronkite	Acoustic development methods
R. Kronlund	Analytical programs
J. Fargo	Stock assessment and biology
C. Fort	Herring assessment
D. Gillespie	Fish Ageing technician
V. Haist	Marine fish/Pacific cod stock assessment
L. Hamer	Herring data base management
S. Hardy	Statistics/sampling
S. Janz	Fish ageing technician
T. Johansson	Statistics/sampling
R. Kieser	Population hydroacoustics estimation
B. Leaman	Stock assessment and recruitment biology
D. Little	Fish ageing technician
G. A. McFarlane	Marine fish stock assessment, population dynamics and biology, fish/ocean interaction
S.E. MacLellan	Fish ageing supervisor
W. Mitton	Sablefish, hake, dogfish and pollock
T. Mulligan	Acoustic development methods
N. Olsen	Analytical programs
I. Perry	Fisheries oceanography/shellfish
J. Rankin	Fish ageing technician
J. C. Rice	Head, PSARC
L. Richards	Multispecies stock assessment, mathematical analysis
K. Rutherford	Statistics/sampling
M. Saunders	Groundfish stock assessment and biology
J. Schweigert	Herring stock assessment and stock identification
M. Smith	Sablefish, hake, dogfish and pollock
R. Stanley	Shelf rockfish stock assessment biology, sampling studies
R. Tanasichuk	Hake/herring/euphausiid interactions
N. Venables	Statistics/sampling
D. Ware	Fisheries oceanography
G. Workman	Technical support
L. Yamanaka	Rockfish stock assessment and biology

APPENDIX 4
SUMMARY OF COST/RECOVERY OR USER/PAY PROGRAMS IN SUPPORT OF GROUNDFISH RESEARCH, SCIENCE BRANCH OF FISHERIES AND OCEANS CANADA

Sablefish

A cost/recovery program was initiated in 1994 for sablefish research and management. A landing tax is levied on the fishery, and a portion of the revenue is allocated directly to research projects. Projects currently funded are stock assessment, spring and fall tagging surveys, otolith ageing, data processing of logbooks, biological, survey and tagging data, shorebased sampling, and a handling mortality study. A proportion of department staff salaries, as well as additional contract staff and overhead expenses, is paid for by this cost/recovery program.

Hook and Line Rockfish

A user/pay logbook program was initiated in 1993 and a cost/recovery biological sampling program was initiated in 1995. In the logbook program, a contractor produces the logbook (department designs) and sells this to fishers with an additional keypunching fee. Fishers purchase logbooks and upon completion return log records to the contractor. The contractor then keypunches the filled-in log records and submits the data to the department. A program for obtaining biological samples allows fishers (at the department's request) to retain 50 pieces of rockfish over and above their trip limit. Upon landing these fish they are turned over to the department to sample, and after biosampling, the fish are returned to the fisher for sale.

Trawl Fishery

In 1994 and 1975 a relinquishment fund was established to deal with sales of fish exceeding trip limit. A nonprofit society was established in 1995 to manage the fund, which now exceeds one million dollars. The society will support programs related to groundfish research. In 1996 several projects have been approved including:

1. A three-week charter to conduct a POP survey and a six-day charter to conduct flatfish/Pacific cod trawls alongside the department research vessel. The society is also funding two contract personnel to aid in data collection during the surveys. Department research staff are developing survey design and coordinating surveys. Staff will also conduct onboard data collection, data collation and write up of the research reports. Data are to be used to enhance stock assessments.

2. DFO port sampling staff and several students will be funded to conduct at-sea sampling. A total of eight trips between May and August will be conducted.

6. NMFS - AFSC

A. AGENCY OVERVIEW

Essentially all groundfish research at the AFSC is conducted within the Resource Assessment and Conservation Engineering (RACE) Division, the Resource Ecology and Fisheries Management (REFM) Division, and the Auke Bay Laboratory (ABL), which is responsible for groundfish assessment in the GOA east of Cape St. Elias. The RACE and REFM Divisions are divided along regional or disciplinary lines into a number of tasks and subtasks. A review of pertinent work by these tasks during the past year is presented below. A list of recent publications and reports produced by RACE, REFM, and ABL scientists are presented as Appendix I.

1) RACE Division

In 1995 the primary activity of the RACE Division continued to be fishery-independent stock assessments of important groundfish species of the northeast Pacific Ocean and BS. Groundfish trawl surveys were conducted by the BS and West Coast subtasks of the Groundfish Assessment Task. There were three bottom trawl surveys in 1995. The Mid-water Assessment and Conservation Engineering (MACE) Task conducted a major survey of the Pacific whiting resource along the west coast during the summer of 1995 and has conducted three acoustic surveys of pollock abundance in the GOA and BS in early 1996. Major emphasis in 1995 was along the continental west coast (California-Oregon-Washington-British Columbia), in keeping with triennial rotation of comprehensive surveys among three major geographic areas. Focus will be in the GOA region in 1996. The Conservation Engineering group has also been refining methods used to stabilize research survey trawls, monitor fishing configurations of sampling trawls, and explore possible methods of reducing bycatch. Underwater video and scanning sonar are being used to study behavior of fish encountering trawl gear with the purpose of detecting behavior differences among species and size classes which might be exploited to reduce bycatch. The Recruitment Processes task conducted four Fisheries-Oceanography Coordinated Investigations (FOCI) cruises in the spring of 1994, investigating interaction between the environment and spawning products of GOA and eastern BS pollock. An additional FOCI study near the Pribilof Islands in late summer 1994 looked at young-of-the-year pollock.

For more information on overall RACE Division programs, contact Division Director, Dr. Gary Stauffer at (206)526-4170.

2) REFM Division

The research and activities of the REFM Division are designed to respond to needs of the NMFS regarding conservation and management of fishery resources within the

U.S. 200-mile EEZ of the northeast Pacific Ocean and BS. Specifically, REFM's activities are organized under the Observer Program and the following tasks: age and growth studies, socioeconomic assessments, and marine assessment and resource ecology. Scientists at AFSC assist in preparation of stock assessment documents for groundfish in three management regions (BS/AI , GOA, and Washington-Oregon-California), conduct research to improve precision of these assessments, and provide management support through membership in regional groundfish management teams.

For more information on overall REFM Division programs, contact Division Director, Dr. Richard Marasco at (206)526-4172.

3. NMFS - AFSC - ABL

The ABL, located near Juneau, Alaska, is a major division of the NMFS AFSC. ABL's groundfish task (part of the laboratory's marine fisheries assessment program) is primarily involved with research and assessment of sablefish and rockfish in the GOA. Presently, the groundfish task is staffed by ten permanent biologists.

In 1995-96 field research, ABL's groundfish task conducted the annual NMFS sablefish longline survey in the GOA.. Other field studies by ABL in 1995-96 included 1) rockfish maturity and genetic sampling; 2) an experiment to determine small scale distribution of POP aggregations; and 3) continued juvenile sablefish studies, notably a pilot study that used a small-mesh gillnet for surveying young-of-the-year fish.

Ongoing analytic activities involved management of ABL's sablefish tag database and preparation of three annual status of stocks documents for GOA groundfish (sablefish, slope rockfish, and PSR). Also, an age-structured model analysis was used to estimate catchability of sablefish in the longline survey and to determine alternative estimates of sablefish biomass.

For more information on overall ABL programs, contact Laboratory Director, Dr. Michael Dahlberg at (907)789-6001.

B. MULTISPECIES STUDIES

1) Research

a. BS Crab/Groundfish Bottom Trawl Survey - RACE

The 1995 eastern BS crab-groundfish bottom trawl survey was conducted from June 1 to August 2, continuing the annual series of eastern BS resource assessment surveys which began in 1971. Primary purpose of the survey was to assess abundance, distribution, and biological condition of major demersal fish and crab resources on the eastern BS shelf. Further research conducted during the standard survey included collection of stomachs from various groundfish for use in trophic

interaction studies; additional sampling in areas of high king crab and Tanner crab abundance to reduce variability of population estimates, retrieval and redeployment of bottom temperature sensors in Bristol Bay which record seawater temperatures for a 12-month period, and an evaluation of potential bias in subsampling methods for large bottom trawl catches.

The survey encompassed an area approximately 465,000 km^2 which included continental shelf waters from inner Bristol Bay west to the 200-meter depth contour and from Alaska peninsula north to St. Matthew Island. The survey was conducted aboard two chartered fishing vessels. A total of 394 bottom trawls was completed during the survey using the standard 83-112 eastern bottom trawl. These included 379 successfully completed trawls and 11 unsuccessful hauls at scheduled sampling sites, and four opportunistic hauls to collect additional information on king and Tanner crab. Seawater temperature profiles and tow bottom depths were collected at most sampling sites using micro-bathythermographs attached to the headrope of the net.

Estimates from the survey indicated a moderate reduction in biomass compared to 1994 for almost all flatfish species and Pacific cod. There was a slight increase in the estimate for walleye pollock, however, this was for the demersal component of the population only since there was no hydroacoustic survey during 1995.

For further information, contact Gary Walters (206)526-4143.

b. West Coast

1995 was a "triennial year" for focusing research survey efforts in the West Coast region off Washington, Oregon, California, and British Columbia. As such, two bottom trawl surveys and one echo integration/mid-water trawl survey were conducted in this area by the AFSC. The seventh in a series of coastwide triennial groundfish surveys was conducted during June through September to monitor distribution and abundance of groundfish resources of the continental shelf between depths of 55 and 500 m. In October and November, a bottom trawl survey of the continental slope waters (183-1,280 m) off southern Oregon and northern California repeated 1990 investigations of deeper groundfish resources off the Pacific coast.

c. 1995 Triennial Bottom Trawl Survey of West Coast Groundfish Resources - RACE

The West Coast Groundfish Subtask continued its series of triennial bottom trawl surveys of the groundfish resources off California, Oregon, Washington, and British Columbia during the summer of 1995. The survey began June 8 near Pt.

Conception, California, and concluded on September 6 off Nootka Sound, British Columbia. Two chartered vessels successfully completed trawl hauls at 524 of the scheduled 610 stations between the depths of 55 and 500 m.

The west coast triennial survey series date back to 1977. In earlier surveys (1977-1986) survey design emphasized providing estimates of rockfish abundance for resource management. Experience from those surveys showed area-swept trawl surveys did not provide sufficiently precise rockfish abundance estimates because of patchy distribution of rockfish. Survey design was altered in 1989 to emphasize multispecies objectives and improve precision of Pacific whiting (*Merluccius productus*) and sablefish (*Anoplopoma fimbria*) biomass estimates. The 1992 survey replicated 1989 survey design.

The 1995 trawl survey extended the depth range of past triennial surveys; previous surveys covered 55-366 m while the 1995 survey covered 55-500 m. Four strata of high station density were downgraded to the background station density because we found that small precision improvements in sablefish abundance estimates realized by the higher station density did not justify time spent sampling extra stations. By reallocating high density stations to the deep stratum, we hoped to more comprehensively cover habitat of slope rockfish species (except thornyheads). New stations in the deep strata were located in a manner consistent with survey design of the shallower strata. Shallower than 366 m, the survey replicated stations fished during 1989 and 1992 triennial surveys.

For further information, contact Mark Wilkins (206)526-4104.

d. 1995 West Coast Continental Slope Bottom Trawl Survey of Groundfish Resources - RACE

In October-November 1995, we resumed the annual series of upper continental slope (100-700 fm) bottom trawl surveys of groundfish resources begun in 1988. The survey period in 1994 was used to conduct research on survey trawl efficiency and video sled comparisons of fish density. In 1995 we surveyed the INPFC Eureka area (40°30' to 43°00' N lat) aboard the NOAA ship *Miller Freeman*. Data derived from annual slope surveys are used by fishery managers to assess stock condition and establish annual harvest guidelines for sablefish, Dover sole, and two species of thornyhead rockfish. It presently takes four to five years to complete a trawl survey of the entire U.S. west coast because of the of the coastline, time necessary to collect trawl samples from deep water, and availability of only one month of vessel time for the survey each year. Slope groundfish resources in the Eureka area were last surveyed in 1990.

During the past two years the fishing industry and an independent review panel of fishery scientists criticized our slope survey gear performance and resulting survey data. In 1995 we implemented changes to trawl gear and trawling

methodology called for by results of studies conducted in 1994 to improve gear performance. Changes included a four-point door bridle to improve door stability, shortened drop chains connecting ground gear to the footrope to allow less escapement along the footrope, and an increased target towing speed from 2.0 knots to 2.3 knots to improve net stability. We also added instrumentation to the trawl to improve our ability to monitor gear performance. Besides the regular SCANMAR equipment for measuring net dimensions and the bottom depth data logger, we also attached a bottom contact sensor to the footrope, a tilt sensor on the trawl doors, and a new Wesmar net sonar system to the headrope. The Wesmar sonar provides a real-time image of the mouth of the trawl while it is fishing on bottom. It provided us with a better understanding of the trawl's dynamics when adjustments were made in speed and wire length. We also took video footage of the new four-point trawl door configuration and the ground gear while they were fishing on the bottom. A fisherman representing the Oregon fishing industry participated for three days during the second leg of this year's cruise and was able to observe and critique modifications to the sampling gear while the survey was in progress.

Analyses of 1995 survey data have shown the modified configuration of the trawl is more stable while fishing, maintaining a more constant net width and height. Large quantities of mud in the catches occurred much less often. Samples collected with modified trawl reflected catch rates similar to those seen with unmodified gear in the same area in 1990. Our results indicate that although trawl was unstable while fishing during past surveys, this problem may not have significantly affected catch rates.

For further information, contact Bob Lauth (206)526-4121.

e. Age and Growth Task - REFM

The Age and Growth Task of the REFM Division serves as the AFSC's ageing unit for groundfish species. The task consists of a biometrician, age validation researcher, data manager/technician, and eight age readers. Ages are usually determined from otoliths, but scales and/or finrays are sometimes used.

Data provided by the task are used in stock assessment work which contributes to estimation of allowable catch of many commercially important groundfish species. These species include walleye pollock, Pacific whiting, Pacific cod, sablefish, POP, northern and dusky rockfishes, Atka mackerel, yellowfin sole, rock sole, rex sole, and miscellaneous sole and rockfish species.

The radiometric lab of the Age Unit is currently focusing on the ageing of several rockfish species: POP, shortspine thornyheads, shortrakers, rougheye, northern and dusky. Recently published work (Kimura and Kastelle 1995) indicates radiometric ageing is best accomplished using otolith cores (centers) rather than whole otoliths.

A study is currently underway with the National Marine Mammal Laboratory to apply radiometric ageing to gray whales and other baleen whales. We have found that obtaining necessary ear bones (i.e., whale bullae) is itself a major difficulty. Also, possible reconstruction of the whale bone as it ages may invalidate the radiometric ageing method.

Delsa Anderl has completed work with Dr. Akira Nishimura of Japan's National Research Institute of Far Seas Fisheries, and Sandra Lowe on the first-year growth in the otoliths of Atka mackerel (Anderl et al. 1996). Delsa Anderl is also continuing working with Jon Heifetz on a study based on known age sablefish.

For further information contact Dr. Daniel K. Kimura (206)526-4200.

f. Trophic Interactions Program - REFM

The Trophic Interactions Program continued regular collection of food habits information on key fish predators in the North Pacific. Program personnel and fishery observers collected fish stomachs. About 12,279 stomachs were collected from the BS, 1,409 from the GOA/AI, and over 2,500 from the west coast region. BS species sampled were walleye pollock, Pacific cod, yellowfin sole, Alaska plaice, rock sole, flathead sole, skates, arrowtooth flounder, Greenland turbot and Pacific halibut. GOA/AI species sampled included walleye pollock, arrowtooth flounder, and Pacific cod. Pacific whiting stomachs were collected from the west coast region. Shipboard scans of fish stomach contents were performed on 116 fish (primarily walleye pollock) in the eastern BS and 76 fish (sablefish and thornyheads) in the west coast region. Laboratory analysis of stomach contents by regions totaled 10,300 and 2,198 stomachs for the BS and GOA/AI regions, respectively.

A report on ecosystem implications of the current groundfish fishery bycatch, utilization, and discard practices was completed. Results highlighted the magnitude of offal (processed fish waste) relative to fishery discards. It appears about 59% of the total (retained + discarded) catch weight of groundfish fisheries in the BS, AI, and GOA becomes offal and is returned to the sea. Discards, however, constituted only about 15% of total catch weight of groundfish fisheries. Groundfish inhabiting these regions are documented consumers of offal. It is estimated groundfish in the eastern BS may consume over 160,000 mt of offal during the May through September feeding period of each year. Population trends of offal consumers, including birds, were examined and did not appear to how increases related to increased availability of offal. Combined amount of offal and discards in the eastern BS is only about 1% of the estimate of unused detritus already going to the bottom, implying these amounts are negligible when energy flow of the whole system is considered.

A comparative approach to learning about groundfish food webs was undertaken by the group. Groundfish food webs of the eastern BS, GOA and AI regions were constructed and various aspects of the food webs were compared, particularly with respect to the role of pollock in each food web. Walleye pollock was the central groundfish species in the BS groundfish food web. It was not only the most abundant species, but it was also the most important prey for many of the piscivorous groundfish species. Walleye pollock shared its central role in the other two regions with other groundfish species: arrowtooth flounder in the GOA and Atka mackerel in the AI region.

The key feature of all three groundfish food webs was that the most abundant groundfish species in the pelagic realm was one that relied heavily on euphausiids and copepods for prey and thus had a lower trophic level than other abundant groundfish species. Average trophic level of walleye pollock was lower in the BS than in the GOA and AI regions. Similarly, groundfish that relied heavily on pollock for prey had lower trophic levels in the BS. The possibility is raised that the shorter food chain length leading to pollock in the eastern BS relative to the GOA and AI areas leads to higher stability (shorter return to equilibrium) in the eastern BS.

Work is continuing on parameterizing a multispecies virtual population analysis model and a static energy balance model (ECOPATH) for two time periods in the eastern BS.

For more information, please contact Pat Livingston at (206)526-4242.

2) Stock Assessment

Marine Assessment and Resource Ecology Task (MARE) - REFM

The MARE is responsible for providing stock assessments and management advice for groundfish in the North Pacific Ocean and the BS. In addition, task members conduct research to improve precision of these assessments, and provide technical support for evaluation of potential impacts of proposed fishery management measures.

During the past year, stock assessment documents were prepared by the REFM MARE task for the GOA and BS/AI plan development teams of the NPFMC and for the managing of the PFMC.

Assessment scientists provided analytic assistance on many current fisheries management issues. These included 1) identification and prioritization of research activities that may lead to improved groundfish stock assessments, 2) modeling of groundfish stock structure, 3) contributed to a comprehensive report on bycatch, utilization and discards, 4) provided analytical advice to the NPFMC to establish an overfishing definition, and 5) made presentations to the National Research Council

(NRC) for national review of stock assessment methods. Our group is participating in this project by analysis of simulated data sets generated by the committee.

Research activities spanned a broad range of topics. Field studies initiated by staff members included continuing development of a demersal rockfish trawl for improved stock assessment and maturation studies for Atka mackerel. Significant research contributions on bycatch analysis, food web analysis, methods for quantifying uncertainty in stock assessments and Pacific whiting migration were presented at various symposia. In addition, staff members participated on nationwide NMFS committees for overfishing definitions, risk assessment in stock assessment analyses, and NRC review of stock assessment methodology. Staff members also served on national and international steering committees of GLOBEC and PICES.

For further information, contact Dr. Vidar Wespestad, (206)526-4249, or Dr. Anne Hollowed (206)526-4223.

3) Management

a. Observer Program - REFM

The Fisheries Observer Program is responsible for placement of observers on vessels fishing for groundfish species in the EEZ of the northeastern Pacific Ocean and BS. Observers collect data which provide the basis for in-season management of groundfish fisheries by NMFS, provide a means for evaluating and developing management strategies by regional management councils and NMFS, and are used in the stock assessment process. Observers play important roles in providing information critical to continuation of the U.S. fishing industry.

During 1995, no foreign vessels were allowed to catch or process fish in the U.S. EEZ along the west coast and Alaska. All allotted groundfish were given to U.S. vessels and processing plants, both for catching and processing. The Observer Program trained and deployed 550 observers to vessels fishing off Alaska, and 17 observers to vessels fishing off the Washington-Oregon-California coast. The program was responsible for defining sampling duties and data collection methods used by observers, training observers prior to deployment, debriefing observers upon their return, and editing and managing resulting data. Catch data were provided to the Alaska and Northwest Regional Offices to assist in management decisions regarding catches of groundfish and prohibited species. These data were also used in implementation of the Vessel Incentive Program in Alaska, where vessels were prohibited from exceeding certain prohibited species catch (PSC) standards. Valuable data were also collected regarding operations of the groundfish fishery.

For further information, contact Dr. William Karp (206)526-4194.

b. Socioeconomic Assessment Task - REFM

During 1995 the Socioeconomic Assessment Task was actively involved in providing economic information used in evaluation of management measures being considered by the PFMC and NPFMC. Task members served on the BS/AI, GOA, and west coast groundfish plan teams and on both NPFMC and PFMC technical work groups and contributed significantly to, and in several cases had the lead for, analyses and review of the following fishery management actions: 1) NPFMC license limitation program for groundfish and crab fisheries off Alaska, 2) North Pacific Fisheries Research Plan (Research Plan) (i.e., the observer program and user fees to support it), 3) NPFMC amendments to control bycatch in the GOA and BS/AI groundfish fisheries, 4) NPFMC increased retention and utilization of groundfish catch, 5) NPFMC harvest priority in the groundfish fishery (i.e., reserve part of a TAC or season for vessels that meet specific bycatch and discard standards), 6) NPFMC total weight measurement (i.e., use of scales or marked bins to provide better estimates of total catch for at-sea and onshore processing), 7) NPFMC vessel bycatch account (VBA) program (individual bycatch quotas), 8) moratorium for the BS/AI and GOA groundfish fisheries and BS/AI crab fisheries, 9) continuation of NPFMC allocation of BS/AI pollock, GOA pollock and Pacific cod between onshore and at-sea processors, 10) expansion of community development quota (CDQ) program in the BS/AI groundfish and crab fisheries, and 11) PFMC sablefish management (stackable licenses and trip limits). Also in support of the PFMC, a task member assisted in improving both historical groundfish catch data and access to the data.

Task members prepared publications on the following topics: 1) economics of bycatch, 2) management of high seas fisheries, 3) economic status of Alaska groundfish fisheries, 4) exports of edible fishery products from the Pacific Northwest and Alaska, 5) CDQ and open-access BS/AI pollock fisheries, 6) use of marketable permits for pollution, and 7) catch, bycatch, utilization, and discards in Alaska groundfish fisheries.

Task members provided economic advice and technical review and support for: 1) Saltonstall-Kennedy, Sea Grant, and Alaska Science and Technology Foundation research proposals, 2) redefined PacFIN system, 3) evaluation of Alaska halibut and sablefish IFQ program, 4) university research proposals, 5) economic counterpart to "Our Living Oceans," 6) preliminary assessment of effects of the PFMC limited entry program, 7) U.S. Forest Service and NMFS workshops on ecological and economic valuation assessment techniques for resource management, 8) NMFS limited entry workshops, 9) NMFS fishing cost data workshops, 10) NMFS efforts to improve their data collection and catch estimation programs, 11) NMFS efforts to determine feasibility of monitoring catch and bycatch of individual fishing vessels in support of future CDQ, ITQ, and VBA programs, 12) the OECD study of economic aspects of the management of living marine resources, 13) annual cooperative NMFS and ADF&G survey of Alaska groundfish processors.

For further information, contact Dr. Joe Terry (206)526-4253, jterry@afsc.noaa.gov.

C. BY SPECIES

1) Pacific Cod Stock Assessment

a. BS/AI

The length-based Synthesis model used in the previous two stock assessments was retuned for the present assessment, incorporating additional length-frequency information, revised catch estimates, and the 1995 trawl survey estimate of stock size. The 1995 trawl survey biomass estimate of 1.00 million t was down about 27% from the 1994 survey estimate. However, the 1994 survey estimate was nearly double the 1993 level, and was most likely an overestimate. New biomass and catch projections from the model are very much in line with last year's projections, with projected biomass increasing by only 1% and projected catch (under an $F_{35\%}$ harvest strategy) increasing by 9%. The 1992 year class continues to look very strong in the 1995 trawl survey size composition, and the 1989-1991 year classes continue to appear at least average in size.

Using an $F_{35\%}$ (=0.36) harvest strategy, the assessment model projects a 1996 ABC of 313,000 t for the eastern BS portion of stock and 357,000 t for eastern BS and AI combined. Reliable estimates of F_{MSY} and B_{MSY} are not available for this stock. The assessment model projects a 1996 OFL (under an $F_{30\%}$=0.43 harvest strategy) of 368,000 t for the eastern BS portion of the stock, or 420,000 t for the eastern BS and AI combined. Pacific cod in the eastern BS and AI is managed as a unit, although nearly all assessment research focuses on the eastern BS portion of the stock.

b. GOA

The latest assessment features some major improvements to the model which included separating catch and size composition data into different fishery categories (e.g., trawl, longline and pot gear), use of mean size-at-age data within the model, and investigations on sensitivity to different natural mortality rates, trawl survey selectivities, and survey catchability coefficients.

Projected biomass (ages three and above) for 1996 is 557,000 mt, representing a 3% decrease from the 1995 biomass projected in last year's assessment. For calculation of ABC, an $F_{40\%}$ strategy is used resulting in a 1996 ABC projection of 110,000 mt, which is about 50% of the value expected under average conditions with no fishing. However, fishery managers believe a lower harvest level would be prudent because of continuing decline in stock abundance below any level

previously estimated and because recent recruitment levels appear to be below average.

At the September meeting, the team selected a range of ABC values corresponding to the maximum likelihood estimate and the lower 95% confidence bound. The lower 95% confidence bound was estimated by assuming that log-likelihood values are true likelihoods and applying the principle that log-likelihood values are distributed as chi-squared. Appendix Table 2A.1 gave a range of ABC values between 65,000-110,000 mt (4,000 mt of which the author anticipates as bycatch in the halibut fishery).

The assessment also included an additional analysis on alternative survey catchability values. Preliminary results suggest a poor ability to estimate catchability when several key parameters are estimated simultaneously. The likelihood was flat over a range of catchability coefficient values suggesting a greater degree of uncertainty in current stock size than previously estimated. Given this uncertainty, there exists less confidence that an ABC value of 110,000 mt (which is about 50% higher than any annual harvests recorded in the Gulf) would be risk averse.

Consequently an ABC value of 65,000 mt for was used for 1996, corresponding to the lower 95% confidence bound. Reasons for selecting this value are:

0 this harvest level is similar to historical values both prior to and after peak abundance levels of the mid-1980s,
1 stock abundance is declining below any level previously estimated, and recent recruitment levels appear to be below normal,
2 based on a model the North Pacific Council's Plan Team considered reasonable, this harvest level represents a conservative interpretation of statistical confidence bounds, and
3 preliminary analyses on the survey catchability coefficient suggest the absolute abundance *may* be significantly lower than previously assumed -- a plausible alternative model configuration provided an ABC value of about 65,000 mt.

For further information, contact Dr. Grant Thompson at (206)526-4232.

2) Shelf Rockfish Stock Assessment - GOA - PSR

The PSR assemblage is comprised of five species that inhabit waters of the continental shelf of the GOA and are thought to exhibit mid-water schooling behavior. At certain times, however, some of these fish are caught in bottom trawls. Dusky rockfish appears to be the most abundant species in the group, and has been the target of a bottom trawl fishery in recent years. A jig fishery for black rockfish has also

developed in the central GOA since 1991. Current exploitable biomass for the pelagic shelf assemblage is based on the average of biomasses estimated in the 1987, 1990, and 1993 triennial trawl surveys: 57,644 mt. Results of these surveys, however, are highly uncertain for rockfish, especially when applied to species that may be somewhat pelagic in distribution. PSR are presently managed using an F=M strategy, in which the annual exploitation rate is set equal to estimated rate of natural mortality for dusky rockfish (0.09). Applying this exploitation rate to the current exploitable biomass yields a gulfwide ABC of 5,190 mt for 1996.

In past years, the GOA Groundfish Plan Team recommended black rockfish in the central Gulf be separated from the pelagic shelf group and assigned a separate ABC. These proposals stemmed from concern that under the present management regime, black rockfish may be selectively over-harvested in localized areas; also, most black rockfish reside in nearshore waters that are not sampled in present trawl surveys. The recommendations, however, have never been enacted at PFMC level. As an alternative solution to the problem of black rockfish management, the plan team in 1995 drafted a proposed management plan amendment. If adopted, this amendment would separate dusky rockfish from the pelagic shelf assemblage, and transfer management authority for other species in the group to the ADF&G, in both state and federal waters.

For more information, contact David Clausen at (907)789-6049 or Jon Heifetz at (907)789-6054.

3) Slope Rockfish

a. Research – GOA

1. Maturity Studies of Slope Rockfish

Slope rockfish maturity studies were initiated by ABL in 1995 to determine new estimates of the size and age of maturity for female POP and other species in the GOA. This project was a cooperative study with the University of Alaska Fairbanks, Juneau Center, School of Fisheries and Ocean Sciences. The two most recent studies of POP maturity in the GOA were conducted over 20 years ago and showed conflicting results as to the size of maturity for females. This, together with current need for valid maturity information in population dynamics models, provided rationale for the study. Maturity samples were collected off southeastern Alaska in May and July 1995 during two cruises of the NOAA *RV John N. Cobb*, and off Kodiak in March-April 1996 during a cruise of the NOAA *RV Miller Freeman*. Sampling focused on female POP, but also included female sharpchin, black, northern, and dusky rockfish. Ovaries were visually examined and assigned maturity codes, and otoliths and histology samples were also taken for laboratory analysis. Preliminary analysis of data for female POP off southeastern Alaska indicates size of 50% maturity was around 35-36 cm fork length.

For more information, contact Jon Heifetz at (907)789-6054 or Dave Clausen at (907)789-6047.

2. Genetic Studies of Slope Rockfish

ABL's genetics task has completed an initial look at shortraker and rougheye rockfish from the eastern GOA and AI regions. Approximately 30 enzymes were screened electrophoretically from 400 adults of each species. Several loci showed fixed differences for the common allele mobility between species, providing a useful tool for species identification. In addition, it appears there are some geographically based allelic frequency differences between the eastern GOA and AI regions.

In cooperation with Dr. Anthony Gharrett and Andy Gray at the University of Alaska, study on the use of polymerase chain reaction (PCR) amplification of mitochondrial DNA (mtDNA) to study rockfish genetics is nearing completion. Results will be used to examine phylogenetic relationships among rockfish species, determine if separate genetic stocks exist for various species of slope rockfish, and verify species identification of larval and post-larval rockfish. As part of this study, rougheye rockfish samples were compared between the eastern GOA and AI regions. Results confirm observations from the electrophoretic studies that there are genetically based stock differences between rougheye rockfish from the eastern GOA and AI regions.

For more information, contact Jon Heifetz at (907)789-6054.

3. Spatial Distribution of POP Aggregations

ABL used the NOAA *RV Miller Freeman* in April 1996 to conduct an experiment on distribution of POP in a localized area, the "Snakehead," south of Kodiak Island. The cruise was under the auspices of the AFSC Rockfish Working Group. For the experiment, 34 trawl hauls were completed in the Snakehead area around one large aggregation of POP and around lesser concentrations of these fish. These data, along with previous data from intensive sampling of POP by ABL in the eastern GOA, will be used to evaluate alternative sampling strategies for estimating abundance of this species.

For more information, contact Jon Heifetz at (907)789-6054 or Dave Clausen at (907)789-6049.

b. Stock Assessment

1. BS – POP

The POP complex consists of true POP (*Sebastes alutus*) and four other red rockfish (OR Rock.) species (northern rockfish, rougheye rockfish, sharpchin rockfish, and shortraker rockfish). Prior to 1991, the complex was managed as a unit in each of the two management areas. Since 1991, however, the PFMC has managed *S. alutus* separately from other species in both areas, and has also split out rougheye and shortraker in the AI. This was done to avoid excessive catches of less abundant members of the complex, particularly shortraker and rougheye. As a change from 1995, the ABC and TAC are subdivided for true POP within the AI area. Because of concern about the possibility of localized depletion and because there is an indication, based on length frequency data, that the fishery may be exploiting different components of the AI stock, the ABC and TAC are also subdivided in the AI region. Specifically, ABC and TAC are allocated in the following proportions, based on an average of biomass estimates from the two most recent trawl surveys: eastern subarea (541) 25%, central subarea (542) 25%, and western subarea (543) 50%.

Stock assessment for this complex is based mainly on *S. alutus*, which has the most data and is the most abundant species in the complex. An age-based synthesis model has been used as the primary analytic tool for the last three assessments. Synthesis results indicate the *S. alutus* stocks in both areas underwent declines in abundance during the 1960s and early 1970s, and remained low in abundance through the early 1980s. For several years, the PFMC set TAC well below (normally at 50% of) ABC to promote rebuilding of the stocks. Through a combination of these management actions and improved recruitment, the stocks have been recovering slowly, although the most recent survey from the eastern BS slope region indicated some downturn in that portion of the stock.

Reliable estimates of F_{MSY} and B_{MSY} for *S. alutus* are not available. Therefore, recommended 1996 ABC is based on harvest strategy that reduces the equilibrium level of spawning biomass per recruit to 44% of the pristine level ($F_{44\%}$). The $F_{44\%}$ (=0.058) level was chosen over an $F_{35\%}$ (=0.077) level because an analysis of *S. alutus* in the GOA showed the $F_{44\%}$ level produces the best harvest policy given uncertainty in stock-recruitment relationship and life-history characteristics of this species. When applied to projected 1996 age 9+ biomass levels of 44,100 t in the eastern BS, the resulting 1996 ABC for *S. alutus* is 1,800 t. The 1996 OFL for *S. alutus* is based on $F_{30\%}$ (=0.093), resulting in a catch of 2,860 t.

As in the eastern BS ABC calculation, results from the 1994 survey were included in the estimation of exploitable biomass for 1996 in the AI. The 1991 survey biomass in the AI was much higher than predicted by the model, and 1994 survey estimates were high as well. The additional high survey year increased model prediction of stock size and, using $F_{44\%}$, resulted in an estimated ABC of nearly 17,000 t -- an increase of 70% over 1995. It was felt by the authors that results from the last two surveys were above expected long-term mean stock size. In order to address uncertainty in the survey results and to estimate an ABC that would lead to more stable yields, the authors conducted a simulation over 1,000 years of fishing, the average of which gave an ABC of 12,100 t and a female spawning biomass of 133,000 t. Based on simulated long-term average spawning biomass in the AI at $F_{44\%}$ (=0.063), the resulting 1996 ABC for *S. alutus* is 12,100 t. The 1996 OFL for *S. alutus* based on $F_{30\%}$ (=0.096) under model projections is 25,200 t.

For the other subcomplexes ("others" in the eastern BS and northern/sharpchin and shortraker/rougheye in the AI), 1996 ABC was calculated as the product of the natural mortality rate (0.06 for northern and sharpchin, 0.025 for rougheye, and 0.03 for shortraker) and exploitable biomass. Since estimates of other biological parameters are unavailable, harvesting at the $F=M$ strategy also corresponds to the OFL.

For further information, contact Daniel Ito at (206)526-4231.

2. GOA

Slope rockfish are defined as those species of *Sebastes* that, as adults, inhabit waters of the continental slope, generally in depths greater than 150-200 m. Twenty-one species of rockfish are classified into the slope assemblage, the most abundant of which are POP, and northern, rougheye, redstripe, sharpchin, shortraker, silvergrey, and harlequin rockfish. Stock abundance of slope rockfish is considered to be depressed compared to its former abundance in the early 1960s. The "stock synthesis" model is applied to POP. This model incorporates age composition, in addition to using other parameters such as fishery CPUE and estimated biomass from the triennial trawl surveys. Based on this model, our best estimate of exploitable biomass for POP in the GOA is now 142,470 mt. Exploitable biomass for other species in the assemblage is estimated from the average values in the 1987, 1990 and 1993 trawl surveys, and totals 272,470 mt.

POP age samples indicate presence of a strong 1986 year class, especially in the central and western GOA. This age-class was first noted in samples from the 1990 triennial survey and verified in the 1993 survey. Past age samples have also identified a strong 1976 year class.

To prevent possible over-exploitation of the more desirable species, slope rockfish assemblage is divided into four subgroups: POP, shortraker/rougheye rockfish, northern rockfish, and other slope rockfish. Separate ABCs are assigned to each subgroup. POP are presently managed using an adjusted $F_{45\%}$ strategy, where the ABC is adjusted downward in proportion to the ratio of current biomass to a target biomass. Target biomass is set at 150,000 mt of female spawning biomass. Other subgroups are managed under an F=M strategy, in which the annual exploitation rate is set equal to the rate of natural mortality. The 1996 ABCs are: POP, 8,060 mt: shortraker/rougheye rockfish, 1,910 mt; northern rockfish, 5,270 mt, and other slope rockfish, 7,110 mt.

Recently, a rebuilding plan has been initiated for POP. Under this plan, an $F_{55\%}$ rate adjusted downward by ratio of current biomass to target biomass is used to compute a TAC of 6,959 mt for POP.

For more information, contact Jonathan Heifetz at (907)789-6054, James Ianelli at (206)526-6510, or David Clausen at (907)789-6049.

3. West Coast POP

A rebuilding program was established for POP in 1981 following depletion of this stock during the 1960s and early 1970s. The updated stock assessment, as in the analysis performed in 1992, indicates the abundance of POP has declined dramatically along the west coast to slightly more than 10% of estimated levels during the early 1960s. The latest assessment model includes data from NMFS's 1992 triennial survey as well as recent fishery size composition data.

Additionally, size-at-maturity data have been analyzed to revise estimates of proportion mature. This information was combined with previous estimates of size-specific fecundity to estimate a fecundity-at-age index which is used to monitor reproductive potential of the stock. Previously, mature female spawner biomass was used as a proxy for this measure. The new estimates of proportion mature at age are similar to the schedule used previously, however, adding the fecundity relationship has changed calculations affecting $F_{35\%}$ and other spawner biomass potential per recruit (SPR) harvest rates. Several sources of information were used which show some internal inconsistencies. However, the overall conclusion is that stock is at a low and stable to slightly increasing level. Recommended harvests should remain at minimal levels. Improved information should become available when data from the 1995 summer triennial survey have been analyzed.

For further information, contact Dr. James Ianelli at (206)526-6510.

4) Thornyheads Stock Assessment – GOA

The current assessment presents a refined analysis of the thornyhead resource in the GOA. The estimate of ABC is slightly lower than that in the 1995 stock assessment and fishery evaluation (SAFE) report. Decline resulted from a revision in the size at maturity as a more gradual process and one in which length at 50% mature is slightly larger. This results in lower estimates of spawner biomass and lower harvest rates. Also some restrictions on growth were eliminated in this year's model, which resulted in slightly slower growth than was used previously.

For further information contact Dr. James Ianelli (206)526-6510.

5) Sablefish

a. Research – GOA

1. Sablefish Longline Survey

The AFSC has conducted an annual longline survey of sablefish and other groundfish in the GOA from 1987-95. The survey is a joint effort involving two divisions of the AFSC -- ABL and RACE. It replicates as closely as practical the GOA portion of the Japan-U.S. cooperative longline survey conducted from 1978-94 and also samples gullies not sampled during the cooperative longline survey. Sixteen kilometers of groundline are set each day, containing 7,200 hooks baited with squid. In 1995, 81 stations were sampled from June 22 to September 9. The survey vessel was the chartered fishing vessel *Ocean Prowler*. Sablefish relative population weight for the upper continental slope and gullies (combined) decreased 8% from 1994-95.

For more information, contact Michael Sigler at (907)789-6037.

2. Estimating Survey Catchability with an Age-Structured Population Model

Survey catchabilities are unknown for federally-managed groundfish fisheries of the northeast Pacific Ocean, and an assumed value is applied. In the primary survey method, trawling, survey catchability in the net path is usually assumed to equal 1.0 (Alverson and Pereyra 1969). Survey catchability and biomass are inversely related. Thus if survey catchability is assumed known and value is low, then biomass and consequently ABC will be overestimated. Rather than use an assumed value, survey catchability was estimated with an age-structured model for the sablefish fishery in Alaska. Available data included a survey index (the NMFS sablefish longline survey), commercial catches, and survey age and length data. Monte Carlo simulation

was used for model validation. Estimates of ending biomass generally were similar to simulated values, which implies that estimating survey catchability is reasonable for sablefish in Alaska. These results for sablefish, and those for a previous study of widow rockfish (Bence et al. 1993), imply that survey catchability with an age-structured model is feasible.

For more information, contact Michael Sigler at (907)789-6037.

3. ABL Sablefish Tag Recovery Program

Responsibility for all NMFS and Japanese tags released in Alaska waters during past cooperative longline surveys was transferred from RACE in Seattle to ABL during 1995. Transfer resulted in a consolidated Alaska sablefish tag database with 283,300 release records and about 18,500 recoveries.

Processing new tags and administration of the reward program continued during 1995, using new programs created by ABL staff. The tag database is now on the IT95 UNIX computer, and is accessed with Oracle; tag returns and rewards are processed in a fraction of time required by the old Burroughs system. Oracle interfaces well with the desktop mapping software package ArcView, which should be of great advantage in analysis of sablefish movements.

For more information, contact Nancy Maloney at (907)789-6060.

4. Juvenile Sablefish Studies

Juvenile sablefish tagging studies in southeastern Alaska have been conducted annually by ABL since 1984. In August and September 1995, about 1,000 juvenile sablefish (age 1+) were tagged and released in St. John Baptist Bay, a small bay 30 km north of Sitka. This is the eleventh consecutive year that relatively large numbers of juvenile fish have been found at this locality. A total of 27,542 juvenile sablefish (mostly age 1+) have now been tagged and released in southeastern Alaska, and to date, about 850 of these have been recovered from the commercial fishery.

A pilot study was initiated in 1995 in an attempt to determine spatial and temporal distribution of young-of-the-year (YOY) sablefish in the GOA. The objective of the study was to determine feasibility of establishing a YOY sablefish survey that could improve current estimates of sablefish recruitment. A small-mesh surface gillnet was opportunistically fished at a number of stations at offshore locations of the eastern GOA during the 1995 sablefish longline survey using the survey vessel *Ocean Prowler*. The net was set at about midnight and retrieved at about 0500 hr. It was constructed of monofilament web, measured 300 m long and 3 m deep, and drifted freely with

the current. YOY sablefish were caught at all stations where the gillnet was deployed. Individual station catches ranged from 3 to 399 fish, and lengths ranged 140 to 230 mm. No age 1+ or older sablefish were caught. This study looks quite promising, and plans are to opportunistically deploy the gillnet at stations throughout the Gulf during the 1996 longline survey.

For more information, contact Thomas Rutecki at (907)789-6051.

b. Stock Assessment – BS, AI, and GOA

The sablefish population in Alaska's waters is still at a relatively healthy level, but with no strong recruitment evident in recent years, the population has slowly decreased since the mid-1980s. However, most of the decrease has been concentrated at the outer range of sablefish in the BS and AI, while abundance in the GOA has been more stable.

Yield estimates are determined from a stock reduction analysis modified to explicitly track estimates of exploitable biomass and provide an estimate of recruitment. The BS, AI, and GOA regions have been combined and analyzed as one stock since 1989. Recommended yield is then apportioned by management area according to estimates of current biomass using an exponential weighted average of past apportionment estimates. ABCs for 1990-92 were computed by multiplying the $F_{0.1}$ exploitation rate (0.116) by the estimate of exploitable biomass at the beginning of the fishing year. Beginning in 1993, an adjustable fishing rate strategy was adopted for sablefish, whereby the $F_{35\%}$ fishing rate (that rate which would reduce the spawning biomass per recruit ratio to 35% of the unfished level) is adjusted in proportion to the ratio of current biomass to a target biomass level that is 35% of the unfished level ($B_{35\%}$).

The sablefish assessment uses cooperative longline survey indices to estimate the abundance trend from 1979 to 1989. Beginning in 1990 and until 1995, an average of the cooperative survey and the domestic survey was used, as it was not clear which survey showed true abundance trend. Use of this average moderated a substantial decrease in abundance from 1989 to 1990 indicated by the cooperative survey, but not by the domestic survey. Since 1990 domestic survey indices have been consistently higher than cooperative survey indices. A study comparing the two surveys used the 1990 to 1995 data to estimate yearly factors to adjust the cooperative survey index to be comparable to the domestic survey. To apply these correction factors to the cooperative survey indices prior to 1990 it is necessary to assume the survey was conducted consistently throughout the time period. For the 1995 assessment, after termination of the cooperative survey, it was necessary to use the correction factors to continue the time series. The abundance trend now reflects the more substantial decrease in 1989-90, and therefore indicates a greater relative decrease in biomass since peak abundance in the mid-1980s and decreased estimates of average recruitment. These two results are cause for more

conservatism than previously warranted, because they indicate current biomass is closer to the low levels of the late 1970s and early '80s than previously indicated, and lower recruitment level indicates that sustainable yields are lower. It is noted that ABCs in recent years were the result of a few large year classes which occurred in the late '70s and early '80s. The last large year class occurred in 1984, and there is no indication of another strong year class for at least another four years, by which time the population could be at historical low levels. Magnitude of the sablefish stock and the appropriate fishing rate largely depends on future recruitment, and little is known about factors that determine recruitment levels.

Conservatism is added to the assessment method which has been used in the past, by using average recruitment since the last large year class (1984) recruited, to project biomass to 1996. This recruitment is more conservative than used in previous recommendations. $F_{35\%}$ (=0.125) is also estimated with more exact methods and is lower than the value used previously.

Recommended 1996 ABC for the combined GOA, BS, and AI is 19,550 mt. This value, which is down 22% from 1995, is the result of a 10% decrease in the adjusted exploitation rate and a projected 1996 biomass (193,300 mt) which is 14 % lower than the 1995 projected value (225,000 mt). The 1996 biomass projection results from a continued decrease in the longline survey from 1994 to 1995 (8 %) and more conservative predictions of recruitment. ABCs for the GOA, BS, and AI were 17,100 mt, 1,160 mt, and 1,310 mt, respectively.

The plan team discussed $F_{40\%}$ and noted the current recommended fishing rate of $F_{35\%}$ adjusted (=.112), is still higher than $F_{40\%}$ (=.103), and that sablefish is one of the few stocks where F(ABC) is greater than $F_{40\%}$. An ABC computed using $F_{40\%}$ would be 15,740 mt, or if adjusted by the ratio of current biomass to 40% of estimated pristine biomass, 12,410 mt. The author also notes an alternative approach for determining an ABC, based on replacement fishing rates, results in a value of 13,500 mt for a GOA ABC. A reevaluation of appropriate fishing rates for sablefish is planned in time for next year's assessment.

Apportionment of the GOA ABC would be 12.9, 40.4, 17.8, and 28.9% to the western, central, West Yakutat, and East Yakutat/southeast areas, respectively. Thus apportionment of the 17,080 mt ABC would be 2,200 mt to the western area, 6,900 mt in the central area, 3,040 mt in the West Yakutat area, and 4,940 mt in the East Yakutat/southeast area. An overfishing level obtained by applying an $F_{30\%}$ rate directly, would be 22,800 mt.

For more information, contact Sandra Lowe at (206)526-4230, or Jeff Fujioka at (907)789-6026.

6) Flatfish

a. Research – BS

A small boat survey was conducted from May 18-May 29 in the Togiak Bay region of inner Bristol Bay. This survey was designed to examine yellowfin sole distribution, maturity, fecundity, and feeding. A 3m beam trawl was used in shallow waters not normally surveyed. Due to bad weather, only 30 of 80 designated tows were made. Nonetheless, considerable valuable information was acquired. Preliminary results indicate yellowfin sole are batch spawners in waters of moderate depth and utilize shallow water feeding, such as herring roe, between batches.

For more information contact Dan Nichol or Terry Sample (206)526-4151.

Additional work was also done in 1995 to describe the relationship between flatfish species distributions and diets with bottom sediment types in the eastern BS.

For more information contact Dr. Robert McConnaughey, (206)526-4150.

b. Stock Assessment

1. BS

Abundance of most of the species of flatfish in the eastern BS has shown substantial increase during the 1980s and is currently at high and stable level of abundance.

a) Yellowfin Sole

Three abundance estimators (trawl survey, virtual population analysis, and stock synthesis) all indicate yellowfin sole resource increased slowly during the 1970s and early 1980s to a peak during the mid-1980s and the resource has remained abundant and stable since that time. This trend is consistent with the fact that yellowfin sole is a slow-growing species, which has been lightly exploited while experiencing average to strong recruitment during the past 15 years. Exceptional recruitment from the 1981 and 1983 year classes has maintained the abundance of yellowfin sole at a high level and additional good recruitment from the 1986-1988 year classes should keep the biomass at a high and stable level in the near future.

Projected biomass for 1996 is 2.85 million t. Recommended ABC was calculated according to an $F_{35\%}$ (=0.13) harvest strategy, giving a projected 1996 catch of 278,000 t. The $F_{35\%}$ harvest strategy was considered appropriate given the population's high and stable level of abundance. The 1996 OFL for yellowfin sole is 342,000 t, corresponding to an $F_{30\%}$ (=0.16) harvest strategy. Reliable estimates of F_{MSY} or B_{MSY} are not available for this stock.

b) Rock Sole

An age-based Synthesis model was again used to assess rock sole stock. The time series of abundance estimated by the model parallels that from the trawl survey quite closely apart from the 1994 survey value, which appears to be an overestimate. Both the model and survey indicate a dramatic increase in rock sole abundance throughout the 1980s and early 1990s. The model indicates biomass has remained high and stable during the mid-1990s, with a projected 1996 level of 2.36 million t. The 1987 year class continues to appear exceptionally strong, and the 1990 year class appears to be above average as well.

Harvest levels remain well below the ABC level. Harvesting at an $F_{35\%}$ (=0.18) strategy is used to compute ABC for this stock, giving a projected 1996 catch of 361,000 t. OFL for this stock is defined by the $F_{30\%}$ (=0.22) fishing mortality rate, which corresponds to a 1996 catch of 420,000 t. Reliable estimates of B_{MSY} and F_{MSY} are not available for this stock.

c) Flathead Sole

Due to a change in the BS/AI directed fishing standards, the PFMC directed flathead sole be separated from the "other flatfish" management category beginning in 1995. Trawl surveys indicate the biomass of flathead sole has tripled since 1982, remaining high and stable since 1990. Except for a very high value in 1994, survey biomass estimates have fluctuated between 570,000 t and 620,000 t since 1990. No assessment model has been developed for this stock.

The authors use an $F_{35\%}$ (=0.19) strategy in computing ABC for this stock, giving a projected 1996 catch of 116,000 t for the eastern BS and AI combined. OFL for this stock is defined by the $F_{30\%}$ (=0.23) fishing mortality rate, which corresponds to a 1996 catch of 140,000 t for the combined areas. Reliable estimates of B_{MSY} and F_{MSY} are not available for this stock.

d) Other Flatfish

Beginning with the 1995 fishing season, flathead sole were removed from the "other flatfish" complex, leaving Alaska plaice as the dominant member of the complex. The complex has remained at a stable, and presumably high, level of abundance throughout modern history of the eastern BS survey time series (i.e., since 1982, when the present survey net configuration was adopted). Survey biomass estimates have fluctuated between 550,000 t and 850,000 t during this period, with the 1995 estimate coming in at a value of 590,000 t. No assessment model has been developed for this complex.

The resource has remained lightly exploited and chapter authors recommend an ABC value based on an $F_{35\%}$ (=0.17 for Alaska plaice) harvest strategy, giving a complex-wide 1996 catch of 102,000 t. Setting OFL at the $F_{30\%}$ (=0.20 for Alaska plaice) level gives a complex-wide 1996 catch of 120,000 t. As with the other flatfish species, reliable estimates of F_{MSY} and B_{MSY} do not exist for this complex.

e) Greenland Turbot

The length-based Synthesis model which has been used to assess Greenland turbot stock for the last two years was updated for the present SAFE report. The assessment model estimates the biomass of Greenland Turbot peaked during the early 1970s, followed by a persistent decline to the present level, which is estimated to be about half the pristine abundance level. Year classes since the 1980 cohort have consistently been well below the average level of the 1968-1979 cohorts, and no upturn in stock biomass is anticipated for the next several years. For these reasons, chapter authors have built a number of conservative features into their stock assessment model, including omission of the AI component of the stock from abundance indices used as model inputs, the choice of a low emphasis value for the longline survey index (the longline survey tends to indicate an increasing abundance trend since mid-1980s), and recommendation of a conservative ($F_{40\%}$=0.24) harvest strategy.

The plan team believes the authors' assessment is suitably conservative and concurs with projected 1996 biomass estimate of 135,000 t and suggested 1996 ABC of 17,000 t. However, available evidence indicates this stock is not capable of replacing itself under present conditions. Since no threshold level has been determined for this species, a prudent course for management would be to minimize fishery impacts. Therefore, the plan team recommends the TAC be set at a level commensurate with a bycatch-only fishery and the fishery be managed on

that basis. In particular, the plan team recommends against allowing a directed fishery if the 1996 TAC is set close to recent TAC levels, because of high potential for the species to reach "prohibited" status under such circumstances.

Under an $F_{30\%}$ (=0.37) harvest strategy, 1996 OFL is projected to be 25,100 t. Reliable estimates of F_{MSY} or B_{MSY} are not available for this stock.

f) Arrowtooth Flounder

A new length-based Synthesis model of arrowtooth flounder stock was introduced in the present SAFE report. Both the model and annual trawl survey of the eastern BS shelf indicate the arrowtooth flounder resource continues to be in excellent condition as a result of minimal exploitation and steady increases in biomass throughout the 1980s. Good recruitment from the 1981, 1984, 1986, and 1987 year classes should maintain stock at a high and stable level for the near future.

Projected biomass for 1996 is 576,000 t. Recommended ABC for 1996 is 129,000 t, based on an $F_{35\%}$ (=0.27) harvest strategy. OFL for this stock is defined by the $F_{30\%}$ (=0.34) fishing mortality rate, which corresponds to a 1996 catch of 162,000 t. Reliable estimates of B_{MSY} and F_{MSY} are not available for this stock.

2. GOA

Management of the GOA flatfish resource has been divided into five categories by the NPFMC. Categories include "shallow-water flatfish," "deep-water flatfish," arrowtooth flounder, flathead sole, and rex sole. This reclassification was made because of the significant difference in halibut bycatch rates in directed fisheries targeting on shallow- and deep-water flatfish species and also because of the dominant biomass of arrowtooth flounder which could cause other flatfish species to be overfished if it was not separated from the group and managed under a separate TAC. Flathead sole are also managed under a separate TAC because they overlap distributions of shallow and deep-water categories, and rex sole were given a separate TAC because of a problem with POP bycatch in the directed rex sole fishery in 1993.

Due to halibut bycatch in commercial trawl fisheries, total catch of GOA flatfish species continues to be well below their combined TAC, as in past years. In 1994 the shallow-water, deep-water, flathead sole, rex sole and arrowtooth flounder ABC apportionments were 11%, 31%, 7%, 31% and 10% harvested. Biomass estimates from the 1993 GOA trawl survey indicate the total flatfish resource remains stable with no significant changes estimated for

any species between survey years. Trawl survey size compositions indicate continued presence of juvenile fish recruiting to the stock for most species. For 1996 flatfish species are managed using the $F_{35\%}$ approach, resulting in a combined ABC of 305,000 t and a TAC of 84,140 t.

For further information, contact Thomas Wilderbuer (206)526-4224.

3. West Coast – Dover Sole

Size and age composition data from the INPFC U.S. Vancouver area and the northern part of the Monterey area were analyzed by the length-based version of stock synthesis, a separable catch-at-age model. For both areas, the model was run at various levels of virgin recruitment to generate a range of fits to slope survey abundance estimates. Runs with the slope survey ratio (Q which equals observed survey biomass divided by population biomass after survey selectivities are applied) between 0.5 and 1.0 were taken as a plausible range of biomass levels. Recruitments were fixed to be constant at the virgin recruitment level for both areas. Fishery selectivities were estimated for different time periods in both areas.

In the U.S. Vancouver area, recent landed catches have declined to 1,136 t in 1994. MSY, estimated under an assumed level of density-dependent recruitment is 859 t to 1,015 t for slope survey Qs from 1.0 to 0.5. The 1996 female spawning biomass is estimated to be below the $F_{20\%}$ level for the low biomass scenario and about midway between the $F_{20\%}$ and $F_{35\%}$ levels for the high biomass scenario. Recommended yield for 1996 is calculated by applying $F_{35\%}$ (fishing mortality that reduces female spawning biomass per recruit to 35% of its unfished level) to exploitable biomass. This results in a yield of 501 t (landed catch 477 t and discards 24 t) to 983 t (landed catch 936 t and discards 47 t) for 1996. Current ABC in the U.S. Vancouver area is 2,400 t.

In the northern Monterey area the 1994 catch was 708 t. MSY, estimated under an assumed level of density-dependent recruitment, is 965 t and 1.316 t for the low and high biomass runs, respectively. The 1996 female spawning biomass is estimated to be above target level ($F_{35\%}$) for the high biomass scenario and at the $F_{35\%}$ level for the low biomass scenario. The low and high biomass ranges produce 1996 yields (applying $F_{35\%}$) of 1,326 t (landed catch 1,263 t and discards 63 t) and 2,631 t (landed catch 2,506 t and discards 125 t), respectively. In 1994 catch was 708 t in the northern Monterey area and 2,091 t in the INPFC Monterey area. Current quota for the INPFC Monterey area is 5,000 t.

For further information, contact Jack Turnock at (206)526-6549.

7) Pacific Whiting – West Coast

a. Research

1. Acoustic Surveys - MACE Task

Scientists from the MACE program conducted the seventh triennial EIT survey of Pacific whiting (*Merluccius productus*) off the west coast from central California to Dixon Entrance, Alaska during July 1 to September 1, 1995. Arial coverage for the survey was more extensive compared to earlier surveys due to increased effort offshore and to the north. Increased survey coverage within Canadian waters resulted from cooperative efforts with Canadian scientists. Relatively dense Pacific whiting echosign was observed off California near Point Arena and Cape Mendocino, off central Oregon (43-45°N), over Juan de Fuca Canyon near Cape Flattery, and off northern Vancouver Island. No echosign was attributed to Pacific whiting north of 51°N or south of about 38°N. Although Pacific whiting were sometimes caught south of 38°N, scattering from other species was so prevalent that it prevented identification of Pacific whiting echosign from this area. Pacific whiting were observed over bottom depths of 50-1500 m. Size composition of Pacific whiting differed over the survey area. YOY fish (2-8 cm fork length) were only captured in the southern California area (34°55'-40°30'N). Fish comprising the 20-30 cm mode (primarily one-year olds) were also present in the southern California area, strongly represented in the north California area (40°30'-43°00' N), moderate in Oregon (43°00'-45°46'N), and present in relatively low numbers in northern areas (i.e., Washington - 45°46'N to the U.S./Canada border), south Vancouver (U.S./Canada border to 49°00'N), and north Vancouver (49°00' to 51°03'N). Distribution of one-year old fish extended farther to the north than reported from previous EIT surveys. Fish comprising the 30-40 cm length mode (primarily two-year olds) were strongly represented in California areas and nearly absent in northern areas. Adult fish (>40 cm) were present throughout the survey area, although their contribution was minimal in the southern California area. Preliminary coastwide estimates are 5.84×10^9 fish weighing 2.534×10^6 t.

2. 1995 Triennial Bottom Trawl Survey of West Coast Groundfish Resources

Pacific whiting biomass and population estimates from the 1995 bottom trawl survey were larger than in any previous triennial surveys. Estimates in the 55-366 m depth zone, which is comparable to the total survey area in prior surveys, totaled approximately 548,000 t of biomass and 1.25 billion fish. Juvenile whiting made up a large proportion of the population in all areas of the survey. Two-year old whiting were the largest year class off southern and

central California, although one-year olds were also important. Atypically, one-year old whiting were the predominant year class from northern California to the northern extent of the survey area. For the second consecutive triennial survey, we were able to collect temperature profiles at virtually all trawl stations, and relationships between distribution of juvenile whiting and observed temperature anomalies will be studied.

For further information, contact Mark Wilkins (206)526-4104.

b. Stock Assessment

AFSC scientists conducted an assessment of the coastal Pacific whiting (*Merluccius productus*) resource in 1995. The assessment reviewed recent developments in the Pacific whiting fishery, tabulated and analyzed the 1994 catch statistics, described a stock synthesis model application using catch and survey data from 1977-94, and presented yield options for 1996-98.

The U.S. and Canadian harvest of Pacific whiting in 1994 was 358,901 metric tons (t). In 1995 yield will be close to 255,000 t. A geographic version of the stock synthesis model that divided the population into U.S. and Canadian components was used to assess the Pacific whiting population. Population biomass peaked 1987 and has been declining steadily since that time. Biomass of age three and older fish in 1994 was estimated to be 2.269 million t, which is within 5% of projected 1994 biomass in the 1994 assessment. However, estimated size of the 1990 year class is 1.803 billion fish, 23 % smaller than the 1994 estimate. In addition, age-two fish were extremely rare in the 1994 age-composition, indicating a near-complete failure of the 1992 year class.

To forecast yields for 1996-98, a stochastic age-structured population model for Pacific whiting was used. Several harvesting strategies were presented: a constant F strategy, a variable F strategy (where fishing mortality for a particular year is proportional to the level of female spawning biomass), and a hybrid strategy that combines features of the other two policies. Three harvest rates were presented for each harvest strategy. These harvest rates were based on the probability female spawning biomass will fall below a cautionary level of 623,000 t in long-term simulations of Pacific whiting population. Since there exists considerable uncertainty about size of the 1994 year class, two sets of projections were made, one set where the 1994 year class was sampled randomly from 1972-94 recruitment, and an additional set where recruitment of the 1994 year class was sampled randomly from large year classes (>1.5 billion fish). When a hybrid fishing strategy is applied to projected numbers at age in 1996, potential yield for the random 1994 year-class scenario is calculated to be 79,000 t at low harvest rate, 110,000 t at moderate harvest rate, and 139,000 t at high harvest rate. For the strong 1994 year-class scenario, projected yield is 87,000 t at low harvest rate,

123,000 t at moderate harvest rate, and 153,000 t at high harvest rate. The immediate future is highly uncertain depending on size of the 1994 year class. If the 1994 year class is strong, yields should increase in 1997 and 1998. If the 1994 year class is weak, the Pacific whiting population will drop to historically low levels, and coastwide yields will be below 100,000 t.

For further information, contact Martin Dorn at (206)526-6548.

8) Walleye Pollock

a. Research

1. Acoustic Surveys – MACE Task

An echo integration-trawl (EIT) survey of spawning walleye pollock (*Theragra chalcogramma*) was conducted in the southeastern Aleutian Basin near Bogoslof Island from February 25 to March 8, 1996 to determine pollock abundance, distribution and biological composition. This cruise was part of a cooperative survey effort involving two research vessels - NOAA Ship *Miller Freeman* and Japan's *R/V Kaiyo maru* - and scientists from the U.S., Japan, Russia, China, Poland and South Korea. Pollock were observed mainly along the north side of the AI between Akutan and the Islands of Four Mountains, from about the 1,000 m depth contour south toward the slope/shelf break adjacent to the island chain. The densest pollock concentrations were observed south of 53 30' N latitude between Umnak Island and the Islands of Four Mountains (169-170 W longitude). Pollock sampled in eight mid-water hauls east of 169 W longitude ranged in length from 34-65 cm, with a male mean length of 47.4 cm and a female mean length of 50.3 cm. In the eight mid-water hauls conducted west of 169 W, pollock sample lengths also ranged from 34-65 cm, but were larger on average, with a mean male length of 51.7 cm and a mean female length of 54.7 cm. Ninety seven percent of females observed were in a pre-spawning (mature) reproductive condition. Only 2% were actively spawning, and less than 1% were post-spawning (spent).

b. GOA

1. Shumagin Islands Area (February 15-25, 1996)

Replicate EIT surveys of walleye pollock (*Theragra chalcogramma*) were conducted in the vicinity of the Shumagin Islands during February 15-25 to provide data for a variance estimation study. These data will be used to 1) evaluate one- and two-dimensional geostatistical approaches to variance estimation, 2) investigate diel changes in abundance, and 3) determine the abundance, distribution, and biological composition of pollock in the area. The heaviest concentrations of pollock were detected near Renshaw Point and east

of Korovin Island. Pollock mean lengths from size distributions in six hauls ranged from 49-51 cm and were strongly unimodal. Sex ratios from hauls near Renshaw Point were heavily skewed toward males; sex ratios from hauls east of Korovin Island were more balanced. Sixty percent of females observed were in a pre-spawning (mature) reproductive condition; 7% were actively spawning; and 29% were post-spawning (spent).

2. Shelikof Strait Area (March 15-27, 1996)

An EIT survey of spawning walleye pollock (*Theragra chalcogramma*) was conducted during March 15-27 in the Shelikof Strait area between Chirikof Island and Cape Chiniak. As in previous years, most spawning pollock were distributed along the western side of the Strait with greatest densities near Capes Kekurnoi and Kuliak. Fish were most abundant within 50-150 m of the bottom. Size distribution of pollock from hauls within the Strait generally exhibited dominant modes around either 20-21 cm or 50-52 cm length (FL). Eighty-four percent of the females greater than 34 cm FL were either prespawning or spawning and only 9% were spent. Pollock from the 1994 year class (20-21 cm mode) formed a strong, well-defined acoustic layer in mid-water (150-200 m depth) which was broadly distributed between Uyak Bay and the southern limits of the surveyed area near Chirikof Island. The areal extent and strength of this layer of two-year old fish support last year's observation that the 1994 year class is relatively strong.

For more information, contact Dr. Jimmie Traynor at (206)526-4163.

3. Recruitment Processes

Fisheries-Oceanography Coordinated Investigations (FOCI), a NOAA cooperative research program between the Recruitment Processes Task of the RACE Division and the Pacific Marine Environmental Laboratory (PMEL) is designed to investigate causes of recruitment variations in commercially important fish and shellfish. The program's focus is the well-defined spawning population of walleye pollock in Shelikof Strait, and walleye pollock stock structure and recruitment in the eastern BS. BS FOCI is part of the NOAA Coastal Ocean Program. Areas of research include field studies of eggs and larvae in relation to primary and secondary production and the physical environment, biochemical methods for assessing larval starvation and predation and stock structure, and pollock behavior. FOCI conducted three cruises aboard the NOAA ship *Miller Freeman* during the spring of 1995, one in the Shelikof Strait region of the GOA, and two in the eastern BS to study effects of the environment on eggs and larvae of walleye pollock. We also conducted a two-ship study of YOY juvenile pollock in the BS near the Pribilof Islands aboard the NOAA ships *Miller Freeman* and *Surveyor* in late summer. Laboratory studies on reared pollock larvae were conducted to

1) calibrate biochemical indices, 2) estimate feeding, digestion, and gastric evacuation rates, and 3) calibrate histopathological condition indices. Eggs were spawned from fish trawled in the Shelikof Strait and Bogoslof Island area, maintained in refrigerators aboard ship, and then transported in thermos jugs to the culture center at Sand Point in Seattle and to the HMSC of OSU, where behavioral studies were conducted.

For more information, contact Dr. Art Kendall at (206)526-4108.

c. Stock Assessment

1. BS and AI

The current assessment includes several separate estimators of pollock abundance, including combined hydroacoustic/bottom trawl surveys, a CAGEAN model, a Synthesis model, and two different versions of the standard cohort analysis. All methods indicate a total biomass (age 3+) in excess of seven million t for the eastern BS portion of the stock, at least through 1994 (the year of the last hydroacoustic survey). As in previous years, the assessment uses cohort analysis to compute biomass, ABC, and OFL. The stock assessment presents two different models based on cohort analysis; the version using the least-squares estimation technique is the preferred method since it gave an estimated 1994 biomass almost identical to those estimated by the CAGEAN and Synthesis models (7.09 million t versus 7.16 million t and 7.17 million t, respectively). The cohort analysis model, based on a more subjective estimation technique, in contrast, estimated a 1994 biomass of 8.26 million t. The projected 1996 eastern BS biomass given by the preferred model is 7.36 million t.

Because projected 1996 biomass exceeds B_{MSY}, F_{ABC} is capped by the product of ($F_{35\%}/F_{30\%}$) and F_{MSY}, or (0.38/0.46)x0.38 = 0.31. Harvesting eastern BS pollock at the $F_{40\%}$ rate gives a 1996 ABC of 1.29 million t, using the preferred model. In addition to providing a buffer between ABC and OFL, exploitation at the $F_{40\%}$ (rather than $F_{35\%}$) rate is warranted on the basis of the stock's strong dependence on the 1989 (and possibly 1992) year class(es).

The OFL for eastern BS pollock is defined by the F_{MSY} harvest strategy, which corresponds to a 1996 catch of 1.59 million t under the preferred model.

For the AI portion of the stock, the projected 1996 biomass estimate is 87,200 t. Applying an $F_{35\%}$ (=0.42) harvest strategy gives a 1996 ABC of 26,200 t. However, the North Pacific Council believes the AI pollock fishery should be managed on a bycatch-only basis for the following reasons: 1) the trawl survey time series indicates the AI pollock biomass has declined sharply and consistently since 1983, and gives no reason to expect an upturn in the

foreseeable future, 2) some fish captured in the AI region may be part of the Aleutian Basin stock, a stock on which fishery impacts should be minimized, and 3) pollock has been shown to be an important prey item for Steller sea lions breeding on rookeries just to the east of the AI management area, rookeries which recently have fared better than those for which available prey consists largely of Atka mackerel. The 1996 OFL for the AI portion of the stock is 28,800 t, based on an $F_{30\%}$ rate of 0.45. Reliable estimates of F_{MSY} or B_{MSY} do not exist for the AI portion of the pollock stock.

Revised results of the 1995 hydroacoustic survey of the southeastern Aleutian Basin near Bogoslof Island produced a biomass estimate of 1.1 million t. Assuming that growth and recruitment during 1995 will equal mortality, projected 1996 biomass for the Bogoslof area is estimated at 1.10 million t. Applying an $F_{35\%}$ (=0.33) harvest strategy gives a 1996 ABC of 286,000 t. The 1996 OFL for the Bogoslof region is set at 330,000 t, based on an $F_{30\%}$ exploitation rate of 0.30. Reliable estimates of F_{MSY} and B_{MSY} are not available for this portion of the stock.

For further information, contact Dr. Vidar Wespestad, (206)526- 4249.

2. GOA

The exploitable biomass estimates from 1994 and 1995 are from the stock synthesis (SS) model as determined in those years. The 1996 mid-year biomass is estimated at 574,000 mt from the current SS analysis. Comparisons of the 1996 biomass to previous years' levels should be made with biomass levels from the revised hindcast in the current assessment.

Relative to the 1995 SAFE, new sources of information include a) the 1995 Shelikof Strait hydroacoustic biomass estimate, b) length-frequency data from the 1995 hydroacoustic survey, c) age composition data from the 1994 fisheries, d) revised estimates of biomass and updated age and length frequency data from the 1981-1991 hydroacoustic surveys, e) revised estimates of fishery weight at age, and f) updated estimates of discard and catch for 1994 and 1995.

The 1995 hydroacoustic survey used the same equipment as in 1994 with improved detectability of pollock in low density situations, and improved measurements from the near-bottom region. The 1995 Shelikof Strait biomass estimate based on the new system is 725,200 mt (compared to the estimate of 467,300 mt from the 1994 survey). These values were adjusted in the stock assessment to be comparable to estimates from the old system in order to provide a time series of a relative abundance index.

The model has captured the trend in observed Shelikof Strait hydroacoustic biomass estimates from 1988 to 1994. However, from 1994 to

1995 the observed biomass increased in Shelikof Strait, while the model showed a decline in predicted biomass and estimated a lower-than-observed abundance level. A reason for such a discrepancy may be the SS model estimates a decreasing selectivity of the hydroacoustic survey for older fish. This is consistent with the behavior of older fish which tend to be closest to the bottom during the spawning period. The hydroacoustic survey cannot discriminate between fish and the bottom in the last half meter above the bottom. In addition, hydroacoustic surveys during the spawning season located large fish outside of Shelikof Strait suggesting that some of the older fish may not have been available for sampling in the Strait. The model would underestimate the hydroacoustic biomass if a) a larger fraction of the older pollock were off bottom in 1995, or b) the fraction of the older fish spawning in Shelikof Strait was larger than expected in 1995. However, because the hydroacoustic estimate of the biomass in Shelikof Strait has a variance associated with it, some discrepancy between the assessment model and the survey estimate is expected.

Length frequency data from the 1990 to 1995 hydroacoustic surveys show progression of the strong 1988 year class through the population. In the 1995 survey, 15% of the biomass was smaller than 17 cm (age one, 1994 year class). This was the largest number of one-year olds ever observed in hydroacoustic surveys. For the years when data were available, average contribution of age one fish has been less than 1%.

The biomass estimate for the western/central area from the 1993 bottom trawl survey was 760,800 mt, similar to previous survey biomass levels. The age compositions from the 1993 bottom trawl survey revealed strong 1988 and 1989 year classes. The 1989 year class in the BS has been shown to be strong. Presence of the strong 1989 year class found in Shumagin, Chirikof and Kodiak areas suggests that widespread mixing of pollock stocks may occur between the BS and the GOA. Alternatively, 1989 oceanic conditions may have favored recruitment in the western GOA more than the central portion.

Four SS models were evaluated that differed as follows: Model A provided a comparison to the 1994 model configuration, Model B estimated the initial age composition of the time series instead of assuming it to be at equilibrium, Model C was similar to Model B but incorporated the revised weight-at-age parameters, and Model D was the same as Model C except natural mortality (M) was set equal to 0.4. Model D was included because preliminary runs of the SS model with predators indicated that M for adult fish may be closer to 0.4 than 0.3. Based on exploratory runs, Model C was chosen as the most appropriate.

Estimates of various fishing mortality rates based on biological reference points were determined from a dynamic pool model and an age-structured model. The estimated $F_{0.1}$, $F_{30\%}$, $F_{35\%}$ and $F_{40\%}$ full-selection fishing mortality rates were 0.64, 0.50, 0.42, and 0.36, respectively. Additionally, the long-term productive potential of pollock stock was explored with a stochastic age structured simulation with different recruitment scenarios. Risk associated with a given fishing strategy was measured by monitoring the frequency that the spawner biomass fell below the threshold level in the simulation. The threshold level was defined as 20% of the unfished spawner biomass level and was estimated at 384,000 mt.

In order to estimate a recommended fishing mortality rate, tradeoffs between increased yield and the risk of falling below the threshold were evaluated. The fishing mortality rate was determined to be 0.3 (full selection value). This fishing mortality rate was associated with a yield of 52,000 mt which is the stock assessment authors' recommended ABC for the western and central areas.

In 1993 and 1994 the North Pacific Councils' Plan Team requested additional exploitation strategies be explored and recommended an ABC based on the fishing mortality rate that produced a minimal (5%) probability of falling below the threshold spawner biomass level in the long-term (F=0.2). The yield associated with an F of 0.2 is 35,400 mt. The team also requested alternative short-term strategies be explored to account for current stock conditions. Specifically, the team requested short-term stock projections out to the year 2000, initialized with the current age composition and then random recruitment selected from the range of values of the 1982-1993 year classes. Projections assuming an average, as well as a strong, 1994 year class were requested.

Results of short-term projections indicated that if the 1994 year class is strong and subsequent year classes are random, there is less than a 0.1% chance that spawning stock will fall below the threshold by 2000 under fishing mortality rates of 0.2, 0.25, and 0.3. If the 1994 year class is average or random, and subsequent year classes are random, there is a greater than 50% chance the spawning stock will fall below the threshold by 1998 under fishing mortality rates of 0.2, 0.25 and 0.3.

For more information, contact Dr. Anne Hollowed 526-4223.

D. OTHER RELATED STUDIES

The RACE Division has been active in several studies of the sampling methodology related to bottom trawl surveys, including effect of herding and escapement on the catch

rates observed during surveys, effect of changing survey trawl haul duration, alternative methods of subsampling large survey catches, and matters related to bycatch. Underwater video and scanning sonar were used to study behavior of fish encountering trawl gear with the purpose of detecting species and size differences which could be exploited to reduce bycatch. This technology, combined with equipment for measuring trawl operational parameters, was also applied to studies of survey trawl effectiveness.

1) Trawl Herding and Escapement Experiments

David Somerton and Peter Munro (RACE Groundfish Assessment Task) completed two experiments to collect data on the effect of herding by trawl doors and bridles on the magnitude of the catch in research trawl catches. One experiment took place in the BS during the last two weeks of July 1994. The other experiment took place off the coast of Washington during the first two weeks of September 1994. Both experiments were conducted by varying the length of the bridles in three increments and recording the numbers and sizes of fish captured with each gear configuration. Analysis of the data indicates that for most flatfish species (Dover, English, rex, yellowfin, flathead and rock sole) approximately 25% of fish between the wingtips and doors are herded into the path of the trawl. In cases where there is no escapement under the footrope, such herding would lead to a 50% overestimate of density. In addition, Peter Munro completed experiments to estimate escapement of flatfish under the footrope of the 83-112 trawl in the BS during July 1995, using a low-light video camera mounted on the trawl so that it viewed the footrope from directly overhead. Video images were subsequently viewed at the AFSC, and flatfish (rock and flathead sole and Alaska plaice) going either above or under the footrope were counted. For flatfish greater than 25 cm, approximately 20% escaped under the footrope. Another experiment using a small auxiliary trawl mounted under the main trawl will be used by Peter Munro and Ken Weinberg this summer to measure escapement under the footrope of the poly Noreastern trawl with a bobbin footrope. If successful, this experiment will allow estimation of the selectivity curve by species, which is essentially impossible using the video technique.

For further information, contact Dr. David Somerton, (206)526-4116.

2) Effects of Reducing Duration of Survey Trawl Hauls

At the end of the standard annual eastern BS bottom trawl survey, an experiment was performed to determine sampling effects of reducing tow time from 30 minutes to 15 minutes. A low-light camera was also deployed to investigate escapement under the footrope of the 83-110 trawl. A total of 143 trawls, using the camera on 42 of these, was made. Preliminary results indicate there is no difference between catch rates for most species. However, some small flatfish, such as yellowfin sole, showed lower catch rates with shorter towing time. Results of the escapement investigation, which showed escapements may possibly be as high as 0.28 for flatfish in the center of the footrope,

will be combined with the herding experiments of 1994 to model catchability for the 83-110 trawl.

For further information, contact Pamela Goddard (206)526-6614.

3) Escapement of Flatfish Under Footrope of Noreastern Roller Trawl

Good weather allowed us to complete the regular survey sampling of the 1995 west coast triennial bottom trawl survey approximately twenty days ahead of schedule. We used remaining charter time looking at interactions between two standard survey trawls and the fish they encounter. This investigation utilized a video camera mounted in the mouth of the trawl, focusing on the footrope bottom contact and the proportion of fish that escape capture by passing under the footropes. We looked at the flatfish trawl used in the annual BS crab/groundfish survey and the high-opening Noreastern roller gear trawl used in the west coast and GOA triennial surveys.

During our west coast triennial survey, distribution and abundance information on flatfish is less useful than for other species of groundfish because we equip the footropes of our survey trawls with roller gear. We concede this makes the trawls less effective for capturing flatfish, but we found it necessary in order to sample extensive areas with rough bottom substrates. The objective of studying the Noreastern trawl was to examine the extent to which flatfish escape under the footrope of our trawl. Analyses of data may lead to a way to account for the proportion of flatfish escaping capture during our surveys, improving our estimates of their abundance. Video footage was collected from 79 hauls off the coast of Washington in three depths (70, 120, and 165 m) inhabited by different flatfish communities. We are currently reviewing the videotapes.

For further information, contact Ken Weinberg (206)526-6109.

APPENDIX I

Recent Publications and Reports Pertaining to Groundfish and Marine Habitats by Authors at the Alaska Fisheries Science Center

These reports are primarily products of the
RACE Division, REFM Division, and the ABL.

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7. NMFS - NORTHWEST FISHERIES SCIENCE CENTER

A. AGENCY OVERVIEW

The NWFSC provides scientific and technical support to the NMFS for management and conservation of the Northwest region's marine and anadromous resources. Research is conducted in cooperation with other federal and state agencies, and academic institutions. The center's four divisions conduct applied research to resolve problems that threaten marine resources or that impede their use. With establishment of the Fishery Analysis and Monitoring Division in 1995, this year marks the first report of the NWFSC to the U.S.-Canada groundfish TSC.

Programs in the four NWFSC divisions span diverse research areas. The Coastal Zone and Estuarine Studies Division is the center's largest division. It strives to understand and mitigate impacts of habitat alterations (primarily hydroelectric dams) on anadromous species and conducts genetic research on salmon in support of the Endangered Species Act. The Environmental Conservation Division (ECD) monitors chemical pollutants and health in coastal ecosystems throughout the U.S. A major part of this effort is development of methods to determine health effects of pollutants on marine organisms. For instance, the ECD has studied effects of pollution on various groundfish species such as sole, flounder, and halibut. Some effects that have been directly linked with particular types and levels of pollution have been developed for use as early indicators, or biomarkers, of habitat degradation and impacts on population. The Utilization Research Division provides information to enhance the quality, safety and full utilization of seafood products. The seafood biochemistry program of this division has identified enzymes responsible for softening edible portions of some commercial species of groundfish, which renders the fish unmarketable. Current research in this program has recently identified a natural inhibitor found in potatoes for one of these enzymes, and will focus on development and use of other inhibitors. The Fishery Analysis and Monitoring Division provides stock assessment of west coast groundfish species. This division develops models for managing multispecies fisheries, designs programs to provide information on the magnitude and characteristics of the bycatch in commercial fisheries, and studies methods for reducing bycatch and improving survival rates of captured bycatch species. An integral component of the stock assessment and bycatch research programs will be marine fish ecology research. These field and laboratory studies on the population biology of key groundfish species will include investigations of multispecies biological interactions, recruitment strategies, and responses of various life history stages to fishing pressure and environmental changes.

The center's main facility and laboratories, including a state-of-the-art water recirculation facility, are located in Seattle. Major components of the research are conducted at the NWFSC facilities at the HMSC in Newport, Oregon. Other center research facilities are located in Pasco, Big Beef Creek, Mukilteo, Manchester, Washington; Hammond and Clatskanie, Oregon; and Kodiak, Alaska.

For more information on Northwest Fisheries Science Center programs, contact Center Director, Dr. Usha Varanasi at (206)860-3200.

B. MULTISPECIES STUDIES

1) Research -- Fishermen Targeting Behavior

A project in collaboration with the University of Washington is investigating consequences of changing monthly limits on the west coast trawl fishery for sablefish, Dover sole and two species of thornyhead rockfish. Monthly vessel limits are imposed on landings of each species in order to prevent premature attainment of annual quotas. These limits decrease the operational flexibility of the vessels and cause discard of fish caught in excess of the limits A set of limits that would control harvest, provide high economic return, and minimize discard is desired. The best combination of limits is not known because the species vary in price, location (primarily depth) and cost of fishing. A better understanding of fishermen's response to these factors could lead to improved management of this fishery. The project involves dynamic programming to investigate fishermen's behavior while interacting with these patterns under constraints of monthly limits. This analysis includes data from previous observer studies, ongoing fishery logbook data, and resource survey data.

For more information, contact Dr. Richard Methot (206)860-3365

2) Stock Assessment

a. Sebastes Complex Assessment Methodology

A proposed methodology for assessment of the minor rockfish species was included in the PFMC's 1995 SAFE. The methodology utilizes new statistical procedures to apportion unspecified rockfish catch among the many Sebastes species and draws upon previous examination of rockfish species assemblages to divide the Sebastes complex into shelf and slope assemblages, and north and south assemblages. Within each assemblage, assessment models for single species and for groups of species will be developed and tuned to trends in abundance from the triennial trawl survey, and to trends in fishing effort obtained from the trend in estimated fishing mortality for abundant, target species in the assemblage. Further details on this approach are described in the shelf and slope rockfish assessment sections below.

For more information, please contact Dr. Jean Rogers at (541)867-0153.

b. Fishery Logbook Analysis

The NWFSC/FAM is planning to study whether catch-per-effort data taken from trawl logbooks of the west coast groundfish fishery can be standardized to

provide quantitative measures of relative abundance for application in multispecies groundfish assessments. Data from individual vessel logbooks from the states of California, Oregon, and Washington will be analyzed for the period of the mid-1980s to early 1990s. Individual vessel's fishing histories will be examined for changes in fishing pattern and species composition through time. Analysis of spatial patterns in multispecies catch rates for the west coast groundfish fishery will be conducted, and effects of changing management measures, such as single-species trip limits, on catch rates will be evaluated. Catch rates will be standardized using a general linear model analysis where practical. This study will initially focus on potential use of standardized catch rates as measures of abundance for the deep-water complex consisting of sablefish, thornyheads, and Dover sole, but may expand to include other species if successful.

For further information, contact Dr. Jon Brodziak (541)867-0243.

C. BY SPECIES

1) Shelf Rockfish – Stock Assessment

Quantitative stock assessments on many of the west coast shelf species will be conducted for the first time in 1996. Only four of the shelf rockfish (yellowtail, canary, bocaccio, and chilipepper) have been previously assessed and none of those assessments have been coastwide. In keeping with their primary centers of abundance, assessments for yellowtail and canary rockfishes encompass only the northern areas (primarily off the coasts of Oregon and Washington), and assessments for bocaccio and chilipepper rockfish only the southern areas. The 1996 assessment of the remaining shelf species and areas will be conducted with several levels of resolution: 1) all previously unassessed species in the combined slope and shelf assemblages, 2) only the combined shelf species, and 3) bocaccio north of California, yelloweye, sharpchin, and redstripe rockfishes assessed separately. Bocaccio and yelloweye have been quantitatively assigned to the shelf complex, the other species may overlap into the slope assemblage. Limited data exist on remaining shelf species, and those which do exist are imprecise. Biological data on commercial catches are routinely obtained only in California. Accurate landings data are not available because the remaining shelf species are landed in mixed-rockfish categories, with little port sampling for species composition. Discarding at sea has likely been substantial due to lack of market for either the species or the small sizes of fish in the catch. Survey data are often highly variable due to occasional large catches and/or few catches of the species. To augment the limited data, an index of Washington and Oregon commercial trawl effort will be used to help estimate trends in biomass. Estimates of the rate of fishing mortality for canary rockfish will be used as the index. This is based on the assumptions that fishermen direct effort on the entire complex, and relative effort between the species is constant over time. Comparison of the yellowtail and canary fishing mortality rates indicate that these assumptions have validity.

For more information, please contact Dr. Jean Rogers at (541)867-0153.

2) Slope Rockfish – Stock Assessment

Of the defined slope rockfish species, only POP has had a complete quantitative assessment leading to an accepted ABC and harvest guideline. Assessments for darkblotched and splitnose rockfish did not provide sufficient information to establish a numeric ABC. A stock assessment of the remaining species will be completed in 1996. The assessment will be conducted on several levels of resolution: 1) all previously unassessed species in the combined slope and shelf assemblages, 2) only the combined slope species, and 3) darkblotched, splitnose, yellowmouth, and silvergray rockfishes assessed separately. Silvergray rockfish is included in the slope assemblage, but may overlap into the shelf assemblage. As with the shelf assemblage, limited data exist on the remaining slope species. To augment the limited data, estimates of trawl fishing mortality for POP will be used as an index effort. As with the shelf assemblage, this is based on assumptions that fishermen direct effort on the entire complex, and relative effort between the species is constant over time.

For more information, please contact Dr. Jean Rogers at (541)867-0153.

3) Thornyheads – Stock Assessment

The last stock assessment of shortspine and longspine thornyheads was completed in 1994. Projected yields at F35% for the area north of Pt. Conception, California to the Canadian border were about 980 tons for shortspine thornyheads and 7,780 tons for longspine thornyheads. Fishermen have been encouraged to fish in deeper waters in order to achieve the yield for longspine thornyheads without overharvesting shortspine thornyheads. Shortspine thornyheads prefer shallower water, and those found in deeper water are generally the larger fish of that species.

Thornyheads are fished and surveyed in a complex of slope species including Dover sole and sablefish. Assessments for the four species in this assemblage will be undertaken by the FAM in coordination with other west coast stock assessment experts. Changes to the assessment will include the addition of west coast survey data from 1995 and 1996 slope surveys, as well as the 1995 triennial survey which was conducted over a deeper depth range than in previous years. Since there is a growing fishery for thornyheads in the area south of Pt. Conception, this area will be considered in the next stock assessment. Other plans include further use of logbook information, improved estimation of discard rates, and sensitivity analysis regarding assumptions made about the survey information.

For more information, please contact Dr. Jean Rogers at (541)867-0153.

4) Sablefish

a. Research – West Coast

1. Sablefish Bathymetric Ecology

The 1994 assessment of west coast sablefish highlighted the importance of accurate modeling of depth-specific population characteristics. The most recent slope trawl surveys indicate about 30% of the stock biomass is in water deeper than 500 fathoms. Fishery and survey samples indicate that of these deep-living sablefish are old. Explicitly modeling migration from shallow water to the >500 fathom depth zone improved the assessment model's overall fit to the data. The migration rate (about 4% per year) was estimated indirectly by the assessment model, rather than on direct estimation of rates of dispersion into deep water. Independent determination of the extent of such movement would greatly increase confidence that could be placed in the model. In addition, the old deep-living component of the population was assumed to have the same weight-specific reproductive output as sablefish living in the presumably more productive shallow zone. Direct estimation of depth-specific maturation and fecundity would evaluate this assumption.

In 1995 a collaborative study with OSU was initiated to measure depth-specific reproductive output of sablefish and to conduct a pilot tagging study to estimate rates of dispersion into deep water. Reproductive samples were collected in the Eureka area on the NOAA slope trawl survey and off central Oregon on a local fishing vessel. Preliminary analysis of these samples indicates reduced reproductive output by the deep-living individuals. Tagging studies were initiated early in 1996.

2. Survival of Discarded Sablefish

Monthly vessel limits are used in the groundfish fishery to spread the catch and effort throughout the year. These limits cause discard when vessels high-grade to retain more valuable sizes or when vessels inadvertently capture fish in excess of their limit. Discarded fish have been assumed to have nil survival, but sablefish appear to be hardy animals, especially young sablefish captured in shallow water. Evaluation of actual survivorship of discarded sablefish will improve assumptions made in the SAFE, and may lead to fishermen education programs that could improve survivorship of sablefish. The NWFSC/FAM began support of two survival studies in 1995. First, initial stages for expansion of cold-water aquarium facilities at Newport, Oregon were funded. This facility will be used by researchers in the NMFS/AFSC to study sablefish behavior is response to fishing gear under realistic temperature and light regimes. Second, a collaborative study with the University of Washington was

initiated to measure survival of sablefish under field conditions. This study, scheduled for summer 1996, will capture sablefish with trawls then return them to the seabed in cages to measure their mortality over a several day period. This methodology has been used successfully to study the post-capture survival of halibut in the North Pacific.

For further information, contact Dr. Richard Methot (206)860-3365.

b. Stock Assessment – West Coast

An updated assessment for west coast sablefish was conducted in 1994 and is reported on in the NMFS/AFSC contribution. A new assessment will be coordinated by the NWFSC in 1997.

For further information, contact Dr. Richard Methot (206)860-3365.

5) Flatfish Stock Assessment – West Coast – Dover Sole

An updated assessment for Dover sole was conducted in 1994 and is reported on in the NMFS/AFSC contribution. A new assessment will be coordinated by the NWFSC in 1997. This assessment will incorporate updated biological information taken from the fishery and resource surveys. In particular, the assessment will include some recently developed age composition data analyzed by the ODFW staff under a cooperative research agreement with FAMD. These data will be used along with historical age composition information to examine regional growth patterns. The assessment may incorporate commercial catch rates derived from trawl logbooks, if these catch rates can be standardized to provide a reliable abundance index for Dover sole. The assessment will give an updated report on the abundance, fishing mortality rates, and projected yields of the Dover sole resource.

For further information, contact Dr. Jon Brodziak (541)867-0243.

D. OTHER RELATED STUDIES

1) Age Readers

Age composition data are critical for studies of fish growth, recruitment patterns, bathymetric dispersion rates, and application of age-structured assessment methods. A group of three age readers has been added to the ODFW ageing group with funding from the NWFSC/FAM. In late 1995 this group started with reading of Dover sole otoliths from the NMFS slope trawl surveys. Early in 1996 the group is progressing to read a backlog of sablefish otoliths from the fishery and is planning to contribute to the reading of otoliths from several rockfish species.

For further information, contact Dr. Richard Methot (206)860-3365.

2) Environmental Stress

Studies at the NWFSC are being conducted to assess impacts of anthropogenic stresses on groundfish assemblages in nearshore marine and estuarine habitats. Initially focusing on differences between urban and non-urban sites, these investigations have primarily looked at effects of chemical contaminants on reproduction and disease prevalence, especially neoplasia. The primary species studied has been English sole in Puget Sound, though data have also been collected and published on rock sole, starry flounder, flathead sole, and yellowfin sole. This research approach is being broadened in conjunction with new capabilities and staff at the NWFSC and in collaboration with state agencies and the BC/WA Trans-boundary Task Force, to address cumulative effects of multiple stresses on groundfish in the waters of the Pacific Northwest and Canada.

For more information, contact Tracy Collier (206)860-3312.

3) Full Utilization

Several species of marine fish such as Pacific hake, arrowtooth flounder and yellowfin sole are subject to tissue softening of varying degree shortly after landing. This softening is often associated with the presence of myxosporean parasites located within the muscle fibers. Research conducted in the NWFSC suggests this softening is likely due to naturally occurring enzymes, proteases, in the fish muscles whose activities can be amplified by various factors, possibly including the parasites. We have found that sufficient amount of these enzyme activities can be inhibited by natural proteins present in potato extracts to allow time for processing. Other sources of inhibitors are known and have been used to varying extent. They include those present in bovine plasma and egg albumin. However, potato extracts appear to be superior, in part because of broad consumer acceptance, relatively low cost, as well as the presence of important antioxidants. Because of the tissue softening problem, species such as Pacific hake are used primarily for surimi preparation with a typical yield of about 15% by weight. The use of enzyme inhibitors helps surimi preparation but more importantly it allows the formation of surimi into final products. Studies at the NWFSC have demonstrated the feasibility of producing high quality surimi and formulation of products from arrowtooth flounder, an abundant and under-utilized species. In surimi production, there are several steps involving extensive washings and hence the loss of soluble muscle proteins and subsequent low yield. Research with a decanter centrifuge has demonstrated recovery of the soluble proteins and has succeeded in approximately doubling the yield of surimi, a yield nearing that obtained by fish fillets. In fillet production of pollock and cod, yield of product is approximately 30+% and the rest of the carcass may go to waste. Studies show using the decanter centrifuge with a screener (to remove bones) allows processing the trimmings into quality surimi and producing quality fish meal from other parts of the carcass. This is achievable only if sufficient amount of bone is separated. Bones separated can then be converted into bone ash for

commercial use. Using these techniques, the final waste can be reduced to a negligible amount, greatly reducing the environmental impact of waste disposal. Much higher yield of products from fishery resources is achieved with these developments, including the harvest of currently underutilized species.

For more information, contact Sin-Lam Chan (206)860-3380.

APPENDIX 1

Recent Publications and Reports Pertaining to Groundfish and Marine Habitats by Authors at the Northwest Fisheries Science Center

Collier, T.K., C.A. Krone, M.M. Krahn, J.E. Stein, S.-L. Chan, and U. Varanasi. 1995. Petroleum exposure and associated biochemical effects in fish following the EXXON Valdez oil spill 1. 1989-1991.Trans. Am. Fish. Soc. (in press).

Collier, T.K., B.F. Anulacion, J.E. Stein, A. Goks_yr, and U. Varanasi. 1995. A field evaluation of cytochrome P4501A as a biomarker of contaminant exposure in three species of flatfish. Environ. Toxicol. Chem. 14:154-162.

Johnson, L.L., J.E. Stein, T. Hom, S. Sol, T.K. Collier, and U. Varanasi. 1995. Effects of exposure to Prudhoe Bay crude oil on reproductive function in gravid female flatfish. Environmental Sciences 3:67-81.

Johnson, L.L., S-Y. Sol, D.P. Lomax, and T.K. Collier. 1995. Effects of endocrine-disrupting chemicals on marine flatfish reproduction: An approach to environmental risk assessment. In: Proc. Int. Symp. on Fish Reprod. F. Goetz and P. Thomas, Eds. Fish Symp 95, Univ. of Texas at Austin, Marine Sciences Institute, Port Aransas, TX. p. 188.

Johnson, L.L., J.T. Landahl, B.H. Horness, and K. Kardong. 1995. Contaminant exposure, fishing pressure, and population growth of English sole (*Pleuronectes vetulus*) in Puget Sound, WA. Proc. Puget Sound Research '95 2:686-698

Johnson, L.L., S.-Y. Sol, D.P. Lomax, G. Nelson, and E. Casillas. 1996. Environmental contaminants and egg weight and fecundity in English sole (*Pleuronectes vetulus*) from Puget Sound, WA. Fish. Bull. (in press).

NMFS. 1995. Our Living Oceans. Report on the Status of U.S. living marine resources, 1994. R. Methot contributed Unit 15: Pacific coast groundfish fisheries.

Myers, M.S., L.L. Johnson, T. Hom, T.K. Collier, J.E. Stein, and U. Varanasi. 1995. Toxicopathic hepatic lesions in subadult English sole (*Pleuronectes vetulus*) from Puget Sound, Washington, U.S.: relationships with other biomarkers of contaminant exposure. Mar. Environ. Res. in press.

Myers, M.S., M.L. Willis, A.-M. Hus_y, A. Goks_yr, and T.K. Collier. 1995. Immunochemical localization of cytochrome P4501A in contaminant-associated hepatic lesions of English sole (*Pleuronectes vetulus*). Mar. Environ. Res. (in press).

Sol, S.-Y., L.L. Johnson, T.K. Collier, M.M. Krahn, and U. Varanasi. 1995. Contaminant effects on reproduction in North Pacific flatfish. Proc. Int. Pac. Flatfish Conf., Anchorage, AK 1994, pp. 547-560.

Stehr, C.M., M.S. Myers, D.G. Burrows, M.M. Krahn, J.P. Meador, B.B. McCain, and U. Varanasi. Chemical contamination and associated liver diseases in two species of fish from San Francisco Bay and Bodega Bay. Ecotoxicology. 5:1- 31 (1996)

Varanasi, U., T.K. Collier, C.A. Krone, M.M. Krahn, L.L. Johnson, M.S. Myers, and S.-L. Chan. 1995. Assessment of oil spill impacts on fisheries resources: Measurement of hydrocarbons and their metabolites, and their effects, in important species, Exxon Valdez Oil Spill State/Federal Natural Resource Damage Assessment Final Report (Subtidal 7), NMFS, National Oceanic and Atmospheric Administration, Seattle, Washington.

8. NMFS - SOUTHEAST FISHERIES SCIENCE CENTER

NONE

9. NPFMC

A. OVERVIEW

The Council has been moving towards comprehensive rationalization or limited access in North Pacific fisheries. The first step was implementation of the IFQ system in 1995 for sablefish and halibut fixed gear fisheries. The second step was implementation of a moratorium on new entrants to groundfish and crab fisheries in 1996. The third step was a three-year rollover of the inshore-offshore allocations for pollock in the BS/AI and GOA, and for Pacific cod in the GOA beginning in 1996 and includes an extension of the pollock CDQ program. The fourth step is a license limitation system approved by the Council in 1995 for the groundfish fisheries of the BS and AI and GOA, and the BS/AI crab fisheries. The fifth step to comprehensive rationalization of North Pacific fisheries may be individual fishing and processing quotas for groundfish and crab. These may be fashioned after the halibut and sablefish IFQ system, though the overall groundfish system would be much more complex considering all the species and gear groups. However, the Council and fishing industry are awaiting reauthorization of the Magnuson Act which may put a moratorium on implementation of additional IFQ programs.

B. MANAGEMENT ACTIONS

1) Groundfish License Limitation Program

The major management action the North Pacific Council approved in 1995 was the Groundfish License Limitation Program for the federally managed groundfish and crab fisheries in the North Pacific after extensive analysis and public debate. Programs will restrict access to these fisheries in the EEZ. Specifics of the license limitation programs are contained in Attachment 1. Implementation of the program, if approved by the Secretary of Commerce, would not occur until 1997 at the earliest, and more likely would be in 1998.

The Council has settled upon a system that would issue licenses in the form of area endorsements. Area endorsements would allow licensed vessels to participate in directed fishing for groundfish in that area. Vessels which do not hold an endorsement for an area would not be allowed to participate in directed groundfish fisheries, but would continue to be allowed to land bycatch amounts. Endorsements would be issued for the following areas: BS, AI, Western Gulf, Central Gulf (including West Yakutat), and the Eastern Gulf defined as East Yakutat and Southeast Outside.

2) Inshore-Offshore Reauthorization

The Council approved reauthorization of Fishery Management Plan Amendments 18 and 23 which contain the Inshore-Offshore Allocations of Pollock in the BS/AI and of pollock and Pacific cod in the GOA, and continuation of the Pollock CDQ program for Western Alaska. The Council also made some minor changes to the Catcher Vessel Operational Area (CVOA), and recommended the community of Akutan be added to the list of CDQ communities. If approved by the Secretary of Commerce, the reauthorization will extend the life of the allocations and the pollock CDQ program for three years through the end of 1998. Without reauthorization, the Inshore-Offshore Allocations and the pollock CDQ program would have expired on December 31, 1995.

Amendment 23 to the GOA FMP allocates 100% of the pollock and 90% of the Pacific cod to "inshore catcher processors" or to harvesting vessels delivering to "inshore" processors. Under Amendment 18 in the BS/AI, 7% of the pollock TAC is allocated to the Pollock CDQ Program, another 7% of the pollock TAC is set aside as part of the nonspecific reserve which may, at the discretion of the Regional Director, be released back into any BS/AI fishery, including pollock. The remaining portion of the pollock TAC is divided between inshore and offshore harvesters; 35% to harvest vessels delivering to "inshore" processors or to "inshore catcher processors," and 65% to "offshore catcher processors" or to harvest vessels delivering to "offshore processors." Further, a CVOA is defined for the pollock "B-Season," within which only catcher vessels may operate. In its reauthorization action, the Council voted to shift the western border of the CVOA 30 minutes to the east to 167°30' W. longitude, and to allow catcher processors to use the CVOA, if an offshore "C-Season" is enacted by the NMFS Regional Director (i.e., after all inshore quota has been taken for the year). The newly defined CVOA is shown in the figure with statistical reporting areas and the chum salmon closure area.

3) Pollock CDQ Apportionments for 1996-1998

Six organizations applied for pollock CDQs in the BS and AI for 1996-98. These same applicants were thoroughly reviewed by the State of Alaska, which recommended the following percentages for the coming three years as compared to percentages for 1992-93 and 1994-95.

	1992-1993	1994-1995	1996-1998
Coastal Villages Fishing Cooperative	27%	27%	25%
Norton Sound Economic Development Corp.	20%	20%	22%
Bristol Bay Economic Development Corp.	20%	20%	20%
Aleutian Pribilof Island Community Dev.Assn.	18%	18%	16%
Central Bering Sea Fishermen's Assn.	10%	8%	4%
Yukon Delta Fisheries Development Assn.	5%	7%	13%

4) BS and AI Groundfish Specifications

The Council adopted final groundfish specifications for the 1996 BS and AI groundfish fisheries, including ABC, TAC, and PSC limits and apportionments.

Groundfish abundance in the BS/AI area remains relatively stable for most species. For 1996, the Council recommended a 1,190,000 mt TAC for eastern BS pollock, a decrease of 60,000 mt from 1995. Of the TAC, 45% is allocated to the roe season ("A") and 55% to the non-roe season ("B"). As with last year, the "A" season will begin on January 20 for the inshore fleet and January 26 for the offshore fleet. The "B" season opening date, which has been August 15, will be reviewed by the Council at upcoming meetings to determine if a season delay (such as September 1) might be warranted. Changes could be in effect for the 1996 "B" season. The pollock TAC for the AI area is set at 35,600 mt, and 1,000 mt for the Bogoslof district (Area 518). The Council continues to recommend no directed fishing for pollock in the Bogoslof district. Based on a 7.5% allocation, the 1996 CDQs will be 89,250 mt for the eastern BS and 2,670 mt for the AI areas.

The Council recommended a 270,000 mt TAC for Pacific cod, an increase of 20,000 mt from 1995. Under the allocations of Amendment 24, 2% of the TAC will be reserved for jig gear, 44% for fixed gear (longline and pot gear), and 54% for trawl gear. For the fixed gear seasonal apportionment of Pacific cod, the Council recommends that 80,000 mt be released the first trimester (January 1 - April 30), 18,000 mt for the second trimester (May 1 - August 31), and 2,980 mt for the third trimester. The remaining 17,820 mt of the fixed gear's allocation will be held in reserve. The Council passed a motion to prepare a regulatory amendment to provide that any C season for fixed gear cod in the BS/AI commence on December 1 or be contiguous with the B season, with final action scheduled for the April meeting.

In most cases, recommended TACs for other groundfish are similar to last year. Notable exceptions include sablefish, POP, and Atka mackerel. A decline in sablefish stock biomass and recruitment was indicated by surveys and observations by fishermen. Consequently, the recommended TAC for sablefish was reduced to 1,100 mt in the BS and 1,200 mt in the AI area. An increasing stock of POP in the AI led to a higher catch limit (12,100 mt), which was apportioned among regulatory areas as a safeguard against localized depletion. Catch limits were also increased for Atka mackerel from 80,000 mt in 1995 to 106,157 mt in 1996.

The total PSC limit for 1996 for herring (1,697 mt) is 1% of the estimated herring biomass in the eastern BS. Total PSC limits for other species are specified in regulations, but are seasonally apportioned among fisheries during the annual specification process. One notable change for 1996 is the seasonal apportionment of red king crab and zone 1 Tanner crab for the yellowfin sole trawl fishery. Another major change is a recommendation for no PSC to be apportioned to directed trawl fisheries for

turbot, sablefish, or arrowtooth flounder. This recommendation essentially prohibits directed fishing for these species with trawl gear. For the non-trawl halibut PSC apportionment, the Council recommended allocating more halibut to the Pacific cod fishery, particularly in the first trimester. The Council again recommended that pot gear, jig gear, and sablefish hook-and-line fisheries be exempt from the non-trawl PSC program for 1996.

5) GOA Groundfish Specifications

The Council approved final 1996 GOA groundfish specifications, including ABCs, TACs, and PSC limits. Specifications are based on current stock assessments contained in the final GOA Groundfish SAFE, as well recommendations by the GOA Groundfish Plan Team, Advisory Panel, and the Scientific and Statistical Committee.

Many of the quotas remain unchanged from 1995: deepwater flatfish, rex sole, flathead sole, shallow water flatfish, arrowtooth, shortraker/rougheye, northern rockfish, PSR, and Atka mackerel. The triennial GOA trawl survey will be conducted in 1996 and new stock assessments will be prepared for these species for 1997. The TAC for other slope rockfish was decreased to 2,020 mt for 1996. The TAC for POP, which is calculated from the rebuilding plan, was increased from 5,630 to 6,959 mt. The Council approved a plan amendment to allow the POP TAC to be set at or below the calculation from the rebuilding plan, but did not change the TAC for 1996.

New stock assessments for pollock, Pacific cod, sablefish, and thornyheads resulted in lowered TACs. Pollock ABC was reduced from 65,360 mt in 1995 to 52,700 mt for 1996. Increased pollock recruitment in the 1995 Shelikof Strait hydroacoustic survey and length frequency data from the 1990-95 surveys show the progression of the strong 1988 year class through the population. The 1995 survey also observed the largest year class of one-year old fish (15% of the biomass) since the survey began. The average contribution of one-year old fish had been less than 1%, so there is some preliminary evidence for future recovery of the stock.

The 1996 Pacific cod ABC and TAC were set at 65,000 mt, down from 69,200 mt in 1995. Stock abundance is declining below any level previously estimated (3% since last year) and recent recruitment levels appear to be below normal.

The 1996 thornyhead ABC was reduced to 1,560 mt from 1,900 mt in 1995. The primary reason for the reduced ABC was the incorporation of an increase in size at 50% maturity in the assessment model. The TAC was then set at 1,248 mt, 20% below the ABC, to give an additional buffer.

The 1996 sablefish ABC and TAC were set at 17,080 mt for 1996. Results of the sablefish longline survey indicated a reduction in 1996 biomass of 8% between 1994 and 1995. The ABC and TAC, however, were reduced 22% from last year, as indicated

by a 10% decrease in the exploitation rate and a 1996 biomass level that was 14% lower than projected in the assessment.

With the advent of the 1995 ITQ fisheries, industry expressed concern over the possibility of longline survey results being affected by fishing operations just prior to and during sampling. Because of the importance of the survey index in determining ABC and understanding the dynamics of sablefish stock, the sablefish longline fleet was asked to avoid the survey areas for a few days before the area was to be sampled. The survey encountered little longline activity in the Western and Central Gulf. Somewhat more activity was observed in the Eastern Gulf, in the Cape Spencer/Cross Sound area and the area off Sitka. The survey also encountered trawl activity targeting fish on the slope in early July in the Chirikof area. For the most part, cooperation was good in 1995 and is expected to improve in the future.

The 1996 longline survey schedule has been modified to provide more opportunity for fishing activity to avoid the survey. The survey is scheduled to start earlier and be halfway through the Central Gulf before the July trawl opening, providing more area that has already been surveyed and need not be avoided. The survey would not reach the West Yakutat area until about July 18, hopefully allowing the area to rest after a short rockfish opening. The survey is also scheduled to be as far south as the Sitka area before the traditional salmon troll closure around August 13, allowing more area for troller/longliners to fish north of the survey vessel.

A new assessment for DSR increased the TAC from 580 mt in 1995 to 950 mt in 1996 and is based on results of the 1994 and 1995 line transect surveys of yelloweye rockfish in the Eastern GOA. Increased estimates of density in the 1995 survey data are largely due to a change in survey equipment, ensuring that 100% of the fish were counted. Also, 1994 density estimates from Northern Southeast Outside and Southern Southeast Outside areas were reanalyzed.

In 1994 the GOA Groundfish Plan Team recommended separating black rockfish from the PSR assemblage, but the Council followed the SSC recommendation to postpone action until better scientific data were available to analyze effects of species separation. Black rockfish have been targeted by a small boat jig fishery in the Central Gulf for several years, separate from the offshore trawl fisheries for rockfish using catcher-processor vessels. Black rockfish and dusky rockfish would be better managed separately because of their different habitat preferences. Currently, there is no constraint on the developing black rockfish jig fishery under the TAC based on high abundance of dusky rockfish in the trawl surveys. Longevity and slow growth of black rockfish make them particularly susceptible to overfishing.

This year, the team recommended separating dusky rockfish from the assemblage because better data were available for calculating a separate ABC and overfishing level for this species. The team recommended the Council initiate a plan amendment to

examine nearshore pelagic rockfish management. Alternatives could include 1) separating black rockfish from the assemblage, remove it from the federal FMP, and turn its management over to the State of Alaska, and 2) separate dusky rockfish from the assemblage and leave the remaining species under the FMP. The SSC did not support separating duskies for 1996, but did recommend the Council proceed with the plan amendment. The Council will address this issue further at the joint PFMC /Board of Fisheries meeting on January 9. The joint meeting will also discuss other state groundfish management issues. ADF&G has proposed managing a state water fishery for pollock in Prince William Sound, and a Pacific cod fishery in Cook Inlet. ADF&G will also report on the DSR license limitation program. The Council further requested NMFS to manage the shortraker/rougheye, thornyhead, and other slope rockfish fisheries on bycatch status.

The PSC limits for halibut in the GOA are set by gear type and may be apportioned seasonally over the fishing year. For 1996, the Council recommended PSC apportionments based on 1995 rates shown below for the GOA groundfish fisheries. A regulatory amendment to exempt the IFQ sablefish fishery from the halibut PSC requirement was approved earlier this year, thereby lowering the hook-and-line PSC from 750 to 300 mt. Seasonal PSC caps for hook-and-line gear were revised from 1995, but still include 10 mt for DSR fisheries in the Southeast Outside District. Exemption for pot gear from the halibut PSC limits is continued. Halibut discard mortality rates recommended by IPHC staff were also approved.

6) Halibut and Sablefish IFQ Program

The 1995 IFQ seasons for halibut and sablefish extended from March 15 through November 15. Over 87% of the 37.2 m lb halibut quota was harvested by 5,412 IFQ halibut fishermen and 89% of the nearly 45 m lb sablefish quota was harvested by 1,315 IFQ sablefish fishermen in the eight-month season. One percent of halibut and nearly 5% of sablefish were kept in reserve pending the appeals process.

Numerous amendments to modify the halibut and sablefish IFQ programs were approved by the PFMC in 1995:

- Omnibus regulatory amendment made 16 amendments to the IFQ program. Many of the changes affected clearance requirements and the adjustment policy. Changes became effective on June 1, 1995.

- Regulatory amendment to exempt catcher vessels and catcher/ processors from restrictions on IFQ fishing in multiple regulatory areas in the BS/AI and GOA for two years provided the vessels take observers on board and maintain current record keeping and reporting requirements. Those catcher vessels not required to carry observers would

voluntarily comply with observer coverage to be included in the exemption. The amendment would include an option for review and renewal, if necessary, after two years.

- Regulatory amendment to extend the IFQ sablefish fishery in the AI past the regular season closure beginning in the 1996 IFQ season.

- Regulatory amendment to create a catch sharing plan to framework a formula for apportioning Area 4 subarea halibut allocations. These percentages will be applied to the overall Area 4 halibut quota determined by the IPHC in January. The Council designated the first 80,000 lb of quota above the 1995 Area 4 quota (5.92 million lb) to Area 4E.

- Omnibus II regulatory amendment to eliminate the 72-h "fair start" provision, revised owner-aboard restriction, allows delivery of IFQ halibut bycatch by salmon fishermen, revised shipment report and transshipment requirements, allows tagging of halibut and sablefish, eliminates certified mail requirements, and revises the QS/IFQ transfer process. Changes will become effective in the 1996 fishing year.

- Plan Amendments 32/36 allow CDQ compensation quota shares (QS) to be exempt from the block provisions in perpetuity for all vessel categories, except freezer/longline vessels. This action treats all CDQ compensations shares as regular, unblocked QSs. The Council also approved a one-time transfer of compensation shares in CDQ areas for IFQ shares in non-CDQ areas across all vessel categories, except freezer/longline vessels. This action would allow a paired trade of regular large vessel QS in CDQ areas for small vessel CDQ compensation QSs in CDQ areas.

- Plan Amendments 33/37 prohibit use of halibut catcher vessel QS on freezer vessels and allows the freezing of non-IFQ species, such as Pacific cod and rockfish, while harvesting sablefish catcher vessel QS on a freezer vessel.

Amendments initiated in 1995 and approved in 1996 include:

- Plan Amendments 42/42 would allow use of larger vessel category (Categories B and C) QS on smaller category vessels (Categories C and D, respectively), except that in halibut Area 2C and sablefish southeast area, buydown of B category QS would be allowed only for blocks that are less than 5,000 lb (based on 1996 quotas). Small boat fishermen reported the scarcity of medium to large size blocks in some areas and requested the Council enable them to rationalize their operations by purchasing shares from QS holders in larger vessel size categories. Large vessel operators have reported difficulties in utilizing or marketing small Category B blocks and have requested the opportunity to downsize their operations or sell QS to owners of smaller vessels. If approved by the Secretary of Commerce, this program may be implemented in late September.

- Plan Amendments 43/43 increase the sweep-up levels of blocked halibut and sablefish QS blocks. The Council approved new sweep-up levels of less than 3,000 lb for halibut and less than 5,000 lb for sablefish. The new sweep-up levels will be based on the 1996 QS units equivalent to the new sweep-up poundage levels for each area. The moderate increase in the consolidation of very small, blocked QS was approved to provide economically "fishable" amounts for small QS holders, crew members, and new entrants to the fishery, without overly increasing consolidation or creating large blocks. If approved by the Secretary, this program will be implemented for the 1997 IFQ fishing season.

- Regulatory amendment authorizes use of pot longlines for sablefish only in the BS. Pot longlines would be allowed in the BS regulatory area for the entire IFQ season, except the month of June. June prohibition will minimize potential gear interactions with small boat hook-and-line longliners who may be unable to use pot gear because of safety concerns on their smaller vessels. The amendment addresses concern over competition with killer whales for the resource as well as the possibility of harmful gear interactions with both killer whales and the endangered short-tailed albatross. Industry also has been concerned that depredation of hooked sablefish by killer whales may be precluding full attainment of the TAC and uncounted mortality may negatively affect the BS sablefish biomass. The Council requested that NMFS fast-track the amendment so that it could be implemented during the 1996 IFQ season.

7) Seamount Fisheries

In January 1995, the Council approved a regulatory amendment to monitor fishing seaward of the 200-mile EEZ to address two situations which may arise in the sablefish fishery: 1) when a federal fishing closure is in effect inside the EEZ, vessels might continue to fish inside the EEZ, but claim to have harvested this fish seaward of the EEZ; and 2) under the IFQ program starting in the spring of 1995, fish caught seaward of the EEZ would not be counted against an IFQ limit and an incentive would exist to claim that IFQ fish were caught outside the EEZ. In both instances, fishing could be inaccurately reported as taking place outside the EEZ to avoid being counted against the quota.

The PFMC's action will require that all federally permitted vessels carry a fully functional transponder when en route to/from and when fishing in waters seaward of the EEZ off Alaska. Vessels must also complete and submit a Vessel Activity Report, and must, upon reentry to the EEZ, offload any fish harvested outside the EEZ before fishing inside the EEZ. IFQ regulations currently prohibit vessels from having IFQ sablefish and non-IFQ sablefish onboard the vessel at the same time. The vessel would have to offload fish before going seaward of the EEZ and upon reentry to the EEZ. This amendment has not yet been submitted for approval to the Secretary of Commerce.

8) Electronic Reporting

The Council approved a regulatory amendment to implement hardware requirements for electronic reporting. The amendment requires all processor vessels that process groundfish to have satellite communication equipment and necessary hardware and software for electronic transmission of observer data, and requires all shoreside processors that process groundfish to have the necessary computer hardware and software to send data electronically via a modem. Use of this equipment by observers should reduce both the time and expense of collecting fishery information by providing real-time data and reducing the workload of the Observer Program. Currently, most industry reports are submitted by FAX, and all logbooks are kept on paper. It became effective January 1, 1996.

9) GOA Pollock Seasonal Allocations

The Council approved Amendment 45 to the GOA Groundfish FMP to framework greater flexibility in setting seasonal allowances of the pollock TAC. The Council approved combining the third and fourth quarterly allowances into a single release of 50% of the TAC. The first and second quarter allowances of 25% of the pollock TAC in the Western/Central Regulatory Area would remain unchanged. Third trimester release of quota for the Central Gulf (Areas 620 and 630) would occur on September 1 and for the Western Gulf (Area 610) on October 1.

10) Pacific Cod 'C' Season

NMFS is currently developing a regulatory amendment to provide that any BS/AI 'C' season for the fixed gear cod fishery begin on December 1, or contiguous to their fall fishery. This additional fishery could potentially occur through either a recalculation of PSC bycatch figures, or through a reapportionment of unused quota from the trawl gear allocation of Pacific cod. This change should be implemented in 1996

11) POP Rebuilding Plan

Amendment 38 revises the rebuilding plan for GOA POP. This amendment allows the Council to specify a POP TAC *at or below* the amount dictated by the POP Rebuilding Plan. It should be implemented for the 1997 fishing season.

C. ONGOING ANALYSIS

1) Improved Retention and Utilization

In late 1995 the Council initiated analysis of alternatives to reduce discards and increase utilization of groundfish resources in both the BS/AI and GOA. The analysis

will focus on reducing discard of pollock, Pacific cod, rock sole, and yellow sole. The Council recently included an option to phase-in implementation of this program for flatfish species over a period of two to five years, starting at 60% in the first year (assumed to be 1998). Pollock and Pacific cod would begin at 100% retention in all groundfish fisheries. Various options for utilization requirements are still under development.

2) Observer Program

The Council repealed the fee-based Research Plan in 1995, and is proceeding with development of a modified pay-as-you-go program. Under the modified plan, fishing operations required to carry observers would continue to pay directly for those observers, but would do so through a third-party umbrella organization that would provide an interface between fishing operations and the independent observer contracting companies. This structure is designed to alleviate any conflict of interest concerns by creating an "arms-length" relationship between observer contracting companies and fishing operations. NMFS would still retain certain critical functions of the program, including debriefing and use of data collected for management of the fisheries. This new structure for the observer program will not be in place until at least 1997; for 1996 the existing observer coverage requirements will remain in place, with fishing operations contracting directly with independent observer contracting companies for their observers.

This program will likely necessitate issuance of a competitive procurement by NMFS for selection of the third-party umbrella organization (or Prime Contractor). The Council formed an Observer Advisory Committee to assist in development of the specifics of this program. The Council specifically requested the modified pay-as-you-go program also address other issues raised during the last several months of discussions, including:

a. Compensation and insurance packages for observers.

b. Consistent mechanisms to provide observers for State of Alaska-managed crab fisheries to ensure compatibility between crab and groundfish observer programs.

c. Options to defray costs to vessel owners who would pay an unreasonably high proportion of their gross catch value for direct observer coverage. Options would include: fleet-wide surcharge on observer coverage, observer pooling for vessels in this group, and adjustment of coverage levels for vessels in this group.

D. GROUNDFISH LICENSE LIMITATION PROGRAM

1) License Classes

A single type of licenses will be issued (as opposed to multiple types of permits as described in other options).

2) Nature of Licenses

The Groundfish License Program will restrict access to groundfish fisheries in the EEZ off the Coast of Alaska. The license program does not restrict access to waters of the State of Alaska. The program will issue non-severable area endorsements for the following management areas: AI, BS, WG, CG+WY, EY+SO. The endorsement would be contained under one of the following General License Umbrellas: GOA, BS/AI, or GOA/BS/AI. DSR in waters east of 140° NW, and fixed-gear sablefish are excluded from the Groundfish License Program.

3) License Recipients

Licenses will be issued to current owners (as of 6/17/95) of qualified vessels. (Owners must be "persons eligible to document a fishing vessel" under Chapter 121, Title 46, U.S.C. This date may be subject to modification under certain circumstances involving qualified vessels now operating under foreign flags.)

4) License Designations

Licenses and endorsements will be designated as Catcher Vessel (CV) or Catcher Processor (CP) and with one of three Vessel Length Classes (<60', >60' & <125', >125'). In the Eastern Gulf (EY + SO) an additional designation allowing use of legal fixed gear only will be assigned, regardless of gear used to qualify for the endorsement. CP/CV designations will be determined based on the activities of the vessel during 1/1/94 - 6/17/95 or the most recent year of participation during the Endorsement Qualifying Period (EQP). Vessel length classes will be based on the length overall of the vessel as of 6/17/95, as long as the vessel conforms with provisions of the '20% upgrade' and 'Maximum LOA' rules defined in the moratorium. Owners of vessels which have upgraded beyond the "Maximum LOA" would receive licenses and endorsements, but these licenses and endorsements could not be assigned to the qualifying vessel.

5) Qualifying Periods

a. For General Licenses

The Qualifying Period (QP) is 1/1/88 - 6/27/92, with the additional provision that any vessel which "crossed over" to groundfish from crab under provisions of

the proposed moratorium by 6/17/95 would also qualify for a general license. For vessels under 60', the general QP is extended through Dec. 31, 1994 for groundfish pot or jig gear — recipients must choose one area endorsement if qualified for multiple endorsements. Vessels which qualify as "crossovers" or because of the extended general QP would be allowed to use any legal gear to harvest groundfish.

b. For Area Endorsements

The QP is 1/1/92 - 6/17/95. The following exemptions are included in the license limitation program: 1) vessels that were exempted from the proposed moratorium would also be exempt from the license limitation program (26' in the GOA and 32' in the BS/AI), and 2) vessels in the BS/AI using jig gear that are less than 60' using a maximum of five machines, one line per machine, and a maximum of 15 hooks per line. Unlike the moratorium, any 'exempt' vessel which qualifies for a license would receive that license.

6) Landings Requirements For General License Qualification

One landing of groundfish in the general QP, or qualified "moratorium crossover" vessels which "crossed over" from crab by 6/17/95.

7) Landings Requirements for Endorsement Qualification

a. BS/AI

An endorsement will be issued if a vessel made at least one groundfish landing in an area (BS or AI) during the endorsement period (1/1/92 - 6/17/95).

b. GOA

1) For all vessels less than 60' in all GOA endorsement areas, an endorsement will be issued if the vessel made at least one landing in the area during the endorsement period (1/1/92 - 6/17/95).

2) For the Central Gulf/West Yakutat and Southeast Outside endorsement areas, all vessels greater than 60' but less than 125', which made at least one landing in an area in any two of the four endorsement calendar years (1992, 1993, 1994, or 1995 through 6/17/95), **OR** four landings between 1/1/95 and 6/17/95 would receive an endorsement for the area. For all vessels greater than 125', endorsements will be issued to vessels which made at least one landing in an area in any two of the four endorsement calendar years (1992, 1993, 1994, or 1995 through 6/17/95).

3) For the Western Gulf area, all vessels less than 125 feet which made at least one landing between 1/1/92 and 6/17/95 will receive an endorsement.

Vessels which are greater than 125' must have made at least one landing in the Western Gulf in any two of the four endorsement calendar years (1992, 1993, 1994, or 1995 through 6/17/95) in order to receive an endorsement for the area.

8) Components and Alternative Elements Affecting Ownership, Use and Transfer of Licenses

a. Who May Purchase Licenses

Licenses may be transferred only to "persons" defined as those eligible to document a fishery vessel under chapter 121, Title 46 U.S.C. There shall be no leasing of groundfish licenses.

b. Vessel/License Linkages

Licenses may be transferred without a vessel, i.e., licenses may be applied to vessels other than the one to which the license initially was issued, subject to license designations, and the "20% rule" and "maximum LOA" in the moratorium regulations, and the "no leasing" restriction. Licenses may be applied to vessels shorter than the "maximum LOA" regardless of vessel class designations, i.e., "downgrades" in vessel classes are allowed.

c. Options Regarding Separability of Species and/or Area Designations

Area endorsements are not separable, and shall remain as a single "package," which includes assigned CV/CP and vessel length class designations. Crab and groundfish licenses initially issued to a person (as defined under "License Recipients") are not separable and shall remain as a block for a period of three years. After which time, the Council may review whether or not the groundfish and crab licenses should remain non-severable. Groundfish licenses obtained after the initial allocation will not be combined with any other licenses owned by the person, and will remain a separate license.

d. Vessel Replacement and Upgrades

Vessels may be replaced or upgraded within the bounds of the vessel length designations and the 20% rule as defined in the moratorium proposed rule. If a vessel upgrades under the 20% rule to a length which falls into a higher vessel length designation after 6/17/95, then the vessel owner would receive the license and endorsements, but could not use them on that vessel.

e. License Ownership Caps

No more than ten general licenses per person with grandfather provisions to those persons who exceed this limit in the initial allocation. Intent of the Council is

that this limit is applied to the "person" as defined under "License Recipients," and is not interpreted to apply to individual owners within corporations or partnerships.

f. Vessel License Use Caps

There is no limit on the number of licenses (or endorsements) which may be used on a vessel.

g. Vessel Designation Limits

A vessel which qualifies for multiple designations (i.e., both as a CV and as a CP) under the use restriction component will be able to participate under any designation for which it qualifies. CV/CP designations will be based on activities during 1/1/94-6/17/95 or the most recent year of participation during the EQP. If a vessel qualifies as a CP only it may select a one-time (permanent) conversion to a CV, though a CP may operate in either mode. If a vessel qualifies as a CV only, it is restricted to operate as a CV.

CDQs. 7.5% of all BS/AI groundfish TACs not already covered by a CDQ program, and a pro-rata share of PSC will be allocated to CDQ communities as defined in the current CDQ program, with the addition of Akutan. PSC will be allocated "off the top" before the trawl/non-trawl split. The groundfish CDQ program will be patterned after the current CDQ program, but will not contain a sunset provision.

9) Other Provisions

a. Licenses represent a use privilege. The Council may convert the license program to an IFQ program or otherwise alter or rescind the program without compensation to license holders.

b. Severe penalties may be invoked for failure to comply with conditions of the license.

c. Licenses may be suspended or revoked for serious and/or multiple violations. (The Council recommends NMFS consult with the Coalition for Stability in Marine Financing regarding license revocation concerns.)

d. Implement a Skipper Reporting System which requires groundfish license holders to report skipper names, address, and service records to NMFS.

e. An analysis of the impact of various rent collection levels and mechanisms, and enforcement and program implementation costs is required.

f. Vessels targeting non-groundfish species (salmon, crab, etc.) that are currently allowed to land incidentally taken groundfish without a groundfish permit, will be allowed to continue to land bycatch amounts. Additionally, vessels participating in the sablefish and halibut IFQ program would continue to be able to land bycatch amounts of groundfish as specified in regulations governing that program.

g. Vessels which qualified for the NPFMC license limitation program that have been lost or destroyed are still eligible to receive earned licenses and endorsements, subject to rules and conditions outlined in this program.

h. Vessels which qualify under the moratorium and were lost, damaged, or otherwise out of the fishery due to factors beyond the control of the owner and which were replaced or otherwise reentered the fisheries in accordance with moratorium rules and which made a landing in a fishery any time between the time the vessel left the fishery and 6/17/95, will be qualified for a general license and endorsement for that area.

i. Vessels which receive an "empty umbrella" because they qualified under the GQP in one FMP and made landings during the EQP in the other FMP, would be issued endorsements and a general license for the FMP area and FMP subareas for which they meet the Endorsement Landings Requirements.

j. The CDQ vessel exemption included in the moratorium will continue under the Groundfish License Limitation Program. This exemption allows vessels <125' obtained under an approved CDQ plan to participate in both CDQ and non-CDQ fisheries. If the vessel is sold to an interest outside the CDQ plan, the vessel will no longer be exempt from the requirements of the license program.

k. Each element and component of the groundfish and crab license limitation program as described in this action is integral to the overall program. No component or element of the program should be regarded as severable by the Secretary of Commerce.

l. Buyback or retirement programs for vessels or licenses will not be implemented at this time.

m. The Two-Tiered Skipper License Program will not be implemented at this time. Future analysis of a license program for skippers, based on the amended program outlined by SEA, will be set on its own timeline.

n. Community Development Licenses will not be a part of the Community Development Program.

o. The Council will consider options to compensate vessel owners who qualified for Southeast Outside endorsements using trawl gear, if and when individual quota programs are studied.

p. The option to allow vessels designated as CVs to add limited amounts of processing capability will not be allowed under this action. This option will be further analyzed when the Council addresses "Full Utilization."

q. A sunset date on the Groundfish License Program will not be set at this time.

10) Components and Alternative Elements Affecting Ownership, Use and Transfer of Licenses

a. Who May Purchase Licenses

Licenses may be transferred only to "persons" defined as those eligible to document a fishery vessel under chapter 121, Title 46 U.S.C. There shall be no leasing of crab licenses.

b. Vessel/License Linkages

Licenses may be transferred without a vessel, i.e., licenses may be applied to vessels other than the one to which the license initially was issued, subject to license designations, and the "20% rule" and "maximum LOA" in the moratorium regulations, and the "no leasing" restriction. Licenses may be applied to vessels shorter than the "maximum LOA" regardless of vessel class designations, i.e., "downgrades" in vessel classes are allowed.

c. Options Regarding Separability of Species and/or Area Designations

Species/area endorsements are not separable, and shall remain as a single "package," which includes the assigned CV/CP and vessel length class designations. Crab and groundfish licenses initially issued to a person (as defined under "License Recipients") are not separable and shall remain as a block for a period of three years, after which time the Council may review whether or not the groundfish and crab licenses should remain non-severable. Crab licenses obtained after the initial allocation will not be combined with any other licenses owned by the person, and will remain a separate license.

d. Vessel Replacement and Upgrades

Vessels may be replaced or upgraded within the bounds of vessel length designations and the 20% Rule as defined in the moratorium proposed rule. If a vessel upgrades under the "20% rule" to a length which falls into a higher vessel length

designation after 6/17/95, then the vessel owner would receive the license and endorsements, but could not use them on that vessel.

e. License Ownership Caps

No more than five general licenses per person, with grandfather provisions to those persons who exceed this limit in the initial allocation. The intent of the Council is that this limit is applied to the "person" as defined under "License Recipients," and is not interpreted to apply to individual owners within corporations or partnerships.

f. Vessel License Use Caps

There is no limit on the number of licenses (or endorsements) which may be used on a vessel.

g. Vessel Designation Limits

A vessel which qualifies for multiple designations (i.e., both as a CV and a CP) under the use restriction component will be able to participate under any designation for which it qualifies. Vessel designations will be based on **activities** during 1/1/94 - 12/31/94 or most recent year of participation during the EQP. If a vessel qualifies as a CP only, it may select a one-time (permanent) conversion to a CV, though a CP may operate in either mode. If a vessel qualifies as a CV only, it is restricted to operate as a CV.

h. CDQs

For those BS/AI crab species for which there is an assigned Guideline Harvest Level (GHL), 7.5% of the GHL shall be allocated to CDQ communities, as defined in the current CDQ program, with the addition of Akutan. The crab CDQ program shall be patterned after current CDQ program but will not contain a sunset provision.

11) Other Provisions

a. Licenses represent a use privilege. The Council may convert the license program to an IFQ program or otherwise alter or rescind the program without compensation to license holders.

b. Severe penalties may be invoked for failure to comply with conditions of the license.

c. Licenses may be suspended or revoked for serious and/or multiple violations. (The Council recommends NMFS consult with the Coalition for Stability in Marine Financing regarding license revocation concerns.)

d. Implement a Skipper Reporting System which requires crab license holders to report skipper names, address, and service records to NMFS.

e. An analysis of the impact of various rent collection levels and mechanisms, and enforcement and program implementation costs is required.

f. No future super-exclusive areas will be proposed (this option is only an expression of Council intent).

g. Vessels which qualified for the NPFMC license limitation program that have been lost or destroyed are still eligible to receive earned licenses and endorsements, subject to rules and conditions outlined in this program.

h. Vessels which qualify under the moratorium and were lost, damaged, or otherwise out of the fishery due to factors beyond the control of the owner, and which were replaced or otherwise reentered the fisheries in accordance with the moratorium rules and which made a landing in a fishery any time between the time the vessel left the fishery and June 17, 1995 (the date of final Council action on the license program), will be qualified for a general license and endorsement for that fishery.

i. The CDQ vessel exemption included in the moratorium will continue under the Crab License Limitation Program. This exemption allows vessels <125' obtained under an approved CDQ plan to participate in both CDQ and non-CDQ fisheries. If the vessel is sold to an interest outside the CDQ plan, the vessel will no longer be exempt from the requirements of the license program.

j. Each element and component of the Groundfish and Crab License Limitation Program as described in this action is integral to the overall program. No component or element of the program should be regarded as severable by the Secretary of Commerce.

k. An Individual Transferable Pot Quota System will not be implemented at this time.

l. Buyback or retirement programs for vessels or licenses will not be implemented at this time.

m. The Two-Tiered Skipper License Program will not be implemented at this time. Future analysis of a license program for skippers, based on the amended program outlined by SEA, will be set on its own timeline.

n. Community Development Licenses will not be a part of the Community Development Program.

o. A sunset date on the crab license program will not be set at this time.

Landings in State Waters: The Council reaffirmed their intent to allow landings which were made in state waters to count toward qualification in the license program. NMFS had asked the Council to clarify this issue because a federal license will not be required to continue fishing in state waters.

Western Gulf Minimum Landings Requirements: The Council corrected an error in the June Newsletter regarding Western Gulf landings requirements in the EQP. The one landing requirement during the EQP was actually meant to only apply to CVs; CPs from 60-125' would still be subject to landings in two of four EQP years or four landings in 1995. The EQP is the period between 1/1/92 through 6/17/95. The corrected landing requirements are shown in the table below.

Minimum Landings Requirements in the Endorsement Qualifying Period for the Western Gulf

Vessel Type	0 - 59' LOA	60' - 124' LOA	125' + LOA
Catcher Vessel	1 landing	1 landing	1 landing in 2 of 4 EQP years.
Catcher Processor	1 landing	1 landing in 2 of 4 EQP years, or 4 landings in 1995.	1 landing in 2 of 4 EQP years.

Crab Crossover Vessels and Relationship Between Base and EQPs: The Council clarified its intent regarding "crab crossover" vessels; BS/AI crab landings in the base qualifying period would be treated in the same manner as BS/AI groundfish landings. For example, endorsements for GOA groundfish can only be earned if the vessel also had base period landings of GOA groundfish. A summary of the relationship between landings in the base and EQPs and eligibility of vessels to receive area endorsements is shown in the table below.

Relationship Between Base and Endorsement Qualifying Periods and Endorsement Eligibility

Participation in the Base Qualifying Period	Participation in the Endorsement Qualifying Period	Endorsement Eligibility
BSAI Groundfish or Crab	BSAI Groundfish	BSAI
BSAI Groundfish or Crab	BSAI and GOA Groundfish	BSAI
BSAI Groundfish or Crab	GOA Groundfish	GOA
GOA Groundfish	GOA Groundfish	GOA
GOA Groundfish	BSAI and GOA Groundfish	GOA
GOA Groundfish	BSAI Groundfish	BSAI
BSAI Groundfish or Crab and GOA Groundfish	BSAI Groundfish	BSAI
BSAI Groundfish or Crab and GOA Groundfish	GOA Groundfish	GOA
BSAI Groundfish or Crab and GOA Groundfish	BSAI and GOA Groundfish	BSAI & GOA
Vessel is < 60 ' and no base period landings	BSAI and/or GOA Groundfish with pot and/or jig gear.	One FMP Subarea Only
Vessel is < 60 ' with BSAI crab landings	BSAI and/or GOA Groundfish with pot and/or jig gear.	Choice -- See below.
These vessels may choose to qualify under the rules for "crab crossover" vessels or as "pot/jig" vessels. Choosing to qualify as "crab crossover" vessels will mean they qualify for only BSAI or GOA, but not both. Choosing to qualify as "pot/jig" vessels will mean selecting a single subarea endorsement.		

10. PFMC

A. MANAGEMENT ACTIVITIES IN 1995

1) OVERVIEW

As authorized by the groundfish FMP, the PFMC again established harvest guidelines for species in need of individual management attention, providing flexibility to allow landing of incidental amounts in case an annual harvest target was reached prematurely. Little fishing for shortbelly rockfish and jack mackerel occurred, but the entire whiting harvest was taken and processed by U.S. operations. The whiting resource was again allocated between competing user groups by federal regulation.

In 1995 the policy of using cumulative catch limits for individual vessels for calendar month periods was continued, with the levels of these limits intended to provide for a year-round fishery for each species or species group.

The PFMC has postponed further consideration of an IQ program for fixed gear sablefish until the issues are addressed on a national level. For 1995 the "derby" season opening date was delayed to August 6 and the fishery lasted seven days, followed by a "mop-up" fishery to take the remainder of the harvest guideline. Managers set the season length to leave a reserve of 30% for the mop-up fishery.

2) BY SPECIES

a. Rockfish Management

Since 1992 the PFMC has moved away from per-trip limits and towards cumulative catch limits for specific periods. This allows vessels to make any number of landings within the specified period, but the total amount landed must not exceed specified limits for any species. The specified periods in 1995 were calendar months. For the Sebastes complex, different trip limits were established for three regions of the coast, and canary rockfish limits were established for the first time. North of Cape Lookout, Oregon (45°20'15"N latitude), the cumulative monthly limit was 35,000 lb of which not more than 14,000 lb could be yellowtail rockfish and not more than 6,000 lb of canary rockfish. Between Cape Lookout and Cape Mendocino, California, the Sebastes complex limit was 50,000 lb, of which not more than 30,000 lb could be yellowtail rockfish and not more than 6,000 lb canary rockfish. South of Cape Mendocino, the Sebastes limit was 100,000 lb, of which not more than 30,000 lb could be bocaccio. On May 1 the monthly limit for yellowtail rockfish north of Cape Lookout was increased to 18,000 lb and between Cape Lookout and Cape Mendocino was increased to 40,000 lb.

The 1995 widow rockfish fishery again began under a cumulative monthly limit of 30,000 lb but was increased to 45,000 lb on July 14, and operated at that limit through the end of the year. POP was also added to the list of species managed under cumulative limits for the first time, with the limit at 6,000 lb.

b. Thornyheads Management

Unlike 1993 and 1994, in 1995 the two thornyhead species were managed with separate harvest guidelines. Thornyheads are managed under a cumulative trip limit for the Dover sole/thornyheads/trawl-caught sablefish (DTS) complex and also, for the first time, separate sublimits for each of the two species. Different DTS limits were set north and south of Cape Mendocino, with a cumulative monthly limit of 35,000 lb in the north and 50,000 lb in the south. Within the DTS limit, not more than 20,000 lb could be thornyheads, of which not more than 4,000 lb could be shortspine thornyhead. Thornyhead limits were set to encourage vessels to fish deeper, where shortspine thornyhead are relatively less abundant than longspine thornyhead. (Best sources of species composition information indicated that vessels fishing deeper than 500 fathoms encounter much higher ratios of

longspine thornyhead relative to shortspine along some areas of the coast. Taking this into consideration, it was believed that the catch of shortspine thornyhead could be reduced to 20% of the thornyhead catch coastwide.) Landings of thornyheads escalated rapidly in February, and in March the PFMC took action to slow the fishery by advising the Northwest Regional Director of the NMFS to adjust the trip limits downward. A conference call was conducted March 14, resulting in a reduction in the trip limits for the two species effective April 1. The new limit was 15,000 lb cumulative, of which not more than 3,000 lb could be shortspine thornyhead. The ratio of shortspines in the landings remained about 21-25% through July, but the total landings were about 150 to 200 mt per month, above the 120 mt per month required for a year round fishery. In June the GMT projected that both the harvest guideline and the overfishing level would be exceeded unless landings were slowed substantially. However, the PFMC declined to reduce the trip limit because they believed a cumulative limit below 3,000 lb would only increase discard with little reduction in actual catch of shortspine thornyhead. Instead, they encouraged the industry to try to avoid shortspine thornyhead. At the October meeting the GMT reported the landings rate was unchanged and the overfishing level would be hit by late October. The PFMC responded by reducing the cumulative monthly limit for the two thornyheads to 8,000 lb, of which not more than 1,500 lb could be shortspine thornyhead. The shortspine thornyhead harvest guideline was reached about September 20, and the PFMC prohibited further landings of both species during December.

c. Sablefish Management

The 1995 sablefish ABC was increased slightly to 8,700 mt north of the Conception area. The PFMC initially set the harvest guideline at 7,100 mt, equal to the ABC north of the Conception area, minus 900 mt for discard, minus 700 mt projected to be taken in excess of the 1994 ABC. However, the PFMC later recognized that 1994 landings had not exceeded the ABC by the expected amount, so the harvest guideline was increased to 7,800 mt, effective May 1. As in 1994, the harvest guideline was allocated among Treaty Indians, limited entry trawl and nontrawl fisheries, and the open access fisheries.

1. Trawl

Trawl sablefish landings are managed as part of the deepwater trawl DTS complex, which includes Dover sole and the two thornyhead species. A single trawl trip limit covered the complex, with sublimits for sablefish and the two thornyhead species. Beginning in January, trawl-caught sablefish was managed under a monthly cumulative limit of 6,000 lb (with a per trip limit of 1,000 lb or one-third of the Dover sole and thornyheads, whichever is greater). At the April meeting, the PFMC increased the trawl-caught sablefish monthly limit to 7,000 lb cumulative in conjunction with increasing the harvest guideline, effective May 1. On July 14, the trip limit that required trawl-caught

sablefish to comprise no more than 1,000 lb or one third of the Dover sole and thornyheads was removed. The sablefish harvest guideline was projected to be reached November 29, and further landings were prohibited from December 1-31.

2. Non-Trawl

As in past years, a small trip limit was established for non-trawl gears prior to the opening of the regular (unrestricted or "derby") season. However, management of the limited entry fixed gear sablefish fishery was otherwise substantially different from previous years. In previous years, the PFMC had attempted to start the season concurrent with Alaska fisheries in order to reduce effort and thus stretch the season length. However, in 1995 Alaska went to an IQ fishery with a longer season. Thus vessels no longer had to choose between the two fisheries and effort in the West Coast "derby" fishery was expected to increase dramatically. The Alaska IQ season was scheduled to open March 1, and the West Coast fishery, which was set to precede that by three days, would have opened in late February. The fixed gear industry recommended the PFMC delay the West Coast opening date to August, a time when larger fish are more available, quality is better, and wind patterns along the entire coast are more uniformly calm. To help keep landings within the harvest guideline and as a compromise between large and small producers, the PFMC intended that the derby fishery be managed to take no more than 70% of the allocation. The PFMC recommended the fishery would last only seven days, running from August 6-13. Another compromise was implemented regarding fair start provisions. In recent years, the fishery was preceded by a three-day closure, except that pot gear could be stored at sea during that period. Longline fishers claimed this allowed pot gear to preempt the best grounds and to get a head start. New regulations required all groundfish fixed gear, including open access pot and longline gear, to be out of the water 72 hours prior to the opening, but allowed pots to be set 24 hours early. The season ending was also changed to noon, with the requirement that all vessels begin offloading by that time. The plan held the remaining 30% of the allocation in reserve for a mop up fishery to occur about three weeks later, using an equal cumulative monthly limit for all limited entry fixed gear vessels. The monthly limit for the mop-up fishery was set at 5,500 lb.

d. Dover Sole Management

The PFMC began a harvest reduction plan for Dover sole in the Columbia area in 1993, with intention of reducing the harvest guideline from 5,000 mt in 1994 to 4,000 mt in 1995. However, based on the new assessment, the 1995 ABC was reduced to 3,000 mt, with the harvest guideline at 2,850 mt (a 5% reduction to account for anticipated discards). The Eureka area ABC was also reduced by 600

mt, and consequently the coastwide harvest guideline was reduced from 15,900 mt in 1994 to 13,600 mt in 1995.

e. Pacific Whiting (Hake) Management

The PFMC established the 1995 whiting harvest guideline at 178,400 mt (80% of coastwide whiting ABC). This was the second year of a three-year allocation plan which reserves 40% of the annual harvest guideline for shorebased processing after the first 60% has been taken in open competition. A provision is included for making surplus whiting available for at-sea processing on August 15, or a later date, if the shorebased industry did not need the remainder of the harvest guideline. The most notable problem in 1995 was the unexpectedly large bycatch of salmon, primarily chinook. Shorebased vessels and those delivering to mothership processors had higher bycatch rates than factory trawlers, especially during the first two weeks of the season.

As in past years, the large-scale "regular" season started on March 1 south of 42°N latitude (the Oregon-California border) for shorebased operations and on April 15 north of 42°N latitude for both at-sea and shorebased 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 106,090 mt were taken, 102,158 mt delivered at sea and 3,932 mt shoreside. The remainder of the harvest guideline was reserved for shorebased processing. The shorebased fishery took a total of 73,949 mt before it ended on July 24, the earliest ever, when the harvest guideline was projected to be reached. At that time, the 10,000-lb (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. For the year, a total of 176,107 mt of whiting were caught by both the at-sea and shorebased sectors. In 1995, the at-sea processing fleet took 102,158 mt of whiting: 61,572 mt (about 60%) by CPs and 40,586 mt (about 4%) by the mothership fleet.

Bycatch regulations for the whiting fishery continued in effect for 1995. Those regulations prohibited at-sea processing south of 42°N latitude, whiting fishing in the morning between midnight and one-half hour after official sunrise south of 42N, and whiting fishing inside conservation zones around the mouths of the Klamath and Columbia Rivers. Trip limit management continued inside 100 fathoms in the Eureka area to protect chinook salmon that might be in that area. The at-sea processing fleet took about 15,993 salmon, of which 11,579 were chinook salmon, for a ratio of 0.11 chinook salmon per mt of whiting (or one chinook in 10 mt of whiting). This is similar to the 0.11 average rate for all salmon species taken in the joint venture in 1978-1990 and more than three times the 0.03 average rate for chinook salmon taken by the at-sea processing sector in 1991-1994. About 1,430 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 1991-1994 at-sea processing fishery (1.1%).

B. MANAGEMENT ACTIVITIES, JANUARY 1 - APRIL 30, 1996

1) ABCs, Harvest Guidelines and Other Specifications for 1996

ABCs and harvest guidelines for most species in 1996 are identical to those for 1995. Exceptions are POP, Dover sole, yellowtail rockfish north of Cape Falcon, Oregon, and the Sebastes complex in the Vancouver and Columbia management areas. The coastwide Dover sole harvest guideline was reduced from 13,600 mt to 11,050 mt, which is near the projected total 1995 landed harvest of 10,378 mt. The harvest guideline was calculated by adding the recent average landed catch levels for the Vancouver and Monterey areas to the ABCs for the other areas and deducting 5% for anticipated discard. The Columbia area harvest guideline remains at 2,850 mt; the preliminary 1995 landed catch is 2,814 mt. The POP harvest guideline was reduced slightly to 750 mt, which is about 40 mt below the projected 1995 landed catch level and below the overfishing level. The new stock assessment for POP indicated landings have exceeded the overfishing level in recent years and have contributed to keeping the stock at a low but steady size. The yellowtail rockfish harvest guideline in the northern area was reduced to 3,600 mt, by subtracting 570 mt for discards. This reduction also applies to the harvest guideline for the Sebastes complex in the northern area, which was reduced from 11,800 mt to 11,200 mt

The two thornyhead species are again managed under separate harvest guidelines in 1996. For shortspine thornyheads north of Point Conception the harvest guideline remains at 1,500 mt, which is 50% above the ABC but below the overfishing level in order to allow greater harvest of longspine thornyheads (both species are usually caught together, but in varying proportions). The longspine harvest guideline remains at 6,000 mt, which is 1,000 mt below its ABC, to help prevent overharvest of shortspines. Separate trip limits require fishers to sort the two species.

The 1996 sablefish ABC and harvest guideline are the same as 1995. As in 1995, anticipated harvest by Washington treaty Indian tribes is 780 mt, 10% of the harvest guideline. This amount was taken "off the top" before any nontreaty allocations were established. All tribal harvest inside and outside the tribes' usual and accustomed fishing area north of Point Chehalis applies to this allocation.

At its March 1996 meeting, the PFMC recommended the final 1996 whiting ABC be set at 265,000 mt, more than double the preliminary recommendation of 123,000 mt. The increase was based on information gathered during the NMFS hydroacoustic survey conducted during the summer of 1995. That survey, which covered the coast with transects every ten nautical miles from the Conception area to Dixon Entrance, generally confirmed results of the 1992 survey. However, ongoing research has cast uncertainty

on the acoustic target strength factor used to convert relative abundance to a total biomass estimate. There is some evidence that the conversion factor used in past years may result in a 42% overestimate of the biomass. Because of this new uncertainty, the PFMC decided to stay with the more conservative exploitation policy (referred to as the "hybrid F, low exploitation rate" strategy), rather than return to the moderate exploitation rate strategy. (The moderate exploitation policy would have resulted in a 1996 ABC of 369,000 mt.) The PFMC also recommended the harvest guideline for U.S. fisheries again be 80% of the coastwide ABC, or 212,000 mt. From this harvest guideline, any tribal entitlement will be subtracted and then 40% will be held in reserve for vessels delivering to shorebased whiting processing plants. The remaining 60% will be available in an open, competitive fishery beginning May 15. This is a one-month season delay from previous years that is expected to help reduce salmon bycatch.

Allocations between limited entry and open access gears are nearly identical to 1995, with the exception that the PFMC recommended that shortspine thornyhead be added to the list of allocated species. Allocation percentages are determined by landings during the 1984-1988 window period by vessels that did not initially receive limited entry permits. Only minor adjustments have been made since 1994 to reflect the resolution of permit appeals.

The limited entry fixed gear sablefish "derby" will begin September 1, three weeks later than the 1995 season. The PFMC expects the season to last five days, with a "mop-up" fishery to begin about October 1.

2) Limited Entry Trip Limits for 1996

For the limited entry fishery, all monthly cumulative vessel limits were increased to two-month limits, 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 either of the two months, so long as the total for the two months does not exceed the specified limit. This approach was recommended by the PFMC's GAP to reduce discards and as a way to reduce the number of times vessels may be cited for inadvertently exceeding the specified limits. Seafood processor representatives stressed the need to maintain steady supplies throughout the month, and expressed concern that without some limit on the amount landed each month, vessels might tend to land the entire two-month limit early in the first month and move to other fisheries, causing temporary market gluts followed by periods of no fish. The two-month limits do not apply to limits that are specified "per day" or "per trip," nor do they apply to the open access fishery. The specified two-month periods are January-February, March-April, May-June, July-August, September-October, and November-December.

a. Sebastes complex north of Cape Lookout, Oregon (4220'15"N latitude): 70,000 lb per two months, including not more than 32,000 lb of yellowtail rockfish and 18,000 lb of canary rockfish. Between Cape Lookout and Cape Mendocino, California (4030'N latitude), the Sebastes complex limit is 100,000 lb, including

not more than 70,000 lb of yellowtail rockfish and 18,000 pounds of canary rockfish. South of Cape Mendocino, the Sebastes complex limit is 200,000 lb, including not more than 18,000 lb of canary rockfish and 60,000 lb of bocaccio.

b. Widow rockfish: 70,000 lb per two months.

c. POP: 10,000 lb per two months.

d. DTS complex: cumulative 70,000 lb north of Cape Mendocino and 100,000 lb south of Cape Mendocino, with not more than 12,000 lb of sablefish, and not more than 20,000 lb of thornyheads, of which not more than 4,000 lb may be shortspines. Not more than 500 lb of sablefish per trip may be smaller than 22 inches.

The PFMC noted that the proposed shortspine thornyhead and sablefish trip limits are unlikely to slow landings enough for a year-round fishery, and a closure during November-December, and possibly earlier, in 1996 is likely.

e. Lingcod: 40,000 lb per two months, none smaller than 22 inches, except trawl vessels may land up to 100 lb of small lingcod per trip.

f. Pacific whiting: trip limit of 10,000 lb taken before or after the regular season, or inside the 100 fathom contour in the Eureka area (4030' - 4300'N latitude).

g. Non-trawl sablefish: the daily limit remains at 300 lb north of 36N latitude and 350 lb south of 36N latitude outside the derby and mop-up fisheries. The limit of sablefish smaller than 22 inches in length that may be landed during the derby and mop-up fisheries was revised slightly. In previous years the limit was the greater of 1,500 lb or 3% of the weight of all sablefish on board. For 1996, the limit on small fish is the greater of 1,500 lb or 3% of the weight of all sablefish over 22 inches in length. This change is intended to simplify calculation and application of the 3% limit.

3) Open Access Trip Limits for 1996

Trip limits for the open access fishery are identical to 1995 with a few exceptions. First, the PFMC added shortspine thornyhead to the list of species allocated between open access and limited entry fisheries. The open access allocation is four mt for the two thornyhead species combined north of Point Conception, California. To achieve this allocation, the PFMC recommended imposition of a coastwide 50-lb daily trip limit, no more than one landing per day. The PFMC also clarified that vessels will not be allowed to land any groundfish caught with shrimp or prawn pots (traps) that do not meet the definition of legal groundfish gear. Shrimp and prawn trawl trip limits are the same as in 1995. Nontrawl sablefish landings are again limited to 300 lb per day, no more than one trip per day, north of 36°N latitude and 350 pounds south of 36°N latitude. During the mop-up fishery, if any, open access nontrawl vessels will still be

subject to the daily limits but may not exceed the cumulative limit specified for the limited entry mop-up fishery.

At its April meeting, the PFMC recommended landings of thornyheads taken by open access vessels Point Conception be prohibited for the remainder of the year, since over four times the allocation had already been landed. In addition, the pace of the open access sablefish fishery north of the Conception area continued at a high rate, so the PFMC recommended a monthly cumulative limit of 2,100 lb, in addition to the daily limit. These two changes were expected to take effect beginning May 3.

MINUTES OF THE THIRTY EIGHTH ANNUAL MEETING OF THE CANADA - U.S. GROUNDFISH COMMITTEE

I. Call to Order

Devona Adams (Canada) called the conference call to order at 10:00 a.m. on July 22, 1996.

Technical subcommittee members and others present:

Devona Adams, Department of Fisheries and Oceans, Canada
David Hanson, Pacific States Marine Fisheries Commission
Rick Methot, National Marine Fisheries Service
Bill Barss, Oregon Department of Fish and Wildlife
Stephen Phillips, Pacific States Marine Fisheries Commission

II. Appointment of Secretary

Mr. Stephen Phillips of the Pacific States Marine Fisheries Commission, Gladstone, Oregon, was appointed secretary for the meeting.

III. Approval of Agenda

The agenda was approved (Appendix A).

IV. Adoption of Minutes of May 1995 Meeting

Minutes of the Thirty Seventh Annual Meeting (1995) were adopted as submitted.

V. Progress on 1995 Recommendations of the Parent Committee to Itself

1. **Nearshore Rockfish.** Information on historic and current management strategies was collected for nearshore rockfish from state agencies and Canada. Information collected included biological features such as longevity, low rates of mixing, habitat specificity, etc. Further action on developing strategies for nearshore rockfish management was sent back to the TSC for further discussion and action.

2. **Hake (U.S.-Canada Talks).** The two countries have established a working group to try and resolve the issue. Two meetings have been held, with the next meeting scheduled for the fall of 1996. Rick Methot, Sandy McFarlane, and Mark Saunders have been participating in these discussions. Mark Saunders updated the status of this group at this year's TSC meeting and will continue to provide feedback in the future.

3. **Individual Fishing Quotas.** Alaska and British Columbia enforcement agencies met in the Spring of 1996 and are working together to address concerns.

4. **California Participation.** A letter was sent requesting participation in the 1996 meeting.

VI. TSC to the Parent Committee

1. During the 1990s substantial quantities of mackerel and sardine have been encountered in fisheries from California to southern Canadian waters. The TSC asks that the Parent Committee request from each agency a submission to the May 1997 TSC meeting documenting research, stock assessment, and management for Pacific and jack mackerel and sardines.

   The Parent Committee will send a joint letter to the appropriate U.S. (state, federal), and Canadian fisheries agencies requesting information on mackerel and sardines.

2. The TSC requests that the Parent Committee resolve the role and sponsorship of the Washington - British Columbia Trans-boundary Committee and report back to TSC on how they relate to our terms of reference.

   The Parent Committee was unclear as to the role of the Trans-boundary Committee. Rick Methot was directed to look into this matter.

3. In 1995 the Parent Committee received from the TSC details of historic and current management strategies for nearshore rockfishes. Based on these findings, the Parent Committee determined that a management workshop was not warranted in 1995. The TSC feels that there is still a need to move quickly on developing assessment and management techniques for nearshore rockfish. The TSC recommends that the Parent Committee assign individuals to pursue support for separate catch monitoring, research, and management initiatives for nearshore rockfish.

   The Parent Committee is concerned that the TSC/PC needs to set a business plan/timeline for addressing nearshore rockfish concerns. TSC states there is a need to "move quickly" but progress has been limited since talks were initiated in 1992.

   The Parent Committee assigned Stephen Phillips to research what dollars are available for nearshore rockfish catch monitoring, research, and management initiatives for nearshore rockfishes.

If no funds are found by January 1, 1996, the Parent Committee will reconvene to discuss further action on this topic.

4. The TSC wants to express to the Parent Committee their frustration that the Proceedings of the International Symposium on the Biology and Management of Sablefish, which was held in April 1993, have still not been published. We recognize that many factors have contributed to this situation. We fear that the failure to have published these proceedings in a timely manner will hinder our ability to successfully sponsor future symposia. We request that the Parent Committee bring to bear what pressures they can to ensure that the proceedings are published in 1996.

   If the proceedings are not completed by early September, the Parent Committee will send a joint letter to the National Marine Fisheries Service requesting prompt resolution of this matter.

5. The TSC notes that the combined Canadian - U.S. harvest of hake continues to exceed the adopted yield option and recommends to the Parent Committee that the bilateral negotiations be encouraged to arrive at a quick response.

   The Parent Committee noted that there will be a Fall 1996 meeting of the Pacific whiting committee. The Parent Committee will seek establishment of a working relationship between this committee, the TSC, and the Parent Committee.

VII. Recommendations from Parent Committee to TSC

1. The 1993 Report of the Technical Subcommittee of the U.S. Canada/U.S. Groundfish Committee has yet to be completed by the State of California. The Parent Committee requests that the TSC designate another TSC member to complete this task for the 1997 meeting.

2. The Parent Committee requests that the TSC improve its communication among its members, especially in regards to electronic distribution.

3. The Parent Committee requests that the TSC return to the meeting schedule that was agreed to by Bruce Turris (Canada) and David Hanson in 1994.

4. The Parent Committee requests that the TSC be prepared to provide alternative means, if Saltonstall-Kennedy requested funding fails, for addressing nearshore rockfish concerns, taking into account their limited manpower. Innovative solutions must be sought and efforts must continue on sharing of nearshore rockfish information between TSC member organizations. Rick Methot noted that nearshore rockfish are not a "trans-boundary" problem but are species grouping that is of mutual concern to Canadian and U.S. agencies.

5. The 1997 meeting of the TSC was originally scheduled to take place in Sitka, Alaska, on May 7. However, the Parent Committee recommended that an alternate site be considered by the TSC to reduce costs and ensure broader participation. The TSC should agree on an alternate site no later than October 31, 1996.

VIII. Recommendations from Parent Committee to Itself

1. Follow-up on the Saltonstall Kennedy Nearshore Rockfish proposal is needed.

2. A letter will be written to the State of California thanking them for participating in the 1996 meeting and inviting them to the 1997 meeting.

3. A commitment for meeting schedule and attendance is needed early in 1997.

IX. Other Business

The Parent Committee directed the TSC to review the yellowtail rockfish assessment done by Jack Taggart of the Washington Department of Fish and Wildlife.

The Parent Committee encouraged discussion on yellowtail between technical staff from the U.S. and Canada.

X. 1997 Meeting Location

1. 1997 meeting location and dates are still to be determined.

2. Mr. Bill Barss of the Oregon Department of Fish and Wildlife will replace Ms. Tory O'Connell as chair at the 1997 meeting.

APPENDIX A

THIRTY EIGHTH ANNUAL MEETING OF THE CANADA - U.S. GROUNDFISH COMMITTEE

CONFERENCE CALL

JULY 22, 1996

AGENDA

I. Call to order.

II. Appointment of secretary.

III. Approval of agenda.

IV. Adoption of minutes of the May 1995 meeting.

V. Progress on 1995 recommendations of the committee to itself.

VI. 1996 recommendations from the TSC to the parent committee.

VII. Recommendations from the parent committee to the TSC.

VIII. Recommendations from the parent committee to itself.

IX. Other business.