

REPORT OF THE
TECHNICAL SUBCOMMITTEE OF THE
CANADA-UNITED STATES GROUND FISH COMMITTEE

Appointed by
The Second Conference on Coordination
of Fisheries Regulations Between
Canada and the United States

24th Annual Meeting
June 15-17, 1983
Palo Alto, California

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 United States

Date: June 15-17, 1983

Place: Palo Alto, California

Participants:

Canada

Department of Fisheries and Oceans

*Mr. G.A. McFarlane

*Dr. A. Tyler

UNITED STATES

National Marine Fisheries Service

*Mr. T. Dark

Dr. Loh L. Low

Alaska Department of Fish and Game

*Mr. B. Bracken

*Mr. P. Rigby

Washington Department of Fisheries

*Mr. J. Tagart

Oregon Department of Fish and Wildlife

*Mr. R. Demory

*Mr. J. Robinson

California Department of Fish and Game

Mr. J. Hardwick

Mr. F. Henry

*Mr. T. Jow

Mr. S. Schultz

Pacific Marine Fisheries Commission

Dr. J. Harville

Mr. L. Six

Dr. C. Woelke

North Pacific Fishery Management Council

Mr. J. Povolny

International Pacific Halibut Commission

Mr. S. Hoag

* TSC members

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I. CALL TO ORDER

The 24th Annual Meeting of the Technical Subcommittee of the Canada-United States Groundfish Committee was called to order at 0900 June 15, 1983, by Chairman Phil Rigby under instructions set forth by the Parent Committee in 1959.

II. APPOINTMENT OF SECRETARY

Mr. T. Jow, California Department of Fish and Game, was appointed secretary for the meeting.

III. APPROVAL OF AGENDA

The agenda circulated by Chairman P. Rigby was modified and approved (Appendix A). To accommodate Drs. J. Harville and C. Woelke, the discussions on several topics was shifted to June 15, 1983. This report will contain topics in agenda order.

IV. INTRODUCTIONS

Introductions were completed prior to the meeting.

V. TERMS OF REFERENCE

No changes in terms of reference have occurred since 1981.

The terms of reference are:

- a. exchange information on the status of groundfish stocks of mutual concern and to coordinate, whenever possible, desirable programs of research;

- b. recommend the continuance and further development of research programs having potential value as scientific basis for future management of the groundfish fishing;
- c. review the scientific and technical impacts of existing or proposed management strategies and their component regulations relevant to conservation of stocks or other scientific and technical impacts of existing or proposed management strategies and their component regulations relevant to conservation of stocks or other scientific aspects of groundfish conservation and management of mutual interest;
- d. transmit approved recommendations and appropriate documentation to appropriate sectors of Canadian and U.S. governments and encourage implementation of those recommendations.

VI. REVIEW OF AGENCY GROUND FISH PROGRAMS

A. Canada

Groundfish research at the Pacific Biological Station provides the major basis for stock management in Canada's Pacific zone of extended fisheries jurisdiction. Assessment studies formed a large percentage of research activities although in 1982; less emphasis was placed on field surveys and more on analytical studies. Additional emphasis was also placed on studies designed to validate ageing techniques, because of their importance to population analysis. The inclusion of a fisheries ecology unit in the groundfish research group was also a highlight of 1982.

Flatfishes. A tagging study of rock sole in Areas 5C/D was initiated in 1982. Tagging was concentrated on two spawning aggregations to determine if they constitute different stocks. The majority of fish were also injected with oxytetracycline to produce a mark on bony structures at the time of tagging and assist in validation of ageing techniques. Analysis of current results of Dover sole tagging conducted in 1979 indicates greater dispersion in Areas 5C-E than expected outside these areas. The distribution and abundance of juvenile flatfishes in Hecate Strait was again assessed by trawl survey during 1982. This project produces indices of cohort abundance used in population analyses.

The relevance and adequacy of surplus production models for English and rock soles in Area 5D was examined using two types of sequential (cohort) population models. The influence of unknown discarded quantities of English sole juveniles may be a major determinant in the success of such modelling exercises.

Pacific cod. Field activity during 1982 consisted of a trawl survey of the distribution and abundance of Pacific cod, rock sole and lingcod in Queen Charlotte Sound. While no concentrations of Pacific cod were encountered, useful echosounder surveys of both trawlable and untrawlable areas were completed. The distribution of trawlable bottom may be responsible for the unusual depth distribution of Pacific cod catches from this area. Considerable information on the abiotic environment was also collected on this cruise.

Analytical studies continued to extract detailed landing and age composition statistics necessary to determine the dynamics of this species. Examination of these data suggests that standardization of effort, to account for changes in vessel characteristics, may be a significant factor in the assessment of this species in the Canadian zone. Additional studies conducted during 1981 suggest some degree of synchrony in the occurrence of strong and weak cohorts of Pacific cod across broad geographic regions, and that the abundance of one of its principal prey species (sandlance) also undergoes major fluctuations. Investigations of the validity of ageing methods for Pacific cod continued during 1982.

Sablefish. Analysis of tagging data to determine stock boundaries, migration and growth rates, and exploitation patterns was continued in 1982. While the movement of tagged adults continued to increase with time at liberty, the majority of recoveries have been made in the Canadian zone. Tracking of the strong 1977 cohort, which was tagged as juveniles in inside waters, showed the fish recruiting into offshore areas including a substantial portion into waters off southeastern Alaska. A study to determine size and age-specific fecundity was completed, and analysis is underway. A study of spawning activities and early life stage characteristics was also completed.

The ageing technique used for sablefish has been partially validated with the recovery and preliminary analysis of approximately 400 fish previously injected with oxytetracycline. Development of a model to determine management strategies for this long-lived species was initiated during 1982. In addition, investigators contributed major segments of the joint, comprehensive review of sablefish being produced under the auspices of INPFC.

Pacific hake. Research studies on this species continued to focus primarily on the stock in the inside waters of the Strait of Georgia. These studies included reports on the distribution and abundance of hake during commercial fishing and research cruises during 1979-1981. They indicate that a 10-15,000 mt fishery in this area is feasible. A cooperative fecundity study with the Fisheries Ecology Group was also completed.

The stock of hake fished in the outside waters of Vancouver Island has attracted increasing research effort in recent years, due to its potential for large yields. Canadian scientists worked jointly with United States colleagues in the development of a fishery management model for the eastern Pacific Ocean hake stock. A study documenting the biological differences in the stocks of hake occurring around Vancouver Island was also completed.

Lingcod. In response to increasing concern about exploitation of lingcod stocks in Canadian waters by both commercial and sport fisheries, field studies to assess the impact of these fisheries were initiated in 1982. Studies included tagging approximately 12,000 fish in Areas 48 and 3C for stock delineation and validation of ageing techniques. A preliminary study on age validation was also completed.

Spiny dogfish. Although the abundance of spiny dogfish in the Canadian zone could support a fishery of approximately 10,000 mt, only Areas 4B and 3C have recorded significant landings in recent years. Tagging studies of this species in Areas 3C, and 5C, 5D were continued in 1982. Preliminary results of age validation studies indicate that a mark is laid down in the dorsal spine after inoculation with oxytetracycline, and validation of the ageing technique is anticipated over the next several years.

Rockfishes. Major research projects of the rockfish unit continued to address the problems of management of these long-lived species. A tagging

program initiated in 1980 and incorporating oxytetracycline injections, was completed in 1982. Returns to date have provided the first validation of the ageing techniques used for rockfishes at the Pacific Biological Station. Fish (yellowtail rockfish) recovered after two years at liberty showed that two annular marks were deposited outside the oxytetracycline mark, on both the external and internal surfaces of the otolith.

The majority of rockfish research concentrated on Pacific ocean perch stocks. A multi-variate examination of environmental influences on cohort strength suggested onshore movement of surface waters may be correlated with stronger cohorts in this species. A major project examining the reproductive biology and life history strategy of Pacific ocean perch was also initiated in 1982.

Analytical studies included the formulation of management strategies for shelf and slope rockfishes based on the results of species assemblage analysis and forward simulation of the Goose Island gully stock using results of sequential population analysis.

Analytical methods. The analytical methods unit applied mathematical techniques to solve several problems outside the groundfish program. Included in these were: delineation and analysis of herring stocks using a sequential population model; estimation of herring spawning density; and, analysis of salmon mixture problems in gauntlet fisheries.

Fisheries ecology. The primary activities of this group were the use of quantitative ichthyoplankton surveys to assess hake and pollock spawning biomass in Area 4B, and a general survey of ichthyoplankton off the west coast of Canada during the winter months. This group also conducted fecundity studies of hake and pollock in Area 4B.

Other studies conducted by the groundfish program during 1982 included: a review of fisheries in Area 4B; a review of historical tagging studies of rock sole in the Hecate Strait; and, the initiation of a review of the biology and fisheries for dogfish in the northeast Pacific Ocean.

The commercial fisheries unit continued to provide the program with catch/effort information and biological samples from the groundfish fishery. Percent of landed weight for which interview coverage (thus effort) was

obtained was 82% in total and broken down by gear as follows: trawl-84%; trap-75%; and longline-48%. This unit also continued the domestic vessel observer study of trawl discards and initiated a review of interview sampling using a fishing power mode. Personnel of the sampling unit collected 172 biological samples in 1982.

B. United States

1. National Marine Fisheries Service

Groundfish resource assessment at the Northwest and Alaska Fisheries Center is conducted within two divisions; the Resource Assessment and Conservation Engineering (RACE) Division and the Resource Ecology and Fisheries Management (REFM) Division. These divisions are organized into a number of tasks and subtasks on regional or scientific discipline bases.

RACE Division

MARMAP II: Multispecies, Bering Sea, and N.E. Pacific Task

This task is comprised of three subtasks with regional responsibility for fishery-independent assessments of groundfish resources. The Bering Sea, Gulf of Alaska and Pacific Coast subtasks conducted a number of trawl and trap surveys during 1982-83 to determine the distribution, abundance, and biological features of rockfish, pollock, sablefish, and flounders (Table A). A fourth subtask, Ecological Processes, functions across regions to study population recruitment, dynamics of demersal fish populations, and the structure and function of fish and shellfish communities.

Pelagic Resource Assessment Task. This task provides equipment and expertise in the application of hydroacoustic techniques for the assessment of semi-demersal and pelagic fishery resources throughout the NWAFC's area of responsibility. Survey of pollock resources in the eastern Bering Sea and Gulf of Alaska (Shelik of Strait) were completed in 1982 (Table A).

TABLE A. -- Resource assessment surveys and studies conducted during June, 1982-June 1983

Type of Survey or Study	National Participants	Area	Dates	Objectives
<u>Pacific Coast Subtask</u>				
Sablefish Abundance Indexing	U.S.	California	10/24- 11/18/82	Determine trends in relative abundance, size composition, and migrational behavior
Widow Rockfish Assessment	U.S.	Oregon	3/12-4/6/82	Establish feasibility of assessing abundance using sonar/hydroacoustic
<u>Gulf of Alaska Subtask</u>				
Groundfish Assessment Survey	U.S./ ROK	Central Gulf of Alaska	9/11-10/12/82	Distribution, abundance, stock condition
Pollock Assessment Survey	U.S.	Shelikof Strait	3/3-8/20/83	Groundfish distribution, and ocean temperature fronts
Groundfish Assessment Survey	U.S./ U.S.S.R.	Western Gulf of Alaska	4/12-5/10/83	Feasibility of tagging cod and pollock
Groundfish Assessment Survey	U.S./ U.S.S.R.	Western Gulf & Aleutian Islands	6/11-7/27	Predator/prey relationships
<u>Bering Sea Subtask</u>				
Crab-groundfish	U.S./ Japan	Eastern Bering Sea	June-Oct., 1982	Distribution, abundance, stock condition
Ocean fronts/ Groundfish Distribution	U.S.	Southeastern Bering Sea	Sept., 1982	Groundfish distribution and ocean temperature fronts
Tagging Feasibility Study	U.S.	Southeastern Bering Sea	Sept., 1982	Feasibility of tagging cod and pollock
Marine mammal/ Groundfish	U.S.	Southeastern Bering Sea	Sept., 1982	Predator/prey relationships
Crab/Groundfish Survey	U.S.	Southeastern Bering Sea	Feb., 1982	Winter distribution of groundfish
Food Habits of Eastern Bering Sea Pacific Cod	U.S.	Southeastern Bering Sea	--	Predator/prey relationships
Pollock Distribution	U.S.	Southeastern Bering Sea	--	Distribution in the North Pacific Ocean
Groundfish Surveys	U.S./Japan	Southeastern Bering Sea	--	Results of 1981-82 cooperation surveys
<u>Pelagic Resource Assessment Task</u>				
Pollock Survey	U.S.	Eastern Bering Sea	6/9-8/2/82	Distribution, abundance, target strength, food habits.
Pollock Survey	U.S.	Shelikof Strait	3/1-4/15/83	Distribution, abundance, biological data

Other studies. The Ecological Processes Subtask has no dedicated survey effort, but uses ships of opportunity to gather information for a number of ongoing studies. These projects include: (1) the ecology of juvenile groundfish and recruitment processes in the Gulf of Alaska, 1981-82; (2) studies of multispecies relationships in the western Bering Sea; (3) validation of a numerical simulation model of the population dynamics of walleye pollock in the eastern Bering Sea. (4) patterns in distribution and abundance of juvenile flatfish in the eastern Bering Sea; (5) juvenile distributions and recruitment patterns of four gadid species in the eastern Bering Sea; and (6) analysis of Bering Sea yellowfin sole catch at age data and intercalibration with survey abundance indices.

The West Coast Subtask is compiling a comprehensive report on the Pacific hake resource and fishery using contributed papers from numerous NMFS, WDF, and CDF&O sources, and is also assisting in the coordination of the U.S./Canada cooperative study of Pacific hake parasites.

The Pelagic Resources Assessment Task is pursuing study of acoustic target strength values for several species, documenting HP1000 software, incorporating loran into integration systems, developing portable echo integration systems, and completing descriptions of the van-contained echo system.

REFM Division

Foreign Fisheries Observer Program. The foreign fisheries observer program, besides being designed to monitor the progress of foreign and joint-venture catches, is also run as a sampling program of the demersal fish and shellfish resources. Data are systematically collected to determine age composition, sexual maturity, food composition, and other purposes as the need arises. The data collected resides in data files at the NWAFC Burroughs B7800 computer.

The foreign fisheries observer data files are used for pacing the progress of the foreign and joint-venture fisheries and for assessing the status of stocks. One special study that is in progress is mentioned here. The Division has contracted the University of Washington to evaluate the mathematical and

statistical properties of the foreign fisheries catch data files. The end objective is to design sampling procedures to maximize the level of precision of estimators and to develop optimal techniques of sampling within and between vessels.

Status of Stocks Analysis. REFM Division is primarily responsible for assessing the status of stocks and management strategies for most of the groundfish and shellfish stocks covered by the MFCMA. We provide our technical input to the North Pacific and Pacific Fisheries Management Councils by way of fisheries management plan development and amendments. Some of the stocks covered are Pacific hake off Washington-California, pollock, sablefish, Pacific cod, rockfishes, and flatfishes in the Gulf of Alaska and Bering Sea/Aleutians region.

Resource Ecology and Ecosystem Simulation. This activity, based on ecosystems modeling, attempts to ascertain and predict the consequences of manipulating harvests of particular species based on their interactions with other species in the ecosystem. In the past year, activities included:

- (1) Investigation of the fluctuations of fish stocks, including their causes, magnitudes and periods, and implications of these fluctuations to management.
- (2) The construction of a simplified holistic ecosystem simulation model (SKEBUB) for various rapid applications. This model has been applied to other ecosystems, such as Georges Bank, to assist other NMFS laboratories in their studies.
- (3) Preliminary sensitivity analysis was conducted on a Prognostic Biomass Model (PRIOBUB), the results of which indicated the importance of food and feeding data in these simulations. As a consequence, a new food availability, predator-prey size, and density dependent feeding sub-routing was designed.
- (4) Summarization of all available data on fish food requirements (ration) and feeding habits; and completed a comprehensive study of the food and feeding of Pacific hake.
- (5) All ocean temperature and salinity data for the Bering Sea were summarized and published. Temperature anomalies from 1930 to 1982 in five regions in the Bering Sea were computed.

Age and Growth Studies Program. The Division runs the age and growth studies unit at the NWAFC. In recent years, there has been questions over the proper method and age results of many species, especially POP and sablefish. The questions generated have led the Division to focus some of its research efforts on age determination methodology. In this regard, a study has been initiated to age four age structures from the same fish: otoliths, scales, operculum, and fin rays. Four species have been selected for study: pollock, sablefish, Pacific cod, and yellowfin sole. Otoliths, scales, and operculum are aged using the surface reading technique. Fin rays are sectioned for reading. In addition, otoliths receive break-and-burn and sectioned readings as well.

In production reading, the Division has adopted a systematic within reader and between reader tests of all samples read. In general, 20% of the samples are routinely re-aged to obtain a measure of reading errors.

Fishery Economics Program. The Division also includes a fishery economics program at the NWAFC in support of economic analysis of FPM's. With respect to groundfish, economists at the Center have been involved in:

- (1) the development of bioeconomic models for Bering Sea pollock and Gulf of Alaska sablefish fisheries.
- (2) the evaluation of the impacts of the incidental catch of prohibited species and methods of reducing incidental catch;
- (3) the development of a fleet performance evaluation system;
- (4) research intended to increase our understanding of the adaptive behavior of fishermen to a stochastic environment; and
- (5) the preparation of a report on the Pacific hake fishery off California, Oregon, and Washington.

Other Studies and Workshops

Stock Reduction Analysis. Work was continued on stock reduction analysis (SRA). The principal advantages of SRA are that it is a simple method that

does not require age data and yet is flexible in allowing the incorporation of ancillary information such as trawl or hydroacoustic survey estimates of biomass, and results from the analysis of CPUE and biomass estimates from virtual population analysis. A weakness with SRA is that the model, as it was formulated, assumed constant recruitment. More recent work generalized the SRA mode to allow variable recruitment. An SRA model was developed that separates growth from the recruitment of new fish. The critical assumption of an initial virgin biomass was examined and clarified, although the problem was not totally resolved. The new SRA models have been applied to POP stocks in the Gulf of Alaska and Pacific herring stocks in the eastern Bering Sea.

Walleye Pollock Ecosystem Workshop. A workshop was held to initiate work on the identification and resolution of problems involving walleye pollock in the Eastern Bering Sea. The main objectives of the workshop were to:

- (1) identify and document significant ecosystem orientated scientific and/or management problems;
- (2) identify gaps in conceptual understanding and existing data;
- (3) enhance communication between individuals and groups engaged in pollock ecosystem research; and
- (4) develop a conceptual model of the biophysical and fisheries systems in order to focus future discussion and cooperative research efforts.

The workshop at the Northwest and Alaska Fisheries Center on May 2-4, 1983 was attended by over 60 participants from Washington, Alaska, and Japan. Expertise embodied in this group ranged from physical oceanography and the biology and distribution of plankton, fish and marine mammals to fisheries and economics. Most participants were research scientists, however, a number of managers and policy makers also attended. Proceedings from the meeting are being prepared and will be available about October 1.

2. Alaska

The Alaska Department of Fish and Game (ADF&G) presently has three groundfish biologists who are responsible for research and management programs

in the Westward (western Gulf and Bering Sea), Central (Cook Inlet and Prince William Sound), and Southeastern Regions. They are stationed at Kodiak, Homer, and Petersburg, respectively. A coordinator position in Juneau is responsible for interaction with other agencies and development of the Department's statewide groundfish program. A biometrician also stationed in Juneau provides analytical support.

The ADF&G groundfish program can be divided into six tasks: catch reporting, observer-port sampling, resource assessment, regulation development, management action, and logbook collection and analysis. In general, research and management are conducted on a regional basis. The groundfish staff is continuing the standardization of sampling methods, and the regional staffs cooperate on statewide projects.

Activities within the Southeastern Region groundfish program include: dockside and onboard catch sampling; skipper interview and logbook collection; sablefish tagging; information disseminations in-season management of flounder and sablefish fisheries; and regulation development, including cooperation with the North Pacific Fisheries Management Council (NPFMC) and its Gulf of Alaska groundfish planning team. Also, annual reports and proposals for regulation changes are presented to the Alaska Board of Fisheries and its advisory committees.

Catch data (fish tickets) editing and batching is done in Petersburg. In-season catch logs are maintained for the sablefish and winter trawl fisheries. During the next fiscal year, dockside sampling will be continued with samplers in major ports to sample sablefish and rockfish landings. The logbook program, presently limited to the few vessels of the inside flounder trawl fishery will be expanded statewide to include all trawl and longline vessels if supplemental NPFMC funding is made available. No additional sablefish tagging was conducted in 1982; however, returns from previous years continue and numbered over 500 by the end of the year. The tagging program, hopefully expanded to new sites, will continue to provide insight into juvenile migrations and the contributions of nearshore rearing areas to the commercial

fisheries besides contributing basic biological data, e.g., growth, age class strength, and food habits. Fecundity studies on flounder, sablefish, and rockfish were initiated in 1982 and are continuing. A contracted assessment of the nearshore rockfish complex during 1981 and 1982 was completed with a final report published in December of 1982. Management activities included onboard observation of the winter trawl fisheries and close monitoring of fishery performance. Closures were made in the flounder trawl and sablefish longline-pot fisheries.

The Central Region groundfish program, now in its third year of operation, has continued to collect baseline data for groundfish species of present and potential commercial importance. Groundfish data are collected when possible on ADF&G shellfish pot and trawl surveys and on spring, summer, and fall rockfish surveys in the outer and eastern districts of Lower Cook Inlet. Commercial catch sampling has in the past been limited to the Cook Inlet area; increased bottomfish activity in the Prince William Sound area will necessitate catch sampling in Cordova and possibly other ports in Prince William Sound.

Activities of the Westward Region groundfish program also include: catch data collection; information dissemination; regulation development; resource assessment; and as a primary activity, the domestic trawl observer program. The domestic observer program has in the past sampled trawl vessels from southeastern Alaska to the Bering Sea with the greatest sampling effort centralized near Kodiak. Catch per unit of effort, species composition, prohibited species incidence, and other biological data are obtained. Because of the importance of assessing crab and halibut incidence within the expanding groundfish fishery and because of the program's value in obtaining biological data prior to sorting and discard on the grounds, the Department intends to continue the observer program either with State and/or Federal funds. However, because of the intensive labor requirements and lower funding levels the observer program has been reduced with most catch sampling occurring on shore.

As part of the regional assessment program, a trawl survey for Tanner crab and groundfish in waters south of the Alaska Peninsula has been conducted in July since 1981. This survey will again be conducted in 1983.

The regional groundfish biologist assists the Bering Sea groundfish planning team of the NPFMC. Management action in the Westward Region has been limited to fishery observation. No closures have been needed as yet. Dockside sampling was initiated in 1981 to obtain better AWL information, and catch data is edited and compiled by hand on a monthly basis in Kodiak for the "soft" data catch reporting system.

The headquarters groundfish section has been primarily involved in the coordination of Federal and State research and management activities. The Groundfish Research Coordinator is a member of both NPFMC groundfish management plan teams - Gulf of Alaska and Bering Sea. With regard to issues associated with the NPFMC, sablefish and pollock management in the Gulf of Alaska, the ecosystem management approach for the Bering Sea, and collection of data from the domestic fleet have been special concerns. The headquarters staff has worked in conjunction with the regional staff to provide the Council input on these issues. During 1982 the Department cooperated with the Pacific Marine Fisheries Commission (PMFC) and NMFS in the development of a coastwide joint venture trawl logbook to be distributed in 1983.

Major future objectives for the ADF&G groundfish program are to develop a standardized catch monitoring program and a statewide computerized data base.

3. Washington

The Washington Department of Fisheries Marine Fish Program is responsible for research, management, and enhancement of non-anadromous finfish resources. Three divisions are actively involved with groundfish.

Extended Jurisdiction Division. The Extended Jurisdiction Division handles all issues requiring interstate, regional, federal or international cooperation for management, conservation, or protection of groundfish resources in coastal waters. Division responsibilities include membership on the Groundfish Management Team of the Pacific Fishery Management Council and the Scientific and Statistical Committee of the North Pacific Fishery Management Council; all multijurisdictional issues concerning groundfish; and stock assessment and management of groundfish stocks in state coastal waters.

(0-3miles) and the Fisheries Conservation Zone (3-200 miles) adjacent to Washington. Major accomplishments during the past year have been implementation of the Pacific Coast Groundfish Plan in September, 1982 and subsequent management of groundfish stocks under the guidelines of that plan; publication of a report on the status of yellowtail rockfish stocks in the INPFC U.S. Vancouver and Columbia areas; continuation of the black rockfish tagging program; and implementation of a "Washington-Oregon-California Trawl Logbook" providing a single logbook for trawl fishermen of the three coastal states.

Groundfish Management Division. The responsibilities of the Groundfish Management Division include monitoring, research, and management of Puget Sound groundfish resources and their fisheries. General monitoring work includes collection of biological samples of landings from several commercial and recreational gears. Fishery data are also collected from the trawl (Trawl Interview System), set net, troll, handline jig, set line, beach seine, and pot fisheries, as well as the recreational charter boat fleets. The Division provides supervision for the state portion of the National Recreational Fisheries Statistical Survey.

Implementation of the Groundfish Management Plan for Washington's Inside Waters began during the fall of 1982, when several changes in commercial fishing regulations were made, and continued through the next spring when new sport regulations were promulgated. Features of the Plan included division of the inside waters into six management regions, with guidelines for the harvest strategy of resources unique to each region. In general, lingcod and rockfish will be managed with a recreational strategy with little directed commercial fishing. Pacific hake, spiny dogfish, Pacific cod, walleye pollock, flatfishes, and surfperches will be managed under a commercial fishing strategy. Commercial fishery opening and closing dates were synchronized, new sport bag limits were established, and the lingcod moratorium area of inner Puget Sound was opened for a short experimental season.

Several areas of work are nearing completion or are ongoing. These include: a study to determine catch and effort by SCUBA spearfishmen in Puget Sound; a survey of angler motivations and preferences; an extensive monitoring

and logbook program for hand line jig and bottom-fish troll gears; evaluation of the utilization of artificial reefs; evaluation of opening the sport lingcod fishery in inner Puget Sound; evaluation of the role of sport bag limits; conversion of all biological sample data to a new, more readily retrievable format; development of pictorial maturity criteria for coastal rockfishes, lingcod, starry flounder, and English sole, management of the rapidly developing food fishery for whiting in Puget Sound; and completion of the groundfish portion of a comprehensive strategic plan for Washington's foodfish and shellfish resources.

Technical Services Division. Reorganization within the Marine Fish Program resulted in the transfer of the groundfish age reading project and the fishing pier/artificial reef research and development studies into the Technical Services Division. In addition to these projects the responsibilities of the division include annual hydroacoustic surveys to assess herring abundance throughout Puget Sound and routine processing of the Trawl Interview data. Major accomplishments over the past year include: completion of the biological data storage, retrieval and processing systems; completion of the software development and utilization of microcomputer with the hydroacoustic echo integrator, which has allowed infield estimates of fish standing stock and greatly increased the number of transects and sampling stations occupied during a normal research cruise; and coordination of a variety of statistical requests to fill intra-agency, interagency and general citizenry needs.

A. Oregon

The Marine Region staff and its functions were much the same as in 1981. Mr. Clayton Creech of Oregon State University was contracted as a programmer-consultant to modify the Cyber trawl data processing system.

Major emphasis of 1982 activities was on monitoring of the fishery, particularly the trawl fishery. Widow rockfish, canary rockfish, rockfish species composition and Dover sole were the primary recipients of detailed attention. The number of biological samples and rockfish species composition samples obtained in 1982 was 675. This was nearly double the sampling level in 1981. Most of the increase was due to increased species composition sampling.

Commitments to the Pacific Fishery Management Council continued to occupy much staff time, particularly in preparing trip analysis for various groundfish species, especially rockfish and sablefish. Preparation of status of stock reports for canary rockfish and Dover sole also received substantial effort.

A short term task was undertaken to obtain data on discard of Pacific ocean perch in the directed Dover sole fishery. A total of 12 observer trips were made from February to mid-July.

B. California

Groundfish research and management activities provide the base for management recommendations for the various fisheries. The Department of Fish and Game's groundfish work is performed by the Marine Resources Region, Marine Resources Branch, and the Planning Branch.

The Marine Resources Region conducts fishery monitoring and assessments of commercial and recreational groundfish fisheries. A sampling program provides age, size, sex, and species composition for assessments. In 1982, at major ports of landing, 896 samples were obtained. Logbook data were collected and processed for trawl, pot, and commercial passenger fishing vessels (CPFV).

Marine Resources Branch has two federal-aid (Dingell-Johnson) projects based in southern and central California. The southern California project is studying the commercial gillnet fishery, and its impact upon fish utilized by the recreational fishery. The central California project is carrying out studies of the biology, distribution, and migrations of important recreational species including rockfish and lingcod.

Another project of the Branch is the study of the central California gillnet fishery. Rockfish, lingcod, and California halibut are groundfish components of this fishery. Information is sought to provide management alternatives to mitigate the catch of non-target species such as marine mammals and sea birds.

Planning branch processes groundfish data, provides systems analysis and design, and provides biometrical assistance. A new trawler receipt design resulted in printing of new ticket books that will be used with plastic card imprinters. The use of the new tickets will speed up data processing.

TABLE 1. Trawl Landings (mt) from the Northeastern Pacific Ocean by Canadian and United States Vessels in 1981 and 1982, and Mean for 1972 to 1981. (Joint Venture Catches Are Excluded.)

Species	1981			1982			1972-1981					
	B.C.	WA	OR	CA	AK	Total	B.C.	WA	OR	CA	AK	Total
English sole	1,500	370	729	1,689	-	4,788	563	855	995	1,440	-	3,853
Rock sole	1,060	141	10	3	-	1,214	745	107	30	13	-	895
Petrale sole	291	356	884	800	-	2,331	367	329	1,271	778	-	2,745
Dover sole	1,246	1,930	5,232	9,219	-	17,627	914	2,710	8,050	9,967	-	21,641
Rex sole	190	153	610	782	-	1,735	75	230	831	661	-	1,797
Starry flounder	198	720	400	246	100	1,664	168	684	218	164	-	1,234
Arrowtooth flounder	946	432	587	48	3	2,016	526	1,555	709	48	-	2,968
Other flatfish	180	178	484	636	73	1,551	218	247	642	772	130	1,879
Pacific cod	6,677	9,954	46	-	7,354	24,031	4,792	11,087	116	-	17,164	33,159
Lingcod	1,729	811	906	1,176	-	4,622	2,870	711	1,355	1,192	123	6,128
Sablefish	234	570	1,303	3,572	6	5,679	246	1,738	2,943	5,421	2,284	10,471
Pacific hake	5,692	936	162	52	-	6,842	2,826	3,312	1	1,021	18	7,160
Pollock	1,252	941	-	-	558	2,751	924	160	-	193	125	3,368
Rockfish	9,952	14,475	23,580	16,512	8	64,167	10,173	13,151	20,165	-	-	65,160
Miscellaneous species	254	165	192	280	124	881	140	160	49	-	-	667
Dogfish	638	932	5	-	-	1,575	1,719	1,201	-	-	-	2,920
Animal food	42	814	-	-	-	856	66	1,028	-	-	-	1,094
Reduction	303	2,726	-	-	-	3,029	390	2,242	-	-	-	2,632
Total	32,034	37,104	35,134	35,015	8,226	147,513	27,722	41,507	37,375	43,323	19,844	169,771
Percent of Total	21.7	25.2	23.8	23.7	5.6		16	24	22	26	12	
Total hours	33,706	65,511	68,297	-	-		34,449	70,147	94,997			

1) Alaska data not included

TABLE 2. Landings (mt) of Major Rockfish Species Taken by Canadian and United States Trawlers in 1982.

<u>Species</u>	<u>BC</u>	<u>WA</u>	<u>OR</u>	<u>CA</u>	<u>1/</u>	<u>AK</u>	<u>Total</u>
Bocaccio	79	46	563				
Canary	709	408	3,791				
Darkblotched	18	43	910				
Pacific Ocean Perch	5,687	301	543		25		
Redbanded	103	9	45				
Redstripe	63	118	1,063				
Silvergray	1,019	73	138				
Widow	64	6,030	9,263		10,269		
Yellowmouth	1,029	4	213				
Yellowtail	475	5,713	2,154				
Other	927	560	1,481		11,359	18	
Total	10,173	13,297	20,164		21,653	18	

1/ Except for Pacific ocean perch and widow rockfish, catch composition is unavailable for this report.

VII. REVIEW OF NORTHEAST PACIFIC GROUND FISH FISHERIES

A. Canada - United States Fisheries

1. Commercial Fisheries

Canadian and United States commercial fishermen landed 196,788 mt of ground fish in 1982, a 17% increase over the 168,298 mt 1981 landings. Trawlers landed 169,770 mt, 86% of total landings. Notable increases occurred for Pacific cod, Dover sole, lingcod, and sablefish. Pacific cod landings in 1982 increased significantly because of increased catches in Alaska. The major species in the trawl fishery were rockfish, Dover sole, Pacific cod, and sablefish (Table 1).

Rockfish continued as a major part of trawler landings. The major species of rockfish in the coastal landings were widow rockfish, yellowtail, canary, Pacific ocean perch, and bocaccio (Table 2).

Other gear vessels landed 27,017 mt of ground fish. Landings by pot vessels were 10,031 mt and longliners landed 11,296 mt (Table 3). Sablefish was the major species landed by these vessels.

a. British Columbia

Canadian landings of groundfish (excluding halibut and catches from handline/troll gear) in 1982 were 32,414 mt. Even in consideration of past performance of handline/troll gear, this represents a decrease of approximately 10% from 1981 landings. Trawlers landed 27,721 mt, 13% less than in 1981 but 10% above the 1972-1981 mean. The major species in the trawl landings were Pacific ocean perch (21%), Pacific cod (17%), other rockfishes (16%), lingcod (10%), and Pacific hake (10%). Principal areas of trawl production were 5B (20%), 3C (19%), 4B (18%), and 5D (16%).

Canadian landings of groundfish caught by gear other than trawl in 1982 totaled 4,693 mt (Table 5). Trap gear accounted for 3507 mt (99% sablefish); longline 1,186 mt (73% dogfish); and shrimp trawl 0.2 mt. Major areas of production were 5E (23%), 5B (22%), 4B (19%), and 3D (14%).

b. Alaska

Groundfish landings in Alaska approximated 23,045 mt in 1982, representing a 100% increase over the 1981 landings of 11,300 mt. Trawl landings increased by 140% between 1981 and 1982 rising from 8,200 mt to 19,845 mt. The trawl fishery accounted for approximately 86% of the total Alaskan groundfish landings in 1982. The principal species landed was Pacific cod, the majority of which came from the developing shore-based fishery in the Bering Sea.

Alaskan non-trawl landings totaled 3,200 mt in 1982, 3% above the 1981 landings of 3,100 mt. The longline fishery was the primary non-trawl gear with sablefish the principal target species of the fishery. The total sablefish catch in 1982 was 2,900 mt, a 13% gain over the 1981 catch of 2,550 mt. The 1982 rockfish catch, which is also primarily a longline fishery, was 270 mt, an increase of 3% over the 260 mt catch in 1981.

c. Washington

Washington's commercial groundfish landings totaled 47,735 mt in 1982, a 15% increase over 1981 landings of 41,588 mt. Trawl landings were 41,507 mt, or 87% of the total groundfish landings and represented a 12% increase over 1981 landings of 37,104 mt. Trawl effort increased 7% from 65,511 hours in 1981 to 70,147 hours in 1982.

Washington's trawl caught landings of flatfish were 6,717 mt in 1982 compared to 4,780 mt in 1981 a 41% increase. Dover sole and arrowtooth flounder landings increased significantly from 1,930 and 432 mt, respectively, in 1981 to 2,712 and 1,555 mt in 1982. Arrowtooth flounder replaced English sole as the second most important flatfish species in Washington's trawl landings.

Landings of trawl caught roundfish increased 29% from 13,212 mt in 1981 to 17,008 mt in 1982. This large jump in landings was primarily a result of increased landings of Pacific hake as food fish from Puget Sound fishing grounds and continued increases in the landings of Pacific cod from Alaskan fishing grounds.

Rockfish landings declined 9% from 14,475 mt in 1981 to 13,151 mt in 1982. Widow rockfish remained the principal component of the catch with 45% of the rockfish landings; yellowtail rockfish followed with 43% of the landings.

Washington's non-trawl landings, including halibut, were 6,228 mt in 1982. Non-trawl landings, excluding halibut were 4,416 mt in 1982 compared with 4,417 mt in 1981. Among all non-trawl gears sablefish comprised 40% of the landings, halibut 29%, dogfish 13%, rockfish 9% and other species 8%.

d. Oregon

Oregon commercial groundfish landed catch in 1982 was 40,898 mt by all gear types. This was a 8% increase over the previous record landings of 37,740 mt in 1981. As in previous years the trawl fishery accounted for most of the accounted for most of the landing, 37,375 mt or 91% of the commercial landed catch. Rockfish was the most important species group in the trawl fishery, comprising 54% of the landing, 20,163 mt. Species of note were widow rockfish at 9,263 mt; canary rockfish, 3,791 mt; and yellowtail rockfish 2,154 mt. Landed catch of widow rockfish declined because of reduced effort, regulatory action, and declining abundance in the Oregon-Washington area.

Trawl landing of flatfish totaled 12,747 mt. Dover sole was the principal species and comprised 8,050 mt, a record. With the exception of starry flounder, landed catch of all important flatfish species increased over 1981, particularly petrale sole which increased by 44%.

Landed catch by other commercial gear types was 3,523 mt, of which pot and longline gear and shrimp trawl catches of groundfish were most important. Sablefish and rockfish were the principle species in these gears, except sablefish which occurs less in shrimp trawls.

e. California

The 1982 California groundfish landings of 52,696 mt was a continuation of the trend of increasing landings. The 1982 total was a 26% increase over the 41,913 mt 1981 landings. Trawlers landed 82% of the total. Rockfish, Dover sole, and sablefish were the most important trawl caught species. Widow rockfish, caught mainly by midwater trawlers was the most important single species. Total widow rockfish landings in 1982 were 10,270 mt; areas 1B and 1C were the leading catch areas. Dover sole landings increased 8% from 9,219 mt in 1981 to 9,970 mt in 1982. Trawl caught sablefish increased 72% from 2,572 mt in 1981 to 4,421 mt in 1982.

Groundfish landings taken by pot, longline, gillnets, and miscellaneous gears totaled 9,373 mt in 1982; pot fishermen landed 37% and line fishermen landed 33% of this total. The leading species of the non-trawl gear catch was sablefish.

f. International Pacific Halibut Commission

The total commercial catch in 1982 was 28.7 million pounds, 3.0 million pounds more than the 1981 catch of 25.7 million pounds. Canadian vessels took 19% of the catch, down slightly from a 22% share in 1981, and United States vessels took 81%. Most of the increase in 1982 resulted from increased catch limits in Regulatory Areas 3 and 4, both of which are wholly within United States waters off Alaska.

The catch in Area 2A, the waters off California, Oregon, and Washington was 211,000 pounds, slightly above the 200,000 pound catch limit. Most of the catch from this area, which encompasses the southernmost geographical limits for Pacific halibut is taken by small resident setliners and trollers. Only a few thousand pounds are landed by larger setline vessels, usually as an incidental catch in the sablefish fishery.

The catch in Area 2B, the waters off British Columbia reached the 5.4 million pound catch limit set for 1982. The number of Canadian vessels landing halibut declined 15% from 1981, but an improved CPUE, particularly on the grounds on the outside of the Queen Charlotte Islands, resulted in an overall catch and length of season similar to last year.

The catch in Area 2C, the waters off southeastern Alaska, was 3.5 million pounds, just slightly over the 3.4 million pound catch limit and 0.5 million pounds less than was taken in 1981. For the first time in several years the number of vessels participating in Area 2C declined, but a continued improvement in CPUE allowed the smaller fleet to attain the catch limit in the shorter fishing period allowed.

The catch in Area 3A, which includes all Alaska waters between Cape Spencer and the west end of Kodiak Islands, was 13.5 million pounds, 0.5 million pounds less than the catch limit and 0.7 million pounds less than was taken in 1981. The shortfall in reaching the catch limit was undoubtedly due to a very severe storm in the Gulf of Alaska that coincided with the short 3-day final fishing period.

The catch during the initial 8-day fishing period was over 10.1 million pounds and 3.3 million pounds were caught during the final period. CPUE continued to improve from last year. In the Kodiak region, the 1982 value of 192 pounds per skate was the highest CPUE ever recorded for this region.

In Area 3B, Alaskan waters between Kodiak Island and Unimak Pass, 4.8 million pounds were caught, with 4.2 million pounds of this total taken during the 7-day season in late August. This catch was substantially above the 3.0 million pound catch limit. While part of this large overage was due to excellent fishing, the main cause was the difficulty IPHC had in determining the number of vessels intending to fish in the area during the final fishing period. Many vessels were reluctant to commit themselves to the fishery without knowing the exact length of fishing time, and IPHC couldn't determine the appropriate number of fishing days without knowing the expected fleet size. Only poor weather during the early part of this last period prevented an even larger overage. The Area 3B CPUE of 213 pounds per skate was the highest of any area on the coast and undoubtedly reflects the light fishing pressure and low removals of the previous three years.

The eastern boundary of Area 4 was moved in 1982 to Cape Lutke, near Unimak Pass, from its previous location at 170°W. This opened up a 350-mile long stretch of fishing area on the Pacific Ocean side of the Fox Islands which was open to fishing at the same time as grounds in the Bering Sea and western Aleutian Islands. Over 1.0 million pounds, or nearly 75% of the total Area 4 total catch was taken from this newly added Pacific area. Fishing grounds west of 170°W along the Aleutian Islands, which had produced over one million pounds of halibut as recently as 1978 and 1979, were unfished in 1982.

The 1982 ex-vessel value of the halibut catch was \$31.2 million (U.S.), an average of \$1.09 (U.S.) per pound.

2. Recreational Fisheries

a. Canada

Lingcod and black rockfish are the major species in the Canadian recreational fishery for groundfish. No catch data are available.

b. United States

Creel censuses of the groundfish catch reveal that Pacific halibut and rockfish were the leading species by order of catch in Alaska.

Washington recreational data for 1981 show boat catches of 1,394 mt with pollock, Pacific cod, and black rockfish the predominant species. Shore anglers in Washington caught 192,000 groundfish in 1981, mainly flatfish and sablefish.

The estimated Oregon recreational catch for 1982 was 637 mt of which 82% was rockfish. The number of directed groundfish recreational trips was estimated to be 49,918. Anglers on these trips caught 316,580 groundfish, 77% of the total sport catch. Catch rate was 6.3 fish per angler trip. The leading species, black rockfish, comprised 67% of the catch. Other rockfish species and lingcod comprised most of the remainder of the groundfish catch.

The 1982 California recreational catch of groundfish is estimated at 5,000 mt. Rockfish were the predominant species with bocaccio the leading species. Lingcod are also prized by recreational fishermen. Flatfish are minor in the recreational catch. Most of the California recreational fishery occur in central and southern California.

B. Joint Venture Fisheries

1. Canada

In 1982, 16 Canadian catcher vessels delivered Pacific hake to 11 processing vessels in cooperative fishing arrangements. In addition, the processing vessels occasionally fished directly (supplemental fishing) when domestic vessels could not supply sufficient quantities of hake. Seven Polish vessels and four Soviet vessels participated in this fishery. A total of 20,889 mt. of Pacific hake was processed in the 1982 fishery. Catches by Canadian fishermen were 19,613 mt and processor vessels caught the remaining 1,276 mt. Incidental catches in the joint venture fishery were 400 mt of pollock, 85 mt of rockfishes, and 14 mt of shad.

2. United States

U. S. joint fishing ventures with foreign partners continue to grow and successfully harvest groundfish resources in the Bering Sea and northeast

Pacific Ocean. In the Bering Sea, joint-venture catches have increased 38% since 1981 due mainly to increased harvests of pollock (54,604 mt) Pacific cod (13,591 mt) and Atka mackerel (12,475 mt). The total joint-venture Bering Sea catch in 1982 was 108,472 mt. Catches in the Gulf of Alaska of 74,433 mt were 339% greater than in 1981, a result of the rapidly growing fishery for pollock in Shelikof Strait. Pollock catches totaled 73,917 mt. In the Washington-California region Pacific hake catches of 67,464 mt were 55% greater than in 1981. In all areas there were increases in harvesting and processing capability. Processor months increased from 48 in 1981 to 51 in 1982 in the Bering Sea, from 6 to 26 in the Gulf of Alaska, and from 50 to 62 off the west coast. It is anticipated that harvests made by joint-ventures in the Bering Sea and Gulf of Alaska in 1983 will substantially exceed those in 1982. Already this year, the catch of pollock in Shelikof Strait almost doubled the 1982 catch. Pacific hake catches off the west coast should remain about the same as in 1982.

C. Foreign Fisheries

1. Canada

Japan and Poland conducted national fisheries for Pacific hake off southwest Vancouver Island during 1982. One Japanese and seven Polish vessels caught 11,318 mt of hake with incidental catches of 921 mt that included pollock, rockfishes, and shad.

2. United States

Foreign fisheries occurred in the U.S. Fishery Conservation Zone in 1982 from California to the Bering Sea. Foreign catches in 1982 were down for all major species in all areas from 1981 catches. Reductions were particularly notable for pollock (-29%), Atka mackerel (64%), POP (-34%), and flounders (-38%) in the Gulf of Alaska and Pacific hake (-90%) in the Washington-California region. Reduced catches in the Gulf of Alaska resulted mainly from smaller allocations and in the Washington-California region because only Poland was granted an allocation for Pacific hake. Foreign vessel months decreased from 1,125 in 1981 to 1,116 in 1982 in the Bering Sea, from 349 to 246 in the Gulf of Alaska and from 91 to 7 in the Washington-California region.

Foreign catches from the Bering Sea totaled 1,158,897 mt of which 959,336 mt were pollock. Gulf of Alaska catches by foreign fishermen were 150,619 mt; pollock catches were 92,613 mt. Pacific hake was the major species in the Washington-California area; 7089 mt of the total of 7,242 mt were Pacific hake.

D. Canada-U.S. Groundfish Management and Regulations - Significant Changes.

1. Canada

Dr. Tyler described the Canadian implementation process for regulations. The two groups involved are the Fisheries Research Branch and the Field Services Branch. Scientists at the Pacific Biological Station calculate total allowable catch (TAC) annually on a stock by stock basis and provide TAC's to the Field Services Branch. The Field Services Branch provides management recommendations to the Groundfish Advisory Board for consideration. The Field Services Branch adopts regulations.

An example is Pacific cod closures that were recommended and implemented. Weather affected the fishery and the regulation did not work because of unforeseen circumstances.

Sablefish regulations include fleet license limitations. Twenty-three licenses were recommended but 51 were issued. A problem exists with dormant licenses and demand by new entrants. Escape panels were changed to 8"x8" panels. A 3-inch escape ring which would allow most sablefish of under 55 cm to escape is under consideration.

2. United States

a. North Pacific Fisheries Management Council

Mr. Jeff Povolny provided an overview of regulations in the Gulf of Alaska and the Bering Sea. The Gulf of Alaska Groundfish Plan was adopted in 1978 and 12 amendments have since been adopted or approved. Amendment 10, effective on June 1, 1982, closed the fishing conservation zone (FC2) east of 140° W. long. to all foreign fishing, deleted U.S. southeast fishing sanctuaries, allowed foreign midwater trawling only between 140° and 147° W long, and reduced Pacific ocean perch OY from 14,400 to 875 mt. in the eastern regulatory area.

Amendment 11 was approved by NPFMC in 1982 and under secretarial review on May 30, 1983. It increases pollock OY to 143,000 mt from 95,200 mt in the central regulatory area, sets sablefish OY at 9,748 mt, divides the Yakutat district in two for sablefish management purposes, establishes sablefish management objectives and annual determinations of DAH, grants field authority to NMFS Regional Director, and requires notification of ADFG or NMFS by domestic vessels prior to leaving Alaska waters to deliver elsewhere. Amendment 12 was also approved in 1982 and is in preparation for secretarial review. It prohibits the use of trawls and sablefish pots for directed sablefish fishing east of 140° W. long. to Cape Addington.

The Bering Sea plan was implemented on January 1982 and eight amendments have been made. Amendment 1 establishes multispecies OY, framework procedures, fishing and plan year. It also deals with halibut fishing areas, foreign trawling in Petrel Banks, and provides for an assessment document. Amendment 2 increases DAH for yellowfin sole and other flatfish and increases the Pacific cod OY. Amendment 3 establishes a comprehensive prohibited species management regime. Amendment 4 increases joint venture processing (JVP) for pollock, yellowfin sole, other flatfish, Atka mackerel and other species. Pacific cod OY is increased and foreign fishing area changes were made. Amendment 5 deals with incidental salmon catches in the foreign fishery. Amendment 6 establishes a U.S. sanctuary north of Unimak Pass. Amendment 7 modifies foreign fishing regulations and amendment 8 sets a prohibited catch ceiling for salmon.

b. Alaska

Gillnets for groundfish were eliminated in southeast Alaska. A permit is required for trawling inside 3-miles in southeast Alaska. Delays were established for offshore sablefish fishing. By state regulations sablefish fishing can begin on March 15 in waters offshore of southeast Alaska as opposed to January 1, by federal regulations.

c. Pacific Fishery Management Council (PFMC)

The PFMC groundfish plan (FMP) was implemented in September 1982. The FMP countians OY's for Pacific ocean perch, sablefish, Pacific hake, shortbelly rockfish, and widow rockfish. Other species are managed with provisions of continuous assessments and a points of concern mechanism. In 1982 trip limits

of 10,000 lbs were reduced to 5,000 lbs for Pacific ocean perch. In fall 1982, sablefish landings were projected to exceed OY and a 3,000 lb trip limit was set in November. Widow rockfish OY's were raised and trip limits of 75,000 lbs were established in late 1982. For 1983, a sablefish size limit of 22 inches was implemented to reduce the catch of small fish and also the total landings. Widow rockfish trip limits were reduced to 30,000 lb and rockfish trip limits were established at 40,000 lbs. At mid-year, rockfish landings exceeding 3,000 lb were limited to one per week per vessel. Amendment 1 to the FMP was considered by PFMC in June 1983. It contains 9 issues as follows: 1) fishery year; 2) flexibility in management regime for Pacific ocean perch; 3) JV fisheries south of 39° N lat; 4) marking of fixed gear; 5) vessel identification; 6) additional species to FMP; 7) sablefish trip limits; 8) trawl foot rope specifications; and 9) OY for jack mackerel. Amendment 1 is in preparation for public review.

d. Washington

Implementation of the Groundfish Management Plan for Washington's Inside Waters began during the fall of 1982, when several changes in commercial fishing regulations were made, and continued through the next spring when new sport regulations were promulgated. Features of the plan included division of the inside waters into six management regions, with guidelines for the harvest strategy of resources unique to each region. In general, lingcod and rockfish will be managed with a recreational strategy with little directed commercial fishing; Pacific hake, spiny dogfish, Pacific cod, walleye pollock, flatfishes and surfperches will be managed under a commercial fishing strategy; commercial fishery opening and closing dates were synchronized; new sport bag limits were established; and the lingcod moratorium area of inner Puget Sound was opened for a short experimental season.

Washington state regulations were implemented consistent with provisions of the PFMC FMP.

e. Oregon

The Oregon Fish and Wildlife Commission (OFWC) reduced Pacific ocean perch trip limits from 10,000 lb to 5,000 lb effective in February 1982 prior to FMP implementation. State regulations consistent with federal regulations were

also adopted. Travel prohibition inside 3 miles was considered by OFWC but no action was taken. OFWC instructed ODFW staff to monitor the area fishery and prepare recommendations as necessary.

f. California

California regulations were implemented consistent with management measures of the PFMC FMP in January 3, 1983. Last summer (1982) setnet fishermen in the Monterey area (1B) encountered high incidental catches of sea birds, mainly murre; a few marine mammals also taken. The Director was empowered to take action to mitigate bird and mammal losses. Setnets were not allowed in depths of 10 fathoms or less during the summer period and reductions in seabird and mammal mortalities resulted.

The federal regulations of 3,000 lb trip limit for sablefish implemented in late 1982 eliminated the fixed gear fishery and limited trawlers as well.

VIII GROUND FISH RESEARCH

A. Stock Assessments

1. Pacific Cod

a. Canada

Mr. MacFarlane reported there is little to add to that reported in the 1982 Report of the TSC. Mr. Westheim is in the process of defining CPUE for Pacific cod. In reviewing the historical data, an eight to ten year fluctuation in abundance is noted and an attempt is being made to explain these fluctuations.

b. United States

Mr. Rigby reported on Mr. Blackburn's studies of the 1977 year class of Pacific cod which has slower growth than adjacent year classes. The 1977 year class is about twenty times as abundant as adjacent year classes. This year class is expected to phase out of the fishery in 1984. The otolith break and burn method is used by ADFG to age Pacific cod.

Commercial catch and NWAFC survey data have been used to assess the condition of cod stocks in the Bering Sea. In the Bering Sea, both sets of data indicate major increases in abundance occurred in 1978 and 1979. Survey data indicates that the populations remained large and relatively stable during

1980-82. The biomass estimates from the 1982 survey was the highest since 1975 at 1,013,900 mt. The 1977 year-class, primarily responsible for this major increase in abundance, was predominant through 1981 and was a major component in 1982. REFM Division has also applied cohort analyses and a numeric population simulator to determine the dynamics of Pacific cod populations in the eastern Bering Sea/Aleutians region. This analysis also showed the 1977 year-class to be extremely strong and that it has been supporting the bulk of the fishery in 1982-83. The population simulator projects that allowable catches for the stock would decline rapidly in 1984 and 1985 to levels that are closer to historical levels of about 60,000 tons. Applying an exploitation rate of 0.4 to a projected 1983 exploitable biomass of about 570,000 at yields an allowable catch of 228,000 mt.

In the Gulf of Alaska, surveys conducted in 1980-82 were used to estimate the biomass. Total exploitable stock size was estimated to fall between 396,000 and 792,000 mt and MSY was estimated to range between 95,00-190,000 mt. The EY was assumed equal to MSY, and the allowable biological catch was set at 60,000 to minimize the incidental catch of halibut. Commercial catches in 1981 are dominated by 4-year old or older cod with no evidence of large subsequent year-classes.

2. Rockfish

a. Canada

Rockfish research in Canada was continued on the determination of levels of exploitation and their impacts on stocks; emphasis was on Pacific ocean perch. Work on the reproductive biology and life history strategy of Pacific ocean perch was contained.

b. United States

Mr. Dark reported that Pacific ocean perch stocks in the eastern Bering Sea declined drastically in the early 1960's and remain at a very low level of abundance. Catch and CPUE have continued to decline and are at very low levels relative to earlier years. Cohort analysis has been applied to catch at age data from the Bering Sea and Gulf of Alaska stocks. The abundance estimates derived, differed significantly from past CPUE assessments, suggesting far more serious depletion than previously believed. Using the most reasonable

estimates of natural mortality and fishing mortality available, cohort analysis indicated that mean stock biomass in the Gulf of Alaska and eastern Bering Sea declined 95 and 85 percent (respectively) during 1963-76. Similarly, mean stock biomass in the Aleutian region fell 91% during 1974-76. There is no consistent evidence that the stock is rebuilding despite reduced catch levels in 1978-81 of 500-2,200 mt. While MSY is estimated to be 32,000 mt it is clear that the present population cannot support sustained catches of that magnitude. EY for 1982-83 is estimated to be about 1,700 mt but to promote rebuilding, it is considered advisable to set catch levels below EY.

In the Gulf of Alaska, survey data suggests there have been some increases in the relative abundance of Pacific Ocean perch in 1979 and 1981 after stocks were reduced substantially by intense fishing during the 1960's. The commercial catch in 1979-81 was only about 5% of what it was during 1964-66. MSY for the gulf is estimated to be 125,000 mt, but current stock levels preclude sustained catches of that magnitude. It was estimated in 1979 that EY was 50,000 mt. OY was set at a substantially lower level of 29,167 mt. In 1981 because the Council desired to initiate rebuilding of the stocks. The 1983 OY was reduced even further to 11,475 mt to promote more rapid rebuilding in the eastern area.

Rockfish assessments in southeastern Alaska waters were performed by Rosenthal and others who described species composition and changes in fish sizes by depth and area.

Washington began a black rockfish tagging project to determine distribution of black rockfish among user groups, to assess trends in movement and to validate ageing techniques. To date, 8,600 fish have been tagged and released between Cape Flattery, Washington and Tillamook Head, Oregon. In 1982, 1,751 of the tagged rockfish were also injected with OTC. Approximately 100 tagged fish have been recovered. Recoveries were by Oregon trawlers (28), Washington trawlers (22) charter vessels (23) recreational fishermen on private vessels (9), salmon trollers (13), commercial jig fishery (3), and WDF (2). Movements range from none to substantial distances. Otoliths from OTC injected fish were sent to the Pacific Biological Station.

Initial assessments were made of yellowtail rockfish in the U.S. Portion of the INPFC Vancouver and the Columbia areas. Virtual population analysis and stock reduction analysis resulted in estimated virgin biomasses of 23,159 and 12,727 mt in the Columbia and Vancouver areas respectively. Current (1980) biomass estimates are 13,310 mt for the Columbia area and 8,029 for the U.S. Vancouver area. Maximum sustained yields were estimated at 2,779 in the Columbia area and 1,527 in the Vancouver area.

Oregon continued work on assessments of canary rockfish in the INPFC Eureka, Columbia, and Vancouver areas. Preliminary Chapman-Robson estimates of total mortality (z) is 0.13. Current annual catch is probably exceeding annual recruitment. Work is also progressing on ageing studies of canary rockfish. Black rockfish tagging is being carried out with Garibaldi charter boat captains and volunteers. A goal of 10,000 tagged fish is planned contingent on funding approval. An opportunity exists to study black rockfish recruitment in conjunction with this tagging program.

California assessments are continuing on bocaccio and chilipepper in the INPFC Conception and Monterey areas. Progress has been hampered by data deficiencies and the short series of biological samples. A year-round study was completed on discards in the Monterey, California trawl fishery which is predominantly a rockfish fishery.

3. Sablefish

a. Canada

Assessments of sablefish off Canada utilized Japanese catch and catch per unit of effort data. A single stock is indicated and a 3,500 mt quota is the management measure. Age structured models, longevity, and year-class phenomena are also considered in assessments.

b. United States

Mr. Dark described sablefish abundance index work conducted by NMFS from Alaska to California from 1979 to date. The experimental design will be modified in 1983 based on evaluation of results to date. Tagging at index sites resulted in over 20,000 tag releases of which 552 (2.6%) were recovered. Movement distances ranged from 0-172 miles. Most active migrants were released off Alaska and California.

ADFG staff are performing stock assessments, fecundity studies, and modeling of sablefish in southeast Alaska and in the Gulf of Alaska. A status of stock document is scheduled for completion in July 1983.

Little progress has been made on assessments in other states. In California, organization and evaluation of logbook data from the pot fishery is planned.

A. Flatfish

a. Canada

Current flatfish tagging of a target of 5,000 English sole is ongoing. In 1982, 7,000 rockfish were tagged; no movements were demonstrated. Flatfish are injected with OTC at tagging to validate age.

b. United States

Assessments of yellowfin sole in the Bering Sea indicate a large population with strong recruitment from 1966-70 and 1973-76 year classes. A healthy population is projected through 1985.

In southeast Alaska, assessments of starry flounder indicate a decline in average size and fecundity. A 450-500 mt annual fishery occurs in the area. Age of maturity is variable with age 5 the minimum. Maximum age is 26 to 28 years.

Catch and fishery data are collected for English sole in Puget Sound for assessments.

Oregon's assessments of Dover sole in the Columbia and Vancouver areas are continuing. Preliminary results suggest allowable biological catch ranges of up to 6,300 to 7,000 mt in the Columbia area and 2,000 mt in the Vancouver area. Recent catches (1981-82) are above ABC but deep water exploitation has not been fully developed. Analyses of Dover sole tag results in Area 2B reveal no north-south movement but inshore-offshore movement. Females move more inshore and are caught in 50-150 fathoms in summer while males were seldom caught inside 100 fathoms.

Assessments of flatfish stocks in California are in progress but hindered by reorganization of the data systems that provide catch distribution and associated effort.

5. Pacific Hake

a. Canada

The Strait of Georgia Pacific hake fishery expanded from none in 1978, 500 mt in 1979 and in 1980, 2,900 mt in 1982 and over 3,000 mt this year. Assessments indicate that 10,000-15,000 mt are available. Long-term research on this stock include fecundity studies and monitoring to determine response of the stock to fishing. For offshore Pacific hake, a joint management study with NMFS will be initiated on August 15, 1983 with joint hydroacoustic work in the Vancouver area.

b. United States

NMFS in addition to the cooperative work with PBS will this summer conduct the triennial survey to assess the Pacific hake stock from Monterey, California to northern Vancouver Island. Trawl and hydroacoustical techniques will be utilized.

Fifteen hydroacoustic trawl cruises were conducted by the Washington Department of Fisheries in central Puget Sound (Saratoga Pass and Port Susan) between October, 1982 and April, 1983 to determine the biomass of this stock of Pacific hake. Peak biomass estimates ranged from 20,400 to 21,600 mt. The trawl fishery took 6,551 mt, or slightly under the harvest guideline of one-third the peak biomass. Biological data sampled from commercial catches and three research cruises are being analyzed to fine tune the harvest strategy.

6. Dogfish

a. Canada

Dogfish have been found to be long lived with a late age of maturity at 20 to 30 years. Dogfish populations are large in Hecate Strait with estimates of marketable fish ranging from 60,000 to 90,000 mt. The Canadian annual harvest has been 4,000 mt during the past five years. Most of the catch has been from the Strait of Georgia and the Vancouver area. Dogfish stocks have shown resiliency as they were fished down but not eradicated in the 40's and 50's and rebounded in the late 60's.

7. Pollock

a. Canada

No assessments are made of pollock

b. United States

Trends in commercial fishery and survey CPUE-data indicate that pollock abundance in the eastern Bering Sea declined rapidly from 1972 to 1975, stabilized through 1978, increased in 1979, decreased to the lowest level observed in 1980, and rebounded some again in 1981. Cohort analysis also indicated sharp declines in abundance during 1973-74 and then a very gradual decline through 1980. The numeric population simulator predicts relative population stability through 1985 at 9.6 (minimum recruitment) to 11.4 (average recruitment) million mt. Ages 2-4 predominate in commercial catches, with age 3 generally the most abundant. Survey data suggests that recruitment at age 1 from the 1979, 1980, and 1981 year-classes was low relative to age 1 fish in 1975 and 1979. The 1981 year class appears to be especially weak. MSY is estimated to be 1.5 million mt. Due to relatively low recruitment since 1979, EY is currently estimated at 1.2 million mt.

In the Gulf of Alaska, trends in abundance are more difficult to establish due to the short history of appropriate trawl/hydroacoustic surveys and the difficulty of determining directed commercial effort and shifts in resource availability. As a general indicator, however, commercial CPUE data shows no sign of resource deterioration. Stock abundance may have been extraordinarily high in 1977 when the strong 1972 year-class was an important component. During 1980-81 the resource is thought to have remained stable or was increasing. Catch-age analysis indicates that the exploitable biomass during 1976-81 averaged 734-1,233 thousand mt. MSY for pollock in the Gulf of Alaska areas is estimated to be 166 to 334 thousand mt. EY in the Shumagin-Kodiak area is in the range of 180-508 thousand mt. Recommended EY for 1982-83 is in lower half of the EY range or 180-344 thousand mt.

8. Pacific Halibut

- a. International Pacific Halibut Commission assessments from catch-age and CPUE data provide biomass and surplus production.

Since 1974, when biomass was at its lowest point in at least 35 years, biomass has increased 26% in Area 2 and 91% in Area 3. An estimated increase of 57% in Area 4 is based on limited data. The best estimates of surplus production are 13 million pounds in Area 2, 24 million pounds in Area 3, and 3 million pounds in Area 4. The IPHC staff has recommended that catch limits be near 75% of surplus production to provide for population rebuilding, as in previous years. Recommended catch limits are 9 million pounds in Area 2, 19 million pounds in Area 3, and 2.2 million pounds in Area 4, with 10 million pounds set aside for stock rebuilding. The proposed catch limit in Area 2 is the same as in 1982 because Areas 2A and 2B have shown no improvement, and is slightly below 75% of surplus production. The catch limit in Area 3 is slightly larger than 75% of surplus production. The catch limit in Area 3 is slightly larger than 75% because the population appears to be growing rapidly. The catch limit in Area 4 is 75% of the annual surplus production.

These analyses are not the only information used in examining the condition of population components in regulatory areas. In 1982, IPHC carried out adult halibut setline surveys in Areas 2B, 2C, 3A, and 3B. The surveys confirm our quantitative analyses. The populations in Areas 2C, 3A, and 3B appear to be in excellent shape, and the population in Area 2B is marginal at best. IPHC also conducts a juvenile trawl survey in the Bering Sea and Gulf of Alaska with the purpose of forecasting future abundance. Juvenile CPUE in the Bering Sea in 1982 was much higher than average. Juvenile CPUE in the Gulf dropped in 1982 but is well above the low levels of the mid-1970's. Thus, halibut biomass continues to grow in most of its range and juvenile production appears to be stable. However, the poor condition of the Area 2B population component is a major cause for concern.

9. Lingcod

a. Canada

Field studies to assess impacts of commercial and sport fisheries on lingcod stocks began in 1982. In Areas 4B and 3C, 12,000 lingcod were tagged for stock delineation and age validation. A preliminary study of age validation was completed.

b. United States

No active assessments programs are currently ongoing. Limited collections of lingcod samples have occurred in association with 1982 rockfish surveys by ADFG. Oregon's recent lingcod tagging studies conducted aboard charter vessels in 1978 in Areas 2B-2C have resulted in recoveries mostly in tagging areas.

10. Other

a. Canada

Multi-species studies are in progress or in planning stages. One program will study the inshore species complex in the Strait of Georgia where lingcod is the most important species. Another program will be carried out in Hecate Strait. Studies on recruitment processes of rock soles, English sole, Pacific cod, and sablefish will be undertaken. Field studies will be carried out over a 4-year period. Data on zooplankton, fish and hydrology will be collected. Larval survival patterns will be evaluated with hydrographic factors and between and among the four species. Another study under consideration is a modeling effort to determine the effect of sablefish and salmon on productivity of other species in northern British Columbia waters. Four regions will be mapped, systematic trawling will be conducted in deep and shallow areas and mixed species production units will be analyzed.

b. United States

The ecosystems modeling programs in the eastern Bering Sea was described by Dr. Low. Species assemblages and food habits are parts of the study. Part of the biological data will be obtained from the commercial fishery.

B. Related Studies

1. Sablefish

Messrs. Bracken, Dark, Hardwick, and McFarlane provided an overview of the International Sablefish Symposium held in Anchorage in March 1983. This symposium was sponsored by ADFG, NMFS, NPFMC, PPMC, and the University of Alaska Sea Grant College Program. Papers were presented on fishery management strategies, biology, migrations, stock structure and stock assessments. Workshops were held on stock assessments and on the need for future tagging studies. Modeling and implications of altering age composition were major concerns at the stock assessment workshop. The tagging workshop resulted in

conclusions that more emphasis has to be placed on recovery aspects of tagging programs, tagging of juveniles is needed, and an international committee ought to be formed to analyze tag data.

Mr. McFarlane expressed Canadian concerns on tagging results to date. Adults remain in areas of tagging but juveniles in inside Canadian waters move into the Gulf of Alaska. Should juveniles from Washington, Oregon, and California move to spend the adult portion of their lives in northern waters, then the U. S. fishery on young sablefish impacts Canadian fisheries for older fish.

As the result of discussions on sablefish the TSC developed a recommendation to the TSC to form a sablefish tagging coordinating group composed of Messrs. G. A. McFarlane, B. Bracken, and T. Dark. This group will review available tagging data and recommend tagging programs to resolve specific areas of concern. Another sablefish recommendation was developed to the parent committee to encourage and implement coordinated programs to improve data systems and stock assessments for management purposes.

INPFC has scheduled a sablefish age workshop for late September 1984.

2. Review of March 7, 1983 Interim TSC Meeting on Age Methodologies and Validation.

Canadian TSC members were unable to attend. TSC members from each U.S. agency participated. As a result of discussions on age determination at Hopkins Marine Station held on January 12, 1983 in conjunction with the annual meeting of the Canada-U.S. Groundfish Committee and the Second Western Groundfish Workshop, Drs. Loh L. Low and Dan Kimura provided a proposal to organize workshops to exchange views, to provide documentation, to resolve problems, and to finalize age determination documentation. The TSC at this meeting agreed to combine a workshop of age reading experts in April to document and standardize current ageing methods on rockfish species of regional management concern.

a. Review of the April 27-29, 1983 Workshop on Age Determination of Rockfish, Northwest and Alaska Fisheries Center, Seattle.

Dr. Charles Woelke moderated the workshop and provided a review for the TSC. The workshop was sponsored by PMFC. Participants in the workshop included age experts from fishery agencies of the Pacific coast and Oregon State University. Major topics of the agenda were descriptions of current procedures and exchange of views, recommendations, and recommended procedures for inter-agency calibration. The agenda was completed with consensus on break and burn as the preferred age reading method for rockfish and a general rockfish ageing procedures document was drafted. It was suggested that a workshop be coordinated in the future where actual ageing and inter-agency comparisons would be emphasized.

The TSC discussed the results of the workshop. Dr. Harville recommended a second workshop. Differences as to the need for a second workshop arose in the discussion. Most participants of the workshop were in favor of a second workshop. A recommendation to convene a second workshop is contained in a recommendation to the Parent Committee on groundfish age determination.

3. Suggestions for Joint Research

a. Sablefish

Discussions of sablefish research needs by the TSC indicate the lack of data for stock identity and assessments of sablefish, particularly in the Washington to California area. Additional sablefish tagging and a coordinated research program are recommended. The TSC developed a recommendation, the result of discussions, on a coordinated sablefish program for the Parent Committee.

b. Age Validation and Otolith Exchange

Mr. Tagart described the exchange of Pacific ocean perch otoliths among DFO, WDF, and ODFW. Using similar methods, between agency agreements were poor. Mr. Demory stated that otoliths received by ODFW were in poor condition and were very difficult to read.

Age validation studies are in progress. Scientists at Nanaimo have incorporated OTC injections in rockfish, flatfish, and sablefish tagging studies.

4. Other

Mr. Tagart described the WDF program of artificial reef construction to enhance recreational fishing opportunities in Puget Sound. Reefs have been constructed adjacent to fishing piers and at sites accessible for boat anglers. Rockfish and lingcod are groundfish species attracted to the reefs.

C. Cooperative Research with Other Nations

Canada-U.S. cooperative research include Pacific hake parasitology, modeling of the Pacific hake population, and hydroacoustic assesment of Pacific hake, and Pacific cod assessment in the Strait of Juan de Fuca. Efforts with other nations were not reported.

IX. OTHER TOPICS FOR DISCUSSION

A. PacFIN

The Pacific Coast Fisheries Information Network (PacFIN) contains groundfish data submitted by Washington, Oregon, and California. Current reports based on landing data are generated on a timely basis. The desirability of including Alaska and Canadian data, and the possibility of replacing the Groundfish Data Series with a PacFIN report were discussed. A recommendation to the TSC was developed that each agency review data systems and provide recommendations at the next Parent Committee meeting.

B. Economist Participation

The participation of economists in meetings of the TSC was discussed by Mr. Demory. The TSC recommends to the Parent Committee that economists from both countries be appointed as observers at TSC meetings.

C. Review of Impacts of El Nino or Warm Ocean Waters on Groundfish

The TSC noted that in 1983 waters in the northeastern Pacific were warmer than normal. Currently, many agencies, academic groups, and others are documenting impacts on resources of the persistent warmer water. A discussion will be placed on the next TSC meeting agenda.

X. PROGRESS ON 1982 RECOMMENDATIONS

A. Technical Subcommittee

1. Sablefish Status of Stocks Working Group

The working group activities of Messrs. G. McFarlane, B. Bracken, and Dr. J. Balsiger included planning and participation in the March 1983 Sablefish Symposium held in Anchorage. The Symposium report is in preparation and the work of the group will be considered completed with report completion.

2. Age Reading Review

The recommendation of agency review of techniques and agency position on techniques was fulfilled. Each agency provided the recommended action and they are contained in the March 7, 1983 interim meeting report of the TSC.

3. Council Participation at TSC Meetings

The TSC agreed to invite participation at TSC meetings by staff of the NPFMC and the PPMC.

B. Parent Committee

No recommendations were made to the Parent Committee in 1982.

XI. 1983 TECHNICAL SUBCOMMITTEE RECOMMENDATIONS

A. Technical Subcommittee

1. Age Determination by Break and Burn Method

The TSC notes that consensus on ageing technique is necessary for interagency agreement on stock assessments. As a result of evaluation of available information on ageing technique at its meetings, the TSC recognizes and endorses the break and burn otolith technique of age determination as a valid ageing technique for some species and age groups. The TSC recognizes that research on age determination is being carried out and that periodic review of the TSC endorsement of the break and burn method should be conducted.

The TSC recommends that each agency review applications of this technique and present a list of endorsed species at the next meeting of the Parent Committee.

2. PacFIN and Data Series

The Pacific Fishery Information Network (PacFIN) has produced increasingly accurate and timely reports of groundfish catch by INPFC Area, state of landing, landings by gear and by port, etc., on a monthly basis for the past three years. PacFIN reports have been extremely useful in the Washington-Oregon-California area to the Pacific Fishery Management Council (PFMC) and its Groundfish Management Team.

The Groundfish Data Series has provided continuous groundfish data since 1948. Continuation of such a series is essential and modifications of data provided to both the Data Series and PacFIN could result in a continuation of the Data Series but provided by PacFIN.

The TSC recommends that each agency review both PacFIN and the Data Series and be prepared to recommend necessary changes to integrate the two data sets at the next Parent Committee meeting. Additionally, the TSC should seek input from other users including management councils, governments, and industry regarding the Data Series replacement by PacFIN.

3. Coordinating Group

Stock identity, movements and migrations, and patterns of recruitment for sablefish are required to base management recommendations. Sablefish tagging by Canada and the United States have provided a body of information. A review of results of tagging experiments, recommendations for future tagging, and coordination of these efforts are necessary.

The TSC recommends the formation of a sablefish tagging coordinating group of chairman G. A. McFarland (DFO Canada), B. Bracken (ADFG) and Tom Dark (NMFS). This group will review all available sablefish tagging data and recommend joint tagging programs to resolve specific areas of concern including movement of juveniles and transboundary rates of exchange.

The TSC further recommends that this group meet as soon as possible to formulate tagging recommendations for presentation at the fall 1983 meeting with the Parent Committee.

B. Parent Committee

1. Coordinated Sablefish Program

The TSC noted that sablefish stock assessment programs and data systems for such stock assessments are more advanced in Alaska and British Columbia than off the Pacific Coast (Washington-Oregon-California). In fact, the basic catch/effort and biological information necessary to monitor the status of the stock off the Pacific Coast is not available. Recent field programs such as trawl surveys and abundance indexing with pots have been inadequate or in evaluation stages and do not provide for adequate assessments or estimates of biomass. Finally, there is no coordinated program to describe the economic force which may strongly influence the behavior of the fishery and affect the measurement of population parameters.

The TSC recommends that in light of the lack of information critical to the management of the sablefish resource, particularly in the Washington-California region, that the Parent Committee encourage the development and implementation of coordinated programs as soon as possible to:

1. Estimate the status and biomass of the sablefish resource in the Washington-California region.
2. Develop and implement a system to collect catch and effort statistics from the commercial fishery.
3. Develop and implement a system to obtain representative samples of the size and age composition of the landings and catches.
4. Compile and analyze economic data which may help explain the distribution of fishing effort among gear types, areas, and seasons and assist in the evaluation of the representativeness of the size and age compositions of landings, and the rate of discard at sea.
(The Pacific Fishery Management Council's Groundfish Task Force (June 1983) has also recognized the need for improvement of our knowledge and data base of the Pacific Coast sablefish resource and has appealed for funds to support work similar to that outlined above.)
5. Develop a data base for stock identification to enhance our understanding of transboundary movement and recruitment patterns.
6. Validate a sablefish age determination method.

2. Groundfish Fishery Economists

Management of groundfish fisheries in the northeastern Pacific Ocean has increased in complexity in recent years. Fisheries for groundfish have increased precipitously with increases in the harvesting and processing sectors of the industry. Economic factors have contributed to the development of the fishery and economic consequences have become apparent as groundfish fisheries approach maturity.

The TSC has been an effective body in accomplishing biological research, not only between Canada and the United States, but within each nation as well. Management recommendations based on biological principles have been provided to respective governments. Often, economic perspectives that define economic risks and benefits of management actions are not incorporated in recommendations.

Recent management actions in the form of quotas, trip limits, minimum size limits and others have not undergone adequate economic analyses. The TSC recognizes that analyses are needed of economic impacts that result from regulatory action. The TSC also recognizes that market forces, largely economic in nature, are known to affect the distribution of catch among species, gears, areas, and time and the rate of discards at sea, all of which confound the interpretation of fishery data.

The TSC, therefore, recommends to the Parent Committee that a fishery economist with groundfish experience from each nation be appointed and participate as advisors and observers at TSC meetings. Further, the TSC recommends that the Parent Committee encourage the acquisition of an adequate economic data base for groundfish so that economic analyses can be performed to enhance management. With this action, countries can promote and encourage needed economic input to TSC discussions and aid in the accomplishment of economic research necessary for management of the groundfish fishery.

3. Second Age Reading Workshop

The TSC commends the efforts and result of the Committee of Age Reading Experts (CARE) at their first workshop held in Seattle on April 27-29, 1983. One view of CARE is that there is merit in convening a second workshop to resolve certain remaining issues. The TSC supports that view and recommends

that a second workshop be scheduled before the end of 1983 to accomplish the following tasks:

1. Resolve disagreements in very young and/or very old rockfish examined under controlled conditions
2. Work toward a goal of standardizing methods for ageing sablefish.
3. Recommend procedures and a mechanism for monitoring age determination precision among and within agencies. These procedures should include a definition of an "acceptable" level of agreement.

The TSC's view is that the break and burn method is the preferred method for determining rockfish ages and therefore recommends that CARE focus its rockfish and sablefish work on that method. The TSC also acknowledges value in regular interactions of CARE for purposes of controlling deviations from standard procedures, reviewing new techniques and equipment, and resolving any technical problems which may arise from time to time.

Therefore, the TSC recommends that CARE schedule an annual meeting to deal with the above issues.

XII SCHEDULE OF FUTURE MEETINGS

The Canada-U.S. Groundfish Committee will meet during the week of December 5-9, 1983. The 25th Annual meeting of the TSC is scheduled for June 1984 in Canada.

XIII ELECTION OF CHAIR PERSON

Chairman P. Rigby's term of office will continue through 1984.

XIV ADJOURNMENT

The meeting was adjourned by Chairman Rigby at 12:15 a.m., June 17, 1983.

APPENDIX A

AGENDA FOR THE 24TH ANNUAL MEETING OF THE TECHNICAL SUBCOMMITTEE OF THE CANADA-UNITED STATES GROUNDFISH COMMITTEE, CALIFORNIA JUNE 15-17, 1983

- I. CALL TO ORDER
- II. APPOINTMENT OF SECRETARY
- III. APPROVAL OF AGENDA
- IV. INTRODUCTIONS
- V. TERMS OF REFERENCE OF THE SUBCOMMITTEE
- VI. REVIEW OF AGENCY GROUNDFISH PROGRAMS
- VII. REVIEW OF NORTHEAST PACIFIC GROUNDFISH FISHERIES

A. Canada-United States Fisheries

1. Commercial fisheries--new fisheries, notable changes in resources, landings, markets, etc.

- a. British Columbia
- b. Alaska
- c. Washington
- d. Oregon
- e. California

2. Recreational fisheries--where applicable

- a. British Columbia
- b. Alaska
- c. Washington
- d. Oregon
- e. California

B. Joint-venture Fisheries

1. Canada
2. United States including Bering Sea and Gulf of Alaska

C. Foreign Fisheries

1. Canada
2. United States including Bering Sea and Gulf of Alaska

D. Canada-U.S. Groundfish Management and Regulations--Significant Changes

VIII. GROUND FISH RESEARCH

A. Stock Assessments

1. Pacific cod
2. Rockfish
3. Sablefish
4. Flatfish
5. Pacific whiting
6. Dogfish
7. Pollock
8. Pacific halibut
9. Lingcod
10. Other - Multi-species assessment

B. Related Studies

1. Sablefish--review of sablefish symposium (Balsiger, Bracken, McFarland).
2. Review of March 7 interim TSC meeting on age methodologies and validation
3. Suggestions for joint research
 - a. Sablefish - Tagging, electrophoretic studies
 - b. Age validation and otolith exchange
4. Other

C. Cooperative Research With Other Nations

IX. OTHER TOPICS FOR DISCUSSION

- a. PacFIN
- b. Fishery economists
- c. El Nino or warm ocean water

X. PROGRESS ON 1982 RECOMMENDATIONS

A. Technical Subcommittee

- 1. Sablefish status of stocks working group
- 2. Age reading review
- 3. Council participation at TSC meetings

B. Parent Committee

(no recommendations were made to the Parent Committee in 1982)

XI. 1983 TECHNICAL SUBCOMMITTEE RECOMMENDATIONS

- A. Technical Subcommittee
- B. Parent Committee

XII. SCHEDULE OF FUTURE MEETINGS

XIII. ELECTION OF CHAIRPERSON

XIV. ADJOURNMENT

APPENDIX B

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