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

TWENTY-EIGHTH ANNUAL MEETING

June 9-11, 1987

Seattle, Washington

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I. CALL TO ORDER

Chairman R.L. Demory (ODFW) called to order the 28th Annual Meeting of the Technical Subcommittee at 1330 on June 9th, 1987, in Seattle, Washington.

II. APPOINTMENT OF SECRETARY

Mr. Tom Jagielo (WDF) was appointed to serve as secretary.

III. INTRODUCTIONS

Members and invited participants introduced themselves. Member changes since last year include Dr. Laura Richards (DFO), replacing Dr. Jergen Westrheim (DFO) and Mr. Tom Jagielo (WDF), replacing Mr. Jack Tagart (WDF). Participants are listed below by agency, with members indicated by asterisks:

Canada -- Department of Fisheries and Oceans (DFO)

Fisheries Research Branch
*Dr. Laura Richards
Mr. Mark Saunders

Field Services Branch
*Mr. Ed Zyblut (Canadian Member, Parent Committee)
Mr. Richard Jacobson

United States

National Marine Fisheries Service
Northwest and Alaska Fisheries Center (NWAFC)
*Mr. Tom Dark
Mr. Mark Wilkins
Dr. Grant Thompson
Dr. Joe Terry

Southwest Fisheries Center
Mr. Norm Abramson
Dr. Wes Silverthorne

Alaska Department of Fish and Game (ADFG)
*Mr. Barry Bracken

Washington Department of Fisheries (WDF)
Mr. Jack Tagart
*Mr. Tom Jagielo

Oregon Department of Fish and Wildlife (ODFW)
*Mr. Bob Demory

California Department of Fish and Game (CDFG)
*Mr. Frank Henry

Pacific Marine Fisheries Commission (PMFC)
Mr. Guy Thornberg (U.S. Member, Parent Committee)

Pacific Fisheries Management Council (PFMC)
Mr. Jim Glock

North Pacific Fisheries Management Council (NPFMC)
Mr. Steve Davis

International Pacific Halibut Commission (IPHC)
Dr. Bob Trumble
Mr. Steve Kaimmer

IV. APPROVAL OF THE 1986 REPORT AND 1987 AGENDA

The 1986 report of the Technical Subcommittee was approved. The preliminary agenda was reviewed and a number of changes were adopted. The approved agenda is included as Appendix A.

V. TERMS OF REFERENCE OF THE SUBCOMMITTEE

No changes in the terms of reference of the Technical Subcommittee were proposed and none have occurred since 1981. Following are the Terms of Reference of the Technical Subcommittee:

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

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

3. Review the 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.

4. 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 GROUNDFISH PROGRAMS

A. CANADA

The groundfish research program continued its emphasis on understanding biological processes and ecological dynamics during 1986. Emphasis was placed on detailed investigations of the recruitment process, from reproduction through to larval survival and juvenile recruitment. The La Perouse Program investigated physical and biological oceanographic influences on these processes, while the Hecate Strait Program continued research into the ecological dynamics of species assemblages.

1. Flatfish

Field work was confined to a study of the reproductive biology of English sole in Hecate Strait. The first in a series of research cruises for this 3-year study was conducted in Hecate Strait in November. Samples of English sole ovaries were preserved for histological study and data for producing maturity ogives for the species was collected. Maturity stages observed for English sole indicated an October spawning for the species in Hecate Strait during 1986. Lengths of 50% and 100% maturity for English sole females were 34 and 40 cm, respectively.

Laboratory studies included completion of a manuscript dealing with results of the 1982 rock sole tagging experiment with regard to stock delineation, growth and mortality rates. Results suggest that at least two populations of rock sole occur in Hecate Strait, one occupying the northern half of the Strait while the other is resident in the southern half of the Strait. Estimates of instantaneous total mortality rate (Z) derived from the experiment were > 1.0. As the fishing mortality rate for the species was relatively low over the study period (< 0.3) it would appear that a significant increase in the natural mortality rate (previously estimated at 0.25) occurred in the early 1980s. The reasons for the high mortality rate are unclear at present, but the rock sole stocks in Hecate Strait are currently at very low levels.

Analysis of biological data indicated that English sole recruitment in Hecate Strait is increasing while rock sole recruitment remains at low levels. Analysis of the results of the 1983 English sole tagging experiment is currently underway and English sole age validation results will be available in 1987.

2. Slope Rockfish

Research into the reproductive characteristics of long lived rockfishes continued during 1986. Assessment of inter-annual variability in oocyte production, weight and diameter among five stocks of Pacific ocean perch with differing exploitation histories was initiated. Comparison with 1982 results suggests that variability in individual oocyte characteristics is lower than that for oocyte production. Simulation modelling of reproductive performance in response to fishing mortality level indicates that monitoring the reproductive value of recruiting fish, or other

specific ages, may provide far more sensitive measures of stock health than simple biomass based indices. These results also demonstrate that long lived species must be managed to conserve these evolved traits.

A copepod gill parasite (*Neobrachiella robusta*) was shown to be an effective biological tag for stock delineation of its host, Pacific ocean perch. Intensity of infection, prevalence, and the demography of the parasite populations provided complete segregation of otherwise indistinguishable stocks of this fish.

A project to examine the hypothesis of increased fitness conferred by higher levels of genetic heterozygosity was initiated, with Pacific ocean perch as the study species. This project will separate the effects of size and age as independent variables in the relationship of heterozygosity, longevity and fitness.

3. Shelf Rockfish

A commercial trawler was chartered to conduct a repeat of the 1985 shelf rockfish survey to the northwest coast of Vancouver Island. The purpose of the two studies was to examine variability in length composition among consecutive tows and localities, and over the short term (1-week) and longer term (1-year). In spite of the longevity and the relatively asymptotic growth of rockfish, simulation modelling shows that exploitation can still be detected by changes in length frequency.

4. Pacific Cod

Laboratory analysis consisted of the compilation of a new database for the investigation of year-class strength fluctuation of Pacific cod in the Charlotte Area (Hecate Strait). The data base will facilitate a statistical investigation of the effects of ambient temperature, water mass transport, spawning stock size, and availability of herring as prey.

A 3-year study was begun on the maturation cycle of Pacific cod in Hecate Strait and on the La Perouse Bank off southwest Vancouver Island. A cruise was conducted in November 1986 in Hecate Strait to take gonad samples for histological examination and for fecundity studies.

Stock assessment activities included: (1) compilation of 1985-1986 port sample, length frequency data, from which ages are subsequently determined analytically, (2) calculation of standardized landing statistics utilizing a method of allocating effort and relative fishing power factors to data for Pacific cod and its cohabitants, (3) stock assessment of Pacific cod in the Strait of Georgia and vicinity utilizing results of a study on relative fishing power of trawlers, including yield-per-recruit analyses. None of the four stocks examined showed signs of recruitment overfishing. The mixed species fishery precludes maximizing yield-per-recruit by mesh regulation. A partial bibliography of Pacific cod in the North Pacific was completed.

5. Hecate Strait project

Species assemblage analysis. In February 1986 the second of a series of species assemblage survey cruises was conducted in Hecate Strait. The first survey was conducted in May and June of 1984. The two surveys facilitate a comparison of summer and winter distributions of on-bottom fish assemblages.

An agglomerative clustering method was applied to these trawl survey data. Analysis indicated that four assemblages dominated Hecate Strait in both the early summer and winter. The geographic boundaries and species compositions of the summer and winter assemblages were strikingly similar, however the relative abundances of species within assemblages varied considerably with season. Northern Hecate Strait was dominated by ratfish and skate during the winter, while summer surveys showed increased relative abundances of arrowtooth flounder, Dover sole and spiny dogfish. Southern Hecate Strait is characterized primarily by rockfish species during the summer but shows increased relative abundances of spiny dogfish in winter, due to seasonal migration. From these analyses it appears that Hecate Strait is composed of three or four distinct assemblages that show some seasonal variability due to translocations of a few species. In general, depth distributions and assemblage areas remained seasonally stable for the major commercial species, English sole, rock sole and Pacific cod.

Food resource division. Field studies consisted of one cruise conducted during January and February of 1986 to provide information on food resource division. Based on preliminary species assemblage analysis, four sites, each representing a species assemblage unit, were selected within which intensive sampling of fish stomachs, surficial sediments, benthos and epibenthos was undertaken. A total of 1387 fish stomachs from 23 species were collected.

Laboratory analysis of 2016, 2620 and 1117 stomachs from cruises conducted during June 1985, September 1985, and January 1986 were processed at the Pacific Biological Station, while associated samples of sediments, benthos and epibenthos were processed at the Institute of Ocean Sciences, Patricia Bay, B.C. A computer database has been established, and data analyses are presently being interpreted.

6. La Perouse Program

This cooperative research project, with the Institute of Ocean Sciences, was continued in 1986. The primary objective is to measure the amount of inter annual variation in physical and biological conditions on La Perouse bank. The maximum anticipated life of this multi-disciplinary study is 10 years, which should encompass one (and possibly 2) ENSO events. After this period we should be able to identify the dominant physical processes affecting the circulation and water property structure, quantify the statistical variability of the seasonal cycle and begin to obtain first order estimates of the impact of inter annual oceanic fluctuations on Pacific herring, sablefish and Pacific whiting. These species have experienced strong fluctuations in recruitment success recently, that seem to be associated with long term changes in oceanic conditions.

7. Statistics and Sampling

The principal activity during 1986 was maintaining the long term data series involving catch/effort, by interviewing vessel captains at time of landing, and collecting biological data (length frequencies, sex, age structures, gonad condition, etc.) by sampling the various species landed. Additional activities during 1986 included initiating the use on the waterfront of an "automatic" measuring board which can record length, sex, gonad condition and sample characteristics; and incorporating a code for skipper name in the catch/effort database, so that effort can be standardized by skipper.

8. Age Determination

In 1986, the Ageing Unit resolved 12,000 groundfish ages. Most (92%) were aged by otoliths from rockfish, sablefish, Pacific whiting and rock sole. The remainder were fin ray sections from Pacific cod and lingcod. The Unit maintains a double reader system and has established regular precision tests between readers for most species studied at the Pacific Biological Station.

A rock sole age validation study using the otolith break and burn technique has been completed along with a primary report soon to be published.

9. Pacific whiting

Field studies included: (1) continued monitoring and biological sampling of Pacific whiting in the Strait of Georgia (commercial samples) and off the west coast of Vancouver Island (one 3-week cruise in August) to assess relative abundance and distribution and (2) a species interaction trawl survey conducted in August to assess the impact of sablefish and Pacific whiting stocks on the herring stocks in the La Perouse Bank region.

Results of this survey and those conducted earlier to examine the relationship between ocean conditions and the estimated food rations of some major groundfish species, indicated that herring year-class strength was most sensitive to changes in adult whiting ration. These studies also suggest that sablefish, in particular juveniles of a strong year-class, may be an important predator of juvenile herring.

Laboratory studies involved (1) initiating a study of the reproductive response of Pacific whiting to exploitation. Differences in age and size specific fecundity and age at 50% maturity will be examined between stocks in the Strait of Georgia, Puget Sound and offshore; (2) an analysis of size at age over time for the Strait of Georgia and offshore stocks. The analysis indicated that significant changes in size at age have taken place; (3) initiating a study to examine further the consequences of these changes on stock production.

10. Sablefish

Field studies included: (1) continued monitoring of the commercial fishery; (2) continued survey of pelagic larvae; and (3) continued tagging of juveniles. Biological monitoring of the stock was continued using observers during a commercial fishery (one 1-week cruise) and aboard a chartered commercial vessel (one 4-week cruise). For the third year, a survey examining the relative abundance and distribution of sablefish larvae off the west coast of Vancouver Island was conducted in April and May. Over the three years, there has been a 2 to 8 fold difference in larval success as indicated by presence of larvae in the surface waters. Correlation of this index with abundance in the fishery will commence in 1988. Attempts to tag juveniles were inhibited by inclement weather.

Laboratory studies involved: (1) rearing of larval sablefish from eggs through to feeding larvae; (2) examination of factors determining the production of strong year-classes; (3) a cooperative parasite study; (4) initiation of multivariate analysis of trap catch/effort data to determine if it is an appropriate index of abundance for the stock; and (5) an in depth analysis of our tagging database to estimate short and long term rates of immigration and emigration.

Gametes were collected at sea and transported to the laboratory for the rearing study. Eggs were fertilized and incubated at temperatures ranging from 4 to 6 C and salinities from 31 to 34 parts per thousand. Larvae hatched in 11 to 16 days and yolk sac resorption was complete by day 30-34 after hatch. Experiments to determine food preference, particle size and presentation in time were conducted. Larvae began feeding actively prior to full yolk sac utilization. Egg and larval densities were measured daily. This information was used to infer egg and larval depth distribution in the ocean.

The parasite study outlined the life history features of both host and parasite (intestinal trematodes); parasite incidence shows promise as a tool for stock delineation. Analysis of rates of immigration and emigration from tagging data indicated that sablefish could be managed as a single stock.

11. Spiny Dogfish

Field study involved the initiation of a longline survey of the Strait of Georgia. The purpose of the survey, to be conducted triennially, is to establish an index of relative abundance. As well, biological samples of length, sex, maturity, spines and fecundity were collected.

Laboratory studies included: (1) initiation of analysis of 1983 and 1984 tag recoveries from dogfish released during 1978-1984; (2) completion of analysis and reporting on the annulus development on the second dorsal spine, and its validity for age determination. The validation study resulted in a slight modification of the age determination methodology and indicated that dogfish are longer lived and slower growing than previously believed.

12. Walleye Pollock

Field studies involved continued biological monitoring of the commercial fishery.

13. Inshore Rockfishes and Lingcod

The reef-fish assemblage surveys in the Strait of Georgia were continued. Research CPUE may be an important fishery independent method for monitoring population trends of quillback rockfish. Density estimates of quillback rockfish obtained visually by SCUBA were proportional to CPUE obtained by hook and line fishing, using an errors-in-variables model.

An analysis of rockfish and lingcod fecundity and age/size at sexual maturity was initiated. A lingcod survey of the Strait of Georgia region of the Vancouver Area was continued to interpret catch and effort trends in the commercial fishery for lingcod. Preliminary results suggest stock abundance and size of lingcod in the Strait of Georgia is below average.

B. UNITED STATES

1. NMFS-NWAFC (Northwest and Alaska Fisheries Center)

The basic structure and organization of the groundfish research programs of the Northwest and Alaska Fisheries Center (NWAFC) remain unchanged since last reported. Essentially all groundfish work is still conducted within the Resource Assessment an Conservation Engineering (RACE) and Resource Ecology and Fisheries Management (REFM) Divisions. Notable changes in personnel include the resignation of Mr. Martin Nelson, leader of the Pelagic Resources Task, and the retirement of Mr. George Hirschhorn whose position was filled by Dr. Daniel Kimura. The RACE and REFM divisions are divided along regional or disciplinary lines into a number of tasks and subtasks. A review of pertinent work by these tasks and subtasks during the past year is presented below. Recent publications produced by RACE and REFM scientists are presented in Appendix C.

a. RACE Division

Groundfish Assessment Task. In 1986 the primary activity of the RACE division continued to be fishery independent stock assessments of important groundfish species of the northeast Pacific Ocean and Bering Sea. Groundfish surveys were conducted by the Bering Sea, Gulf of Alaska, and West Coast subtasks. There were 4 bottom trawl, one trap, two hydroacoustic, one ichthyoplankton, and one special studies surveys. Major emphasis was on the west coast in keeping with plans to rotate comprehensive surveys among 3 major geographic areas on a triennial basis. The focus will be in the Gulf of Alaska in 1987.

Recruitment Processes Task. This task participated in 1986 and 1987 studies of the distribution and abundance of eggs and larvae from pollock spawning in Shelikof Strait as part of the joint NWAFC-Pacific Marine Environmental Laboratory's Fisheries Oceanography Coordinated

Investigations (FOCI). The study in Shelikof Strait, called the Fishery Oceanography Experiment (FOX), is the first such detailed and coordinated research under FOCI. The objective of FOX is to investigate factors affecting survival of early life history stages (eggs and larvae) of pollock and thus influencing year-class success. The task's efforts have concentrated on tracing the drift of eggs and larvae and relating their distribution to physical processes in the area.

Fish and Shellfish Pathology Task. This group has played a major role in the study of red and blue king crab diseases and continued to do so in 1986. In addition, the task has initiated baseline studies of juvenile and pre-recruit Alaska groundfish with pollock being the first of many species to be collected. Similar studies were begun to characterize the pathology of groundfish and shellfish species in the Washington, Oregon, and California region.

Conservation Engineering Task. Most survey work is heavily dependent on this task to provide sampling gear which conforms to rigid specifications and standardization. The task is also charged with research related to sampling mechanisms and gear performance. Several SCANMAR net mensuration systems have been purchased to provide trawl performance monitoring during trawl surveys. The evaluation period is almost complete and the systems will soon be used routinely on most survey hauls. An experimental electronic fish measuring board has been designed and a prototype should be available soon. The device will act as a microcomputer peripheral and will allow input of lengths as well as other specimen data from a remote workstation.

Pelagic Resources Assessment Task. Hydroacoustic/midwater trawl assessments of demersal or pelagic species is the primary activity of this task. Associated activities include echo integration system development and refinement, in situ target strength measurement, and variance estimator evaluation. In 1986, the task conducted major surveys of pollock in the Shelikof Strait and Pacific whiting off the west coast.

b. REFM Division

The research and activities of the Resource Ecology and Fisheries Management Division (REFM) are designed to respond to the needs of the National Marine Fisheries Service regarding the conservation and management of fishery resources within the U.S. 200 mile Exclusive Economic Zone (EEZ) of the northeast Pacific Ocean and Bering Sea. Specifically, REFM's activities are organized under the Foreign Fisheries Observer Program and the following tasks: Age and Growth Studies, Socioeconomic Assessments, Resource Ecology and Ecosystems Modeling, and Status of Stocks and Multispecies Assessments. The work of these tasks culminates as technical reports and advice to the appropriate fishery management councils and international fisheries commissions.

Foreign Fisheries Observer Program. The Foreign Fisheries Observer Program is responsible for placing U.S. observers on board foreign and joint venture (JV) boats operating inside the U.S. EEZ. In 1986, the program

deployed 316 observers. Observers were placed on foreign vessels which were either fishing on the basis of groundfish quotas allocated by the U.S. State Department, or receiving fish from U.S. vessels as a part of JV arrangements. Vessels from Japan, the Republic of Korea (South Korea), the U.S.S.R., Poland, and the People's Republic of China were involved. The all region observer effort was 18,160 days. Coverage was 93.5% in the Bering Sea/Aleutian (BSA) region, 97.8% in the Gulf of Alaska (GOA) region, and 95.3% off the Washington/Oregon/California (WOC) region. Comparable figures in 1985 were 87.9%, 91.3%, and 94.4% respectively.

Foreign vessels landed 476,200 mt of groundfish in the BSA region in 1986, and 15,500 mt in the GOA region - down 54.0% and 62.3%, respectively, from the 1985 catches. In contrast, deliveries of groundfish by U.S. vessels to foreign processing vessels in JV fisheries increased by 82.8% in the BSA region in 1986, totaling almost 1.2 million mt The JV fishery in the GOA region in 1986 landed only 65,300 mt of groundfish, a 66% decrease from 1985 stemming mainly from the reduced allowable catch of pollock. Pacific whiting was the only target species in the WOC region in 1986. The foreign fleet landed 70,800 mt of groundfish in the WOC region in 1986 (99% Pacific whiting), up 38.8% from 1985. U.S. trawlers delivering to foreign processing vessels in the JV fisheries took 82,800 mt of groundfish in the WOC region in 1986 (98.6% Pacific whiting), up 160.4% from 1985.

In the first two months of 1987, observer coverage of vessels involved in foreign and JV fisheries off Alaska was 91%. Even though both JV and foreign fishing were limited to the BSA region, JV catches showed a phenomenal increase relative to the same two months last year, when fishing took place in both the BSA and GOA regions. This year's JV catch totaled 377,200 mt of groundfish (mostly pollock), compared to 106,200 mt last year. The only foreign fishery in the BSA region during January and February of this year was a longline cod fishery conducted by the Japanese. This fishery took 15,300 mt of groundfish, compared to 20,400 mt taken by all Bering and Gulf foreign fisheries during the corresponding months of 1986.

Age and Growth Studies Task. The Age and Growth Studies Task of REFM served as the NWAFC's unit for determination of age and growth characteristics of fish populations, using otoliths, scales, fin rays, and length composition data. Dr. Daniel Kimura assumed the leadership of the Task following the retirement of George Hirschhorn earlier this year.

Data provided by the Task were used by various NWAFC scientists to study population age composition, population dynamics, and vital parameters of commercially important species. The current annual reading capacity of the task is approximately 50,000 fish. This capacity is similar to that of earlier years, but reflects higher proportions of difficult to age species such as Pacific ocean perch and sablefish. This change in emphasis has resulted from implementation of training and testing programs developed at the NWAFC.

An experiment begun last year regarding the relative precision of alternative methods for aging Pacific cod has entered the data analysis

stage. The experiment compared ages obtained from otoliths, scales, and dorsal fin ray sections. Structures from 650 specimens were read. Scales tended to be less readable than other structures after apparent age three, while otolith readability was poor before apparent age five and after apparent age eight. Fin rays required significantly longer preparation time than the other two structures, and tended to exhibit an indistinct first ring unless sectioning protocol was followed precisely. The results from these comparisons are now under study for the purpose of making a provisional decision regarding a production aging technique for this species, pending future validation of accuracy.

Socioeconomic Task. During the past year, REFM economists conducted or contributed to a variety of research projects including: (1) the development of an ecosystem based bioeconomic model for groundfish in the Bering Sea/Aleutian Islands management area; (2) the development of a bioeconomic simulation model to evaluate alternative minimum size limits for sablefish in the US EEZ off Alaska; (3) an economic analysis of mesh size regulations for the west coast groundfish trawl fishery; (4) the development of a bioeconomic simulation model for pollock in the Gulf of Alaska; and (5) the preparation of reports on various aspects of the economic status of the groundfish fisheries.

Resource Ecology and Ecosystems Modeling Task. During the past year, the Resource Ecology and Ecosystems Modeling Task prepared several numerical programs for the assessment of stocks and the effects of fishing: 1) the SKEBUB (Skeleton Bulk Biomass) simulation was adapted for the Bering Sea; 2) programs for rendering the biomass parameters and the effects of fishing on stock fluctuations were documented; and 3) several programs for determining the age composition of catches from the Bering Sea, using data collected by the Foreign Fisheries Observer Program, were prepared. Other new programs project future age composition of stocks, using assumptions on different levels of fishing and recruitment.

Other Task activities conducted during the past year include the following: 1) a review of recruitment and its relationship to parent stock; 2) an investigation of the properties of alternative equilibrazation procedures; 3) a summarization of past fisheries management actions in the northeast Pacific Ocean, along with a study of the possible effects of these actions; 4) an investigation of the effects of ocean surface anomalies on offshore distribution of Pacific salmon and on catches by the Japanese salmon mothership fishery; 5) adaptation of a simplified version of the Bulk Biomass Model to investigate fishery-mammal interactions in the Benguela Current ecosystem off southwest Africa; 6) cooperative work with the University of Tromso to study the impact of cod enhancement on the ecosystem of a north Norwegian fjord; 7) development of an ocean-wide surface current model that looks at historical ocean flow conditions throughout the north Pacific Ocean and Bering Sea on a daily, monthly, seasonal, or interannual time scale from 1946-1986; and 8) development of a model to study the biological and technical interactions of crab and groundfish in the Bering Sea.

The Trophic Interactions Subtask prepared a summary of research conducted

jointly by REFM and the National Marine Mammal Lab on the diet of marine fish and northern fur seals in the eastern Bering Sea. The purpose of this research was to investigate whether food chain interactions may be influencing the decline of northern fur seal populations. The food habits of marine fish which consume walleye pollock, the major prey item of northern fur seals, were studied in fur seal feeding areas during summer in the eastern Bering Sea. Marine fish were found to consume all sizes of walleye pollock ranging from age 0 to greater than 1 year old. Although walleye pollock 38-48 cm long (age 4-7 years old) were abundant in this area, fur seals consumed mostly age-1 pollock. Fish predators and the commercial pollock fishery operating in fur seal feeding areas removed equal amounts of large pollock. Because large pollock were major predators of age 1 pollock, which were also the major food source of fur seals in 1985, fishery removals of large pollock may actually have been beneficial to northern fur seal populations.

Status of Stocks and Multispecies Assessments Task. The Status of Stocks and Multispecies Assessments Task is responsible for conducting studies which will enhance fishery managers' abilities to manage marine fishery resources properly. Scientists involved in this task assist in preparation of stock assessment documents for groundfish in the three management regions (BSA, GOA, and WOC), and they frequently provide management support in an official capacity through membership in regional groundfish management teams.

During the past year, Task scientists analyzed a number of proposed changes to the BSA and GOA fishery management plans (FMP's). Amendment proposals pertaining to both the BSA and GOA FMP's were to: (1) establish a priority for domestic processors within 100 miles of Unalaska Island, (2) revise the definition of prohibited species, (3) establish data recording requirements for domestic fisheries, and (4) revise the definition of acceptable biological catch. Amendment proposals pertaining only to the GOA FMP were to: (1) modify the fishing season framework; (2) expand the prohibited species catch framework for halibut to include other traditional prohibited species, namely salmon, king crabs, and Tanner crabs; and (3) update the descriptive sections of the FMP, reorganize the chapters, and incorporate Council policy as directed. Amendment proposals pertaining only to the BSA FMP were to: (1) increase the upper limit of the present optimum yield range, and (2) prohibit the discarding of pollock in roe stripping operations.

2. NMFS (Southwest Fisheries Center)

Groundfish-related research is conducted by three major components of the Southwest Fisheries Center (SWFC): the Coastal Division (La Jolla), directed by Dr. Reuben Lasker; the Pacific Fisheries Environmental Group (Monterey), directed by Mr. Andrew Bakun; and the Tiburon Laboratory (Tiburon), directed by Mr. Norman Abramson.

a. Coastal Division (La Jolla)

The Coastal Fisheries Resources Division has been involved in three areas

of groundfish research to support the management needs of the Pacific Fisheries Management Council and to establish a firm basis for future research and more accurate management.

Documentation of the distribution of groundfish spawning is being accomplished by analysis of fish eggs and larvae in historical CalCOFI plankton samples. This effort will aid future attempts to measure species abundance by egg and larvae surveys. Studies of environmental effects on recruitment also depend upon an accurate assessment of the spawning distribution in time and space.

Characterization of the trawl fishing fleet and its mobility among various fisheries has been studied through the PacFIN and other databases. This effort has enabled current analyses of the impact of regulations on the fishing fleet. The impact of sablefish quotas is being studied through the effect of sablefish trip limits on the expected gross receipts of groundfish trawlers. Other activities are the collection of routine price and cost information from the trawl fleet and the calculation of economic indexes to measure changes in the fleet's productivity and landings.

In early 1987, a study to estimate sablefish and Dover sole biomass in central California was initiated. During January and February, a SWFC research party on the NOAA Fisheries Research Vessel David Starr Jordan conducted 40 days of trawl and plankton operations. The sampling utilized a standard bottom trawl and standard plankton samplers, and a sophisticated opening/closing plankton ampler to study the vertical distribution of eggs and larvae. The fecundity, rate of spawning, and size at first maturity of sablefish and Dover sole will be estimated using specimens collected in the bottom trawl, and used to evaluate the precision and bias of estimates of spawn production. Specimens are also being used for studies of flesh condition and age determination.

The results of this research cruise are being analyzed to evaluate the feasibility of measuring sablefish and Dover sole biomass by trawl catch per effort, relative to the feasibility of doing the assessment by egg production techniques. A future stock assessment survey will be planned on the basis of these and subsequent data. In addition to fulfilling this management objective, these samples provide an opportunity to study the ecology of the continental slope fish community and enable multispecies management in the future.

b. Pacific Fisheries Environmental Group (Monterey)

The Pacific Fisheries Environmental Group develops methods of examining relationships between physical and biological data series to help forecast recruitment and to understand fish stock behavior. Data series developed internally are made available to other researchers. Some of the types of information developed are: Coastal Upwelling Indices and other wind-related index series; California Current and other eastern boundary current anomaly diagnostic studies; interspecies covariance of fish catches with respect to climatic variables; and trends and inter-year variability in

atmosphere-ocean exchange processes in coastal upwelling habitats. Co-location with the U.S. Navy's Fleet Numerical Oceanography Center provides access to environmental data on a global scale. This facilitates inter-regional comparative studies as a means to identify key fishery-environmental linkages, and to transfer fishery experiences among regions. The PFEG has also been working on the creation of a database of California Department of Fish and Game recreational groundfish data collected in the Monterey area between 1950 and 1970. The data consist of catch per effort and length frequencies by species. Another Fish and Game database that has been completed is that of commercial landings at California ports from 1928 to 1985. Eventually these databases will be related to environmental information.

c. Tiburon Laboratory (Tiburon)

The groundfish program at the Tiburon Laboratory consists of four interrelated investigations: Groundfish Analysis, Groundfish Communities, Physiological Ecology of Pacific Coast Groundfish, and Underutilized Groundfish Resources.

The Groundfish Analysis Investigation conducts studies aimed at improving management of groundfish fisheries. The work includes stock assessments, development of new management models, development of methods for predicting rockfish recruitment, sampling rockfish landings and aging rockfish, conducting economic studies of alternate management policies, and conducting life history studies of rockfish. In addition, staff participation on the Groundfish Management Team principally involves work on stock assessments and development of management alternatives.

The Recruitment Project's goal is to detect differences in year-class strength of important species of rockfish prior to entry of the year-class into the fishery. Annual midwater trawl surveys for juvenile rockfish are carried out to determine abundance and distribution off the coast of central California. Information is also being gathered on factors that affect year-class strength.

Landings of rockfish have been sampled cooperatively with California Department of Fish and Game (CDFG) since 1977. Several important species are aged and the data are being compiled with software developed by project members. These data are routinely used in stock assessments.

Members of the staff have also been monitoring the timing of parturition in mature *Sebastes* females in northern and central California since 1981. Data on prenatal larval development are collected through the cooperative CDFG and NMFS rockfish sampling program.

Work on groundfish economics is also carried on under the Groundfish Analysis Investigation, in cooperation with other SWFC and Southwest Region economists, industry representatives, and management biologists. This work includes studies of alternate management methods for groundfish.

In FY86 three projects were begun by the Groundfish Analysis Investigation:

development of a management model for California rockfish, development of a management model that incorporates estimates of rockfish recruitment strength, and management. In addition, an analysis of sablefish tagging data is underway to assist in stock assessment of this species.

The main objective of the Groundfish Communities Investigation is to determine how changes in the marine environment affect the distributions, abundances, and related year-class strengths of groundfish species. Changes being considered include regular seasonal transformations of the habitat, as well as changes associated with irregular environmental events such as El Niños. Emphasis is on how these changes affect interspecific relationships, particularly those between predators and prey. Because prey populations fluctuate widely in response to habitat transformations, the ability of specific predators to accept alternate prey in the absence of preferred prey is a major topic of study. Information from these studies should help managers anticipate not only the effects of environmental change on the relative availability of prey, but also the impact of fisheries for such important prey as shortbelly rockfish and anchovies. In addition, recruitment success is thought to correlate with certain elements of environmental changes, and this is another major topic of study.

The Physiological Ecology of Pacific Coast Groundfish Investigation is designed to determine the inherent and environmental factors most affecting the health and condition of five important rockfish species: yellowtail rockfish, bocaccio, widow rockfish, chilipepper, and blue rockfish. Work includes examination ad analysis of adult and juvenile specimens collected from commercial and sport groundfish fleets, and from cruises aboard the David Starr Jordan. Results of analyses and supportive laboratory experiments are used to determine the most important characteristics of condition and reproduction to form measures of health and effective fecundity. Studies include proximate analysis of tissues, estimates of viable fecundity and egg resorption, bioenergetic patterns, examinations for diseases, parasites and malformations, and determination of lipid and gonadal steroid cycles. Results will be combined with oceanographic and other data to determine environmental factors affecting condition and reproductive variability and capacity, and to place species populations in the context of their habitats.

The objective of the Underutilized Groundfish Resources Investigation is to expand the resource base of the groundfish fishery. As maximum sustainable yield is approached for the traditional species, the groundfish fishery will have to turn to other species, as well as to fish that are now being discarded. This study contributes to increased use of such species and to adding information about little-known species that the industry can use when appropriate. Methods are to obtain fish and information from fishermen or from research at sea, test flesh characteristics and market acceptability of underutilized species, and then publish reports of results in appropriate journals or disseminate information in other ways to the industry. Current fishes under study are the grenadiers, small flatfishes that are presently discarded by the fishery, and shortbelly rockfish.

3. Alaska (ADFG)

The Alaska Department of Fish and Game (ADFG) groundfish program underwent considerable change during 1986. As a direct result of State budget reductions, the program was reduced from four full-time project leaders, two full-time headquarters staff persons, and a complement of seasonal employees statewide to one full-time project leader in the Southeastern Region and one full-time observer contract administrator in Kodiak. Support personnel were reduced to 15 man-months in the Southeastern Region and 23 man months associated with the observer program out of Kodiak. The Central Region project, previously situated in Homer, was discontinued entirely. In addition, for the first time since the Magnuson Fisheries Conservation and Management Act was passed in 1976, the ADFG was unable to collect, enter, and summarize fish ticket data from the U.S. Exclusive Economic Zone (EEZ) off of Alaska after November 1, 1986.

a. Southwest Region

The Southeast Region's groundfish project has responsibility for research and management of all groundfish resources in state waters of the Eastern Gulf of Alaska. The project also cooperates with the federal government for management of the waters of the adjacent EEZ. The project leader participates as a member of the Gulf of Alaska Groundfish Plan Team and, with passage of amendment 14 to the Gulf of Alaska Groundfish Management Plan, the state has assumed management responsibility for shelf rockfish in both the federal and state managed waters of Southeast Alaska.

Project activities center around fisheries monitoring and in-season management of the groundfish resources based on data collected from the fisheries. Primary tasks include fish ticket collection, editing, and data entry for state managed fisheries; dockside sampling of sablefish and rockfish; skipper interview and logbook collection and data entry; and limited biological studies. Regulation development and review and information dissemination also require considerable staff time.

Fish tickets are collected from as many as fifteen ports which accept groundfish within the region. The fish tickets are edited, batched, and entered on microcomputers in Petersburg and Sitka. Because of the intensity of many of the region's groundfish fisheries, a "soft data" accounting system using processor contacts is also utilized when necessary to track landings prior to fish ticket data entry. State entry of fish tickets from the EEZ was discontinued November 1 and so no domestic catch reports from the EEZ are available for the 4th quarter of 1986.
During 1986 port sampling was limited to rockfish sampling in Sitka and sablefish sampling in Petersburg and Ketchikan. The rockfish landings were sampled primarily for species composition and biological data including length, weight, sex, and maturity of key species. The sablefish landings were sampled for length, weight and age structures from deliveries of round fish. Skipper interview and logbook programs were continued at a reduced level during 1986 with skipper interview effort concentrated on the state managed sablefish and rockfish fisheries and logbook effort concentrated on the mandatory trawl logbook program. Both of these programs are designed

to provide detailed location and effort information which, when coupled with the fish ticket data, provides an estimate of CPUE by management area for the landed catch. As in past years, a disproportionate amount of time was spent monitoring and developing regulations for the rapidly expanding nearshore rockfish fishery. A series of management options were prepared for the fall Board of Fisheries meetings, but were not discussed because of an early adjournment of the Board. The proposals were incorporated into a Regional Rockfish Management Plan and rockfish regulations will be implemented by Emergency Order during the 1987 season.

Biological studies during 1986 were limited to sablefish tagging in Chatham Strait aboard a chartered fishing vessel during late January and early February. This study concentrated on pre-spawning fish in the lower strait. A total of 3,126 fish were tagged and an additional 130 fish were sampled to obtain biological information. Ovaries from ripe females were retained from the samples for fecundity studies. Otoliths were collected from both sablefish and yelloweye rockfish port samples during the year, but were not read because of the loss of funding for our aging laboratory in Kodiak. Rockfish sex and maturity data from port samples in Sitka was summarized and incorporated into a report on reproductive timing of nearshore rockfish which is currently being published as an ADFG Informational Leaflet.

Management activity during 1986 included the closure of both inside area sablefish fisheries after the shortest seasons on record, and the closure of three areas to flatfish trawling for conservation reasons. New regulations which went into effect during 1986 include setting a flexible opening date for the Northern Area sablefish fishery and a noon opening for the Southern Area sablefish fishery, adjusting the opening date in the outside districts to be compatible with the fishery in the adjacent EEZ, restricting rockfish harvest to hook and line gear only in State waters, deleting the registration requirement for the Northern Area sablefish fishery, prohibiting persons and vessels which participate in the inside area sablefish fisheries from participating in other commercial fisheries 72 hours prior to and 24 hours after those fisheries, and defining demersal shelf rockfish.

b. Central Region

The Central region groundfish project was discontinued July 1, 1986 although fish ticket data entry continued for state managed fisheries throughout the year and for EEZ fisheries until November 1. Management action in the Central region during 1986 included the closure of the Prince William Sound sablefish fishery on June 21 after 82 days of fishing, the shortest season on record for the area. Regulation changes that went into effect during 1986 included the establishment of a guideline harvest range and the requirement of a special permit for the Prince William Sound sablefish fishery. The opening date for the Prince William Sound fishery was changed from January 1 to April 1 to make that fishery coincide with the opening of the EEZ in the Central Gulf.

c. Westward Region

The Westward region groundfish program, centered out of Kodiak, was also cut back substantially during 1986. The Alaska Peninsula annual trawl survey and the age reading lab, which were major parts of the Westward region groundfish project, were both discontinued in 1986. Management funding was also discontinued after July 1 and the project's only function for the remainder of the year was to administer an observer program using special appropriation funding. Activities by the Westward region groundfish program during 1986 were in two major areas. Prior to July the project focused on final data collection and reporting on contractual work for the North Pacific Fisheries Management Council. That contract included four primary areas; the development of computer programs for logbook data entry, entry of logbook data accumulated since 1978, collection and entry of new logbook data from deliveries made during the contract period, and finally, the completion of a contract report which was submitted to the Council prior to July 1.

Activities after July 1 focused on developing and conducting a pilot domestic on-board observer program using the supplemental funding dedicated by the Legislature for that purpose. The primary emphasis of this program is to document prohibited species catch in target fisheries for groundfish and shellfish. A total of nine observer trips were conducted during 1986. This program will continue through June of 1987.

The Westward region Groundfish Project Leader also serves as a member of both the North Pacific Fisheries Management Council Bering Sea/Aleutian Islands and Gulf of Alaska Groundfish Plan Teams.

4. Washington

The Washington Department of Fisheries Marine Fish Program is responsible for research, management and enhancement of non anadromous finfish resources. There are currently three divisions actively engaged in groundfish management.

a. Coastal Marine Fish Management

The Coastal Groundfish Management Division is responsible for management and research of groundfish in all coastal waters and in the outer Strait of Juan de Fuca. The Division also handles all issues requiring interstate, regional, federal or international cooperation. Division responsibilities include membership on the Groundfish Management Team (GMT) of the Pacific Fishery Management Council (PFMC), membership on the Gulf of Alaska Plan Team of the North Pacific Fishery Management Council, multi jurisdictional management and stock assessment of groundfish stocks in state waters (0-3 miles) and in the Fisheries Conservation Zone (3-200 miles) adjacent to Washington, and joint research with other agencies or institutions on questions of mutual interest.

The central focus of the Division is effective management of the coastal groundfish stocks. This is primarily accomplished through membership on

the GMT which develops annual estimates of "Acceptable Biological Catch" for major species/species groups and proposes management strategies to the PFMC. Division personnel implement Council decisions by drafting state regulations and coordinating state enforcement regarding groundfish management. Division personnel are stationed in major ports of landing to collect catch and biological data and other fishery related information.

Major accomplishments of the Division during 1986 were: (1) Three research projects, which included two comprehensive 3-5 year stock assessments (lingcod and black rockfish) and a study of the distribution and abundance of juvenile lingcod in Grays Harbor. These projects are summarized under Agenda Item VIII. (2) Fishery data collection, tabulation and analysis was a major ongoing responsibility of the Division. This work includes monitoring commercial and recreational landings, collection of trawl logbook information, tabulating and analyzing biological data and preparing management regulations. (3) The Division continued its participation on the GMT. Work included monitoring coastwide landings and developing and updating inseason catch projections of those species which are managed by quota or harvest guideline. The GMT also prepares an annual "status of the fishery" document. Division staff contribute stock assessment documents, coastwide landing tables, and special reports for the document. (4) A strong emphasis to achieve full compliance for the mandatory trawl logbook program continued in 1986. Ports samplers intensified collection efforts and enforcement officers issued citations for logbook violations. By early 1987 virtually all coastal trawlers were routinely submitting completed trawl logbooks at the completion of each fishing trip. (5) Work began on a coastwide thresher shark management plan to permit controlled northward expansion of a drift net fishery which previously has operated adjacent to California. Oregon and Washington have completed a joint management agreement for 1987 which includes provisions for seasons, data collection, observer coverage and a 820,000 pound (372 mt) quota.

b. Puget Sound Marine Fish Management

The Puget Sound Marine Fish Management Division is responsible for management of the marine fish resources in Washington's marine waters east of the Seiku River in the Strait of Juan de Fuca. The Division's tasks are divided between Groundfish and Baitfish sections. Additional responsibilities involve the construction of fishing piers and artificial reefs.

The Groundfish Management Section emphasizes research and management work in order to propose, implement, and evaluate regulations necessary to maintain sustainable yields of groundfish species harvested by commercial and recreational fishermen. Regulation proposals are based on analysis of fisheries and biological information gathered from extensive regional field sampling programs. This work is a primary source of information on fishery trends, resource conservation problems and conflicts between user groups.

The Baitfish Management Section emphasizes research, management and conservation work on herring, but also works with surf smelt. Staff

collect and analyze herring data to determine annual spawning escapement estimates, biological characteristics such as age, size, and maturity of fish comprising the commercial catch, and biomass (abundance) estimates of herring obtained in conjunction with hydroacoustic surveys. These investigations are used for regulation of the herring and surf smelt fisheries, and additionally aid in the definition and resolution of environmental issues affecting the spawning habitats of these important species.

The Artificial Reefs Investigation Section emphasizes planning and construction of artificial reefs throughout Puget Sound. Investigations center on proper site selection procedures, comparisons of materials used in construction, and the ecological development of reef habitats.

c. Technical Services

The Technical Services Division performs specialized work in support of stock assessment and harvest management activities performed by the Coastal and Puget Sound Marine Fish Divisions. Areas of work covered by the Division include: hydroacoustics, age determination, and computer data processing.

The Hydroacoustics Unit conducts biomass surveys from the 37-foot Pasquale, with specialized on board hydro acoustic equipment for marine fish stock assessment. Species and areas surveyed on an ongoing basis include: black rockfish coastwide; true cod in Agate Pass; herring in Bellingham Bay, Hood Canal, Gulf of Georgia, and South Puget Sound; whiting in Port Susan; and sockeye salmon pre-smolts in Lake Washington. Other activities include bottom mapping coastwide and testing of new dual beam hydroacoustic gear that will potentially provide greater accuracy in correlating acoustic target strength with actual fish biomass.

The Age Determination Unit conducts microscopic examinations of otoliths, spines, and other bony structures from marine fish samples to determine the age of specimens in support of marine fish stock assessment. Current activities include the aging of Puget Sound whiting otoliths from 1986-87 and widow rockfish otoliths from 1987. The aging of yellowtail rockfish otoliths collected in 1986 will be initiated this summer.

The Data Management Unit provides a variety of data processing services to the Marine Fish Program including: operating and maintaining our shared computer resources; user training and support; maintaining the WDF Fish Ticket, Otter Trawl Interview, and Biological Sample Databases; and designing and implementing new computer applications. The unit is presently managing the installation of new microcomputers and the upgrade of our multiuser computer system. Plans are to consolidate our large databases and streamline data storage and retrieval capabilities.

5. Oregon (ODFW)

In 1986, the restructuring of Agency Marine Resources Programs resulted in certain organizational changes effective January 1, 1986. Shrimp

Investigations staff and functions were placed under the Shellfish Program together with Scallop and Squid projects.

Monitoring of the groundfish fisheries/resources continued much as in the past. Major emphasis continued on the dominant trawl fisheries, especially species composition of rockfish. A somewhat revived salmon troll fishery helped encourage effort switch from rockfish to salmon. Good markets for sablefish helped spur increasing effort on that species. Most activities remained fairly routine and unchanged in substance from previous years, however.

In 1986 there were 1,038 biological samples taken, slightly less than in 1985. In most cases the sampling rate for age composition achieved or exceeded the 2 samples per 100 mt guideline. Rockfish species composition samples exceeded the guideline of 5 per 100 mt and made up 73% of the total number of samples. Age composition sampling of widow rockfish and Dover sole made up 8% and 3% of the samples respectively.

The Groundfish Program also had the responsibility of monitoring the new gillnet fishery for thresher shark (*Alopias vulpinis*). Since this species was excluded from the Fishery Management Plan, thus no federal involvement, management responsibility rested with the state. Because gillnets are not a legal gear in ocean waters north of 38o N. Lat., ODFW issued permits that allowed their use and fish to be landed into Oregon ports. Permits were issued to 38 vessels of which 32 actually participated. The fishery developed slowly but by late summer about 206 mt had been landed into Oregon ports, mainly Astoria. Biological sampling was limited to obtaining carcass weight and length (cm) from insertion of first dorsal to insertion of the second dorsal since fish are dressed at sea.

Major analytical tasks in 1986 involved stock assessment of English sole in the Columbia-Vancouver area and an extensive trip analysis of the Oregon trawl fleet in conjunction with the cooperative OSU Sea Grant/ODFW observer program. Tasks of this sub-project were: (1) summarize management regulations, (2) summarize recent trends in the Oregon groundfish fishery, (3) develop groundfish trawl database retrieval programs, (4) evaluate effects of recent management measures on the groundfish fishery, and (5) describe vessel, gear, and skipper experience in the Oregon trawl fishery. Also in conjunction with the OSU/ODFW program is a sub-project involving age-specific retention rates for Dover, English, and petrale sole. to this end we have aged about 2,600 fish, in the aggregate, of both discarded and retained fish.

Staff also participated in Pacific Fishery Management council activities as members of the Groundfish Management Team, Groundfish Select Group and ad hoc stock assessment group.

6. California (CDFG)

The California Department of Fish and Game's (CDFG) groundfish research and management activities are conducted by the Marine Resources Division (MRD) and the Technical Services Branch. A considerable amount of groundfish

monitoring and assessment work is conducted by MRD biologists with management responsibilities over all domestic fisheries which occur in their respective geographic districts, as opposed to species or fishery specific responsibilities.

Systematic commercial groundfish fishery sampling programs are conducted at all major California ports for biological and species composition data on most of the principal groundfish species. During 1986, commercial groundfish sampling activity decreased 18% over the 1985 level to 1,168 biological samples, due to personnel turnover and budget reductions in monitoring programs. The FY87 groundfish monitoring monies from the PMFC PacFIN contract declined by 32 percent from the previous year's level.

During 1986, the Cooperative NMFS-CDFG Groundfish Monitoring Program continued its sampling program of the State's rockfish fisheries for species composition and biological data. Following a training period in 1985, the monitoring program expanded its coverage in 1986 to include the gill net and hook-and-line rockfish fisheries in the following major southern California ports: San Diego, San Pedro, Long Beach, Ventura, and Santa Barbara. The trawl fishery is extremely small or nonexistent in the above ports. The Cooperative Program now monitors statewide landings in the trawl and gill net rockfish fisheries, with primary emphasis on the trawl fishery. The resulting rockfish species composition by market category data are transmitted to our Menlo Park microcomputer for collation prior to merger with the fish receipt database on the VAX computer in Rancho Cordova. Transmissions to PacFIN are made on a monthly basis.

Trawl landings of the principal flatfish species, particularly Dover sole, are monitored; but all data compilation, ageing, and analysis work is performed by CDFG. A data technician was hired early in the year to computerize the existing 1977-1986 backlog of Dover sole sample data from the INPFC Eureka area and to determine ages of Dover sole from this dataset using the burned section technique. By year's end, 1977-1986 sample data had been computer-entered and all 1982-1985 sample specimens aged. A comparison study between the surface ageing method used previously and the burned section technique was completed by the technician using 122 randomly selected samples from 1981 data. Statistical analysis was completed using a paired t-test with the following results. The paired t-test showed that there was a mean difference of 2.26 years between the two ages, the burned section age being 2.26 years older than the surface ages with a standard deviation of 3.63 and $P < 0.0005$. In addition, the index of average percent error was calculated which measures the precision between determinations or readers. Greater precision is achieved as percent error is minimized. The average percent error was 10.7 percent, indicating low precision which supports the paired t-test findings.

CDFG personnel also participated in the pilot coastwide sablefish monitoring program administered by the NMFS-Tiburon Laboratory. Target sample levels were achieved for most strata.

CDFG maintains mandatory logbook systems for the trawl, gill net, pot, and commercial passenger fishing vessel (CPFV) fisheries. Considerable effort

by Technical Services Branch personnel during the year was devoted to the refinement of new computer programs for processing coastwide trawl logbook data. An additional 2-3 months of programming effort is still necessary to produce a working system due to shoddy programming and scanty documentation by the systems design contractor. A data processing system is under development for the increasing volume of gill net logbook data. New microcomputer programs were developed to process 1977-1987 sablefish trap log data for analysis of trends in catch per unit effort by depth stratum.

Two gill net fishery projects continued their monitoring efforts, principally by at-sea observations, in Monterey and Conception INPFC Areas. The southern California project's primary goal is to assess the impact of the gill net fishery on recreational fishes with emphasis on white seabass and California halibut resources. The central California gill net monitoring project has focused on the problem of by-catches of marine birds, marine mammals, and anadromous fishes in the nearshore fisheries for rockfish, halibut, and white croaker. Effort and catch composition data are collected as well by at-sea observers. This study is evaluating the efficacy of gear, time, and area restrictions in minimizing by-catches and commercial/recreational conflicts. As a result of this study, legislation was enacted to expand existing area closures to set nets used to take rockfish and lingcod in waters from Santa Cruz Point south to Point Sur (INPFC Monterey area), seaward to a depth of 100 fathoms, and in the area from Point Sur south to Pfeiffer Point, seaward to a depth of 75 fathoms. Additional legislation was passed to extend an existing 15 fathom set net closure out to 20 fathoms in specified areas of the central California coast (INPFC Monterey area) to prevent the accidental entanglement of sea otters. The nearshore set net fisheries in these areas target primarily on California halibut, flounders, and sharks.

California currently conducts several research and management programs on recreational fisheries. The Southern California Sportfish Monitoring Project samples skiff and CPFV fisheries which harvest large quantities of groundfish. The Nearshore Sportfish Habitat Enhancement Project supervises the placement and evaluation of artificial reef structures in the Southern California Bight.

The Central California Sportfish Survey Project recently completed a 10 year life history study of important nearshore rock fishes. The project's findings on rockfish distribution, residentiality, age, and growth patterns will be published in 1987 as a CDFG Fish Bulletin. The project also cooperated with NMFS staff in Monterey to computerize recreational data from 1957-1982 for the Monterey Bay area. Currently, the project is studying the fishery for and the life history of California halibut.

MRD personnel participated in the NMFS-funded Marine Recreational Fisheries Statistics Survey (MRFSS). Additional microcomputer programs were developed by MRD staff to extract and analyze MRFSS catch, effort, and biological data in much finer detail than is annually published by NMFS. These programs, which summarize catch length frequency, fishing mode, or site-specific data, were distributed for use in 1986.

Considerable work was performed in support of the Pacific Fishery Management Council's groundfish management plan, including in-season reporting of quota species catches, stock assessments, and preparation and analysis of plan amendments.

C. International

1. International Pacific Halibut Commission

The International Pacific Halibut Commission (IPHC) was established in 1923 by a Convention between Canada and the United States for the preservation of the halibut (*Hippoglossus stenolepis*) fishery of the North Pacific Ocean and the Bering Sea. The Convention was the first international agreement providing for joint management of a marine resource. The Commission's authority was expanded by several subsequent conventions, the most recent being signed in 1953 and amended by the protocol of 1979.

Three commissioners are appointed by the Governor General of Canada and three by the President of the United States. The commissioners appoint the director who supervises the scientific and administrative staff. The scientific staff collects and analyzes statistical and biological data needed to manage the halibut fishery.

Each year the Halibut Commission conducts various experiments, surveys, and data collection programs aimed at better understanding the biology of halibut, the effects of the fisheries upon the resource, and the changes taking place within the halibut population. These projects generally fall into categories of (1) annual field research; (2) special field research; and (3) stock assessment.

The Commission meets annually to review all regulatory proposals, including those made by the scientific staff and the Conference Board, which represent vessel owners and fishermen. The measures recommended by the Commission are submitted to the two governments for approval. Upon approval, the regulations are enforced by appropriate agencies of both governments.

AGENDA ITEM VII. REVIEW OF NORTHEAST PACIFIC GROUNDFISH FISHERIES

A. Canada-United States Fisheries

1. Commercial Fisheries - domestic

a. Total

Canada-United States landings of groundfish (excluding Pacific halibut and joint venture) are reported in Table 1. Excluding Alaska, landings of groundfish were 138,093 mt in 1986, down from a total of 142,991 (excluding Alaska) in 1985. Landings in Washington, Oregon, and California decreased by 24%, 15%, and 3%, respectively, while landings in British Columbia increased 16% over 1986 levels. Trawl gear accounted for 113,913 mt or 82%

Table 1. Canada-United States groundfish landings (mt) by gear type and location in 1985 and 1986 (Pacific Halibut and joint venture excluded).

Gear	Location					
	AK	BC	WA	OR	CA	Total
			1985			
Trawl	90159	38552	20431	25790	35150	210082
Pot	2930	3502	845	1903	936	10116
Longline	13220	1704	2818	1035	1460	20237
Other	161	1061	1559	633	5612	9026
Total	106470	44819	25653	29361	43158	249461
			1986			
Trawl	*	44329	16274	20841	32469	113913
Pot	*	3277	37	1426	686	5426
Longline	*	4246	2545	1386	2856	11033
Other	*	-	686	1251	5784	7721
Total	*	51853	19542	24904	41795	138093

* Alaska data not available due to sampling constraints in 1986.

Table 2. Trawl landings (mt) from the northeastern Pacific Ocean in 1985 and 1986. (Joint venture landings excluded.)

Species	AK	BC	WA	OR	CA	Total	1986
Arrowtooth flounder	*	860	1686	478	18	3042	3404
Dover sole	*	1163	1493	4770	9521	16947	21469
English sole	*	452	820	551	844	2667	3207
Petrale sole	*	416	310	707	577	2010	2165
Rex sole	*	86	79	285	839	1289	1625
Rock sole	*	454	53	6	2	515	479
Starry flounder	*	54	273	97	71	495	953
Other flatfish	*	211	144	392	395	1142	1907
Lingcod	*	2923	599	489	247	4258	7816
Pacific cod	*	3639	928	26	0	4593	45947
Pacific whiting (hake)	*	6802	1558	419	2940	11719	13516
Sablefish	*	522	556	2125	3586	6789	8041
Walleye pollock	*	577	0	0	0	577	44503
Rockfish	*	23189	7227	9947	10573	50936	50770
Spiny dogfish	*	2343	387	0	0	2730	2593
Misc. species	*	209	161	9	2856	3235	1611
Total	*	43900	16274	20301	32469	112944	210006

* Alaska data not available due to sampling constraints in 1986.

of groundfish landed. Major species comprising the trawl catch were rockfish (45%), Dover sole (15%), Pacific whiting (10%), and sablefish (6%). Longline landings accounted for 11,033 mt or 8% of groundfish landed.

b. Canada

Canadian landings of groundfish (excluding halibut) in 1986 were 51,853 mt (Table 1), an increase of 15% above the 1985 level. Trawlers landed 44,330 mt, 15% more than in 1985 and 48% above the 1976-85 mean. The major species in the trawl landings were Pacific whiting (15%), Pacific ocean perch (13%), yellowtail rockfish (10%), Pacific cod (8%), silvergray rockfish (8%), redstripe rockfish (7%), lingcod (7%), yellowmouth rockfish (6%), and dogfish (5%). Principal areas of trawl production were 3D (20%), 5E (19%), 3C (17%), and 4B (16%).

Canadian landings of groundfish caught by gear other than trawl in 1986 totalled 7,524 mt (Table 1). Trap gear accounted for 3,277 mt (99% sablefish) and longline, handline and troll gear for 4,246 mt (24% dogfish, 21% lingcod, and 20% sablefish).

c. Alaska

As mentioned in item VI.B.3, no data from the EEZ groundfish fisheries was entered after November 1, 1986. As a result, with the exception of shelf rockfish in the Southeastern area, groundfish summary landing data is unavailable for groundfish landings from the EEZ off Alaska for the 4th quarter of 1986. Therefore, this discussion refers only to catch information from state managed waters for 1985 and 1986. The state managed fisheries include the internal waters of Southeastern Alaska, Yakutat Bay, Prince William Sound, and the nearshore areas of Southeastern in both state waters and the EEZ for rockfish. Because the loss of headquarters staff has resulted in an incomplete mainframe fish ticket database for 1985 and 1986, this data should be considered preliminary.

Landings of all species increased 28% in the state managed fisheries from 2,886 mt during 1985 to 3,681 mt in 1986. The largest numeric increases were in the sablefish landings which increased by 18% from 1,854 mt in 1985 to 2,193 mt in 1986, and the rockfish landings which increased by 27% from 734 mt in 1985 to 930 mt in 1986. Although the total landings were much smaller, percentage-wise the Pacific cod and flatfish landings showed the greatest change with increases in 1986 of 112% and 88% respectively over the 1985 landings.

Virtually all of the sablefish, rockfish, and Pacific cod landed from state waters were taken on setine gear, while most of the flatfish landed were taken by trawl gear. Small landings of these groundfish species were also made by troll and mechanical jigging machine fisheries, but these represent an insignificant amount of the total landings. One exception to the dominance of longline and trawl gear in the Alaskan groundfish fisheries is in the lingcod fishery where approximately 50% of the landings are from troll fisheries.

d. Washington

Total groundfish landings in Washington State from catches in Washington, Oregon and California waters were 19,989 mt in 1986; 16,274 mt caught by trawl, 2545 mt by setline, 37 mt by pot, 686 mt by shrimp trawl and 447 mt by other gears. This represents a 22% decline over total landings of 25,653 mt in 1985.

In 1986, Washington's landings of trawl caught groundfish declined for the fourth consecutive year. Over all species, landings fell by 20% from 20,431 mt in 1985 to 16,274 mt in 1986. Declines were registered in eleven of thirteen major species categories.

Washington's 1986 landings from gears other than trawl were 3715 mt representing a 29% decrease over the 5222 mt landed in 1985. The pot fishery registered the largest percentage decline (down 95% from 845 mt in 1985 to 37.4 mt in 1986), a reflection of reduced effort. The setline fishery landed 2545 mt; 2142 mt from the coast, and 403 mt from Puget Sound. Coastal landings were 83% sablefish and 14% rockfish, while Puget Sound landings were 81% dogfish and 10% sablefish. The shrimp trawl fishery landed 686 mt in 1985, a three fold increase over 227 mt landed in 1985. Shrimp trawl landings consisted of 80% rockfish, 7% lingcod, 4% dover sole, 4% arrowtooth flounder, and 3% sablefish.

e. Oregon

The total landed catch of groundfish (excluding Pacific halibut) by commercial gear types in 1986 was 24,904 mt (Table 1).
This represents a decline of 14% from the 1985 landings of 28,992 mt.

The trawl fishery accounted for 20,841 mt or 84% of the landed commercial catch. This represents a decline of 24% from the 1985 trawl landings of 25,790 mt. Trawl effort in 1986 was 55,109 hrs compared to the 76,994 hrs expended in 1985, a reduction of 28%. This was due to a greatly expanded shrimp fishery which provided an above average economic alternative for many trawl vessels. As in previous years major species/species groups present in the trawl fishery were rockfish, Dover sole, and sablefish which contributed 50%, 23%, and 8% respectively.

Landed catch (excluding halibut) by all other gear types in 1986 was 4,063 mt, a 27% increase over 1985. Pot and longline gear types were most important, accounting for 35% and 34% respectively. Sablefish was the most important species landed by these gear types. Landings of halibut were 146 mt.

f. California

California's 1986 commercial groundfish landings, including California halibut, were 41,795 mt (Table 1) with an exvessel value of $31 million dollars. The 1986 catch declined by 1,935 mt or 4% from the 43,730 mt catch in 1985 due to decreased landings of most major species. Trawl fisheries

dominated the State's landings, accounting for 78% (32,469 mt) of the total, followed by set net (4,983 mt or 12%), hook and line/longline (2,856 mt or 7%) and "other gear" fisheries (629 mt or 1%).

Trawl landings of the principal groundfish species, with the exception of sablefish and Pacific whiting, declined from 1% to 35% over 1985 levels (Table 2). A shift in trawl effort from groundfish to a rejuvenated ocean shrimp fishery off northern California and Oregon appears to be the principal cause for the 8 percent decrease in aggregate trawl landings. Only 136 California based trawl vessels fished for groundfish off California during 1986, representing a 13% drop in numbers from the 169 vessel 1985 groundfish fleet.

Market demand for most groundfish species, particularly sablefish, remained strong throughout the year. With the elimination of the directed Japanese sablefish fishery in the U. S. Fishery Conservation Zone off Alaska in 1985, increased demand in Japan for U.S.-caught sablefish stimulated fishing effort and caused sharply higher exvessel prices for all size categories. In contrast to California trawl landings, hook and line and set net groundfish catches increased by 76 percent (up 1,236 mt) and 25 percent (up 1,005 mt), respectively, over the 1985 levels. These increases appear to be a result of more intensive fishing effort and not to dramatic increases in resource abundance. Rockfishes and sablefish were the principal fishes taken by these two gear types.

g. Halibut

Halibut fishing in 1986 continued a recent trend of increasing catches. The fishery landed 68.96 million pounds dressed weight (41,700 mt round weight), and slightly exceeded the 66.4 million pound (40,200 mt) catch limit set by the International Pacific Halibut Commission. The 1986 catch level was surpassed only six times since 1929, exceeded the 1985 catch by 12.85 million pounds (7,800 mt), and was about three times larger than the recent low levels of about 22 million pounds (13,000 mt) during the 1977-80 period. Largest abundance and the majority of catch occurred in the Gulf of Alaska (Alaska Peninsula through Southeast Alaska).

IPHC regulations required that all vessels fishing commercially for halibut must have an annual license issued by the Commission, but 350 vessels, or nine percent of the vessels reporting landings did not. The number of vessels was up sharply in most areas, with an overall increase in fleet size of 683 vessels, or over 21 percent from 1985.

The number of Canadian vessels authorized to fish for halibut is limited by the Government of Canada, and thus the fleet size does not vary greatly from year. However, the number of vessels actually landing halibut increased nearly nine percent in 1986, as more of the licensed vessels exercised their right to participate in the halibut fishery.

There are no restrictions on the numbers of United States vessels that may participate in the halibut fishery, and the result has been an overall increase in fleet size over the past several years. In 1986, 3,452 vessels

reported halibut landings, an increase of over 23 percent from 1985, reversing a slight downward trend in the previous two years. Increased fleet participation was prevalent in all major regulatory areas. The largest change in fleet size occurred in Area 3B which increased from 385 to 573 vessels, or nearly 49 percent, between 1985 and 1986. Increases in other areas were 40 percent in 2A, 17 percent in 2C, 25 percent in 3A, and 29 percent in the five regulatory areas within Area 4.

2. Recreational Fisheries

a. Canada

The Field Services Branch (DFO) conducts creel surveys of the recreational angling fishery in the Strait of Georgia. Principal target species are chinook and coho salmon. Provisional estimates of 1986 catches were 70,800 fish for lingcod, 167,800 for all rockfish species, and 5,200 for dogfish.

b. Alaska

No material on recreational fisheries was submitted.

c. Washington

The total recreational bottomfish landings in 1986 were 1,235,276 fish. Washington coastal recreational bottomfish landings accounted for 375,630 fish which included a total of 331,544 rockfish, 22,364 lingcod, and 21,722 fish of other species. Recreational landings in Puget Sound in 1986 totalled 859,646 fish which included 262,645 rockfish, 155,289 Pacific cod, 174,232 walleye pollock, 115,214 flatfish, 25,793 lingcod, and 126,473 fish of other species.

d. Oregon

The 1986 recreational fishery out of Oregon's ports resulted in a catch of 202,541 fish; this was an increase of 25% over that of 1985. Some of this increased catch was due to the longer fishing season in 1986, which was approximately 14% longer than the 1985 season.

The number of bottomfish directed trips in 1986 increased by 36% over 1985, from 19,720 angler trips to 26,153 trips. Charter boat anglers made 54% of the total trips, while private boat anglers made 46%. Anglers targeting on bottomfish caught an average of 5.7 fish per trip, compared to 5.8 fish per trip in 1985.

Black rockfish (*Sebastes melanops*) was again the main species in the recreational catch comprising 61% of the total. Combined rockfish species accounted for 88% of the total catch.

PMFC area 2C again produced the most fish, 200 mt. This area includes the ports of Newport, Garibaldi, and Depoe Bay, that ranked first, third, and fourth, respectively, in the state's landings.

f. California

Estimates of California's total recreational groundfish catch were not available as of this report. However, unpublished catch estimates of the 1986 recreational landings of rockfishes and lingcod were obtained from the Marine Recreational Fisheries Statistics Survey. Recreational catch data from shore, pier, and skiff anglers were not available for this report but rockfish, lingcod, and flatfishes have historically contributed significantly to their catches. Total recreational landings of rockfish were 4681 mt which consisted of 2474 mt from Southern California and 2207 mt from Northern California. Total recreational landings of lingcod were 910 mt which included 173 mt from Southern California and 737 mt from Northern California.

B. Joint venture fisheries

1. Canada

In 1986, twenty one Canadian catcher vessels delivered Pacific whiting and incidental species to eleven processing vessels in cooperative fishing arrangements. These fisheries take place off the southwest coast of Vancouver Island (Area 3C). A total of 30,136 mt of Pacific whiting was processed by seven Polish vessels and four Soviet vessels during 1986. The quotas and catches are outlined below:

Nation	Species	Quota (mt)	Catch (mt)
Poland	Whiting	13,500	13,494
	Pollock	incidental	19
	Rockfish	incidental	6
	Other	incidental	tr.
USSR	Whiting	15,000	16,642
	Pollock	incidental	63
	Rockfish	incidental	34
	Other	incidental	tr.
Total	Whiting	28,500	30,136
	Pollock		82
	Rockfish		40
	Other		tr.

2. United States

U.S. joint venture fisheries have become the dominant harvesters of groundfish in the Bering Sea and Gulf of Alaska at the expense of foreign fisheries. Joint venture catches have increased by 77% in the Bering Sea going from 639,421 mt in 1985 to 1,158,270 mt in 1986 (Table 3). Major

Table 3. 1986 joint-venture landings (mt) in the Bering Sea, Gulf of Alaska, and Washington-California region by species and INPFC area (1985 catches are presented in parentheses).

	Bering Sea				
Species	Area II	Area IV	Area I	Total	
Pollock	295,259	30,260	509,582	835,101	(377,539)
Pacific cod	1,441	7,556	56,386	65,383	(41,271)
Sablefish	0	83	348	431	(109)
Atka mackerel	0	31,978	0	31,978	(37,858)
POP	1	163	101	265	(445)
Other rockfish	13	214	52	279	(17)
Yellowfin sole	163	0	151,238	151,401	(126,407)
Turbot	6	7	23	36	(456)
Flounder w/o YF sole	345	266	61,432	62,043	(45,882)
Squid	3	15	16	34	(30)
Herring	1,453	0	2,309	3,762	(3,058)
Other fish	168	1,442	5,947	7,557	(6,342)
Total	298,852	71,984	787,434	1,158,270	(639,414)

	Gulf of Alaska				
Species	Chirikof	Kodiak	Shumagin	Total	
Pollock	0	56,157	6,425	62,582	(237,859)
Pacific cod	15	750	592	1,357	(2,265)
Sablefish	3	2	38	43	(225)
Atka mackerel	0	0	4	4	(1,845)
POP	0	1	35	36	(254)
Shortspine thornyhead	0	0	1	1	(8)
Other rockfish	0	4	26	30	(45)
All flounders	20	640	302	962	(2,416)
Squid	0	7	0	7	(6)
Other fish	0	238	17	255	(2,246)
Total	38	57,799	7,440	65,277	(247,179)

	Washington-California				
Species	Vancouver	Columbia	Eureka	Total	
Pacific hake	11,346	67,037	3,164	81,547	(31,512)
All flounders	0	0	0	0	(0)
Jack mackerel	0	0	0	0	(0)
POP	0	0	0	0	(0)
Other rockfish	26	135	3	164	(48)
Sablefish	6	0	0	6	(1)
Other fish	43	0	0	43	(6)
Total	11,421	67,172	3,167	81,760	(31,567)

Table 4. Foreign groundfish catches in 1986 by species and INPFC areas (1985 catches are presented in parentheses).

Species	Bering Sea				
	Area I	Area II	Area IV	Total	
Pollock	85,415	251,736	15,178	352,329	(821,272)
Pacific cod	8,706	31,149	5	39,860	(57,331)
Yellowfin sole	53,947	3,250	0	57,197	(100,981)
Flounder	10,392	3,439	44	13,875	(25,689)
POP	4	14	0	18	(74)
Other rockfish	6	12	0	18	(44)
Sablefish	41	67	0	108	(312)
Atka mackerel	6	1	0	7	(1)
Turbot	438	6,357	99	6,894	(21,380)
Squid	22	807	1	830	(1,593)
Other fish	2,505	1,792	1	4,298	(6,302)
Total	161,482	298,624	15,328	475,434	(1,034,983)

Species	Gulf of Alaska				
	Shumagin	Chirikof	Kodiak	Total	
Pollock	72	42	0	114	(31,615)
Pacific cod	11,568	3,642	0	15,210	(9,084)
Flounders	56	15	0	71	(169)
Atka mackerel	0	0	0	0	(1)
Shortspine thornyhead	0	0	0	0	(3)
Squid	0	0	0	0	(5)
Other rockfish	92	59	0	151	(95)
Total	11,788	3,758	0	15,546	(40,972)

Species	Washington-California				
	Vancouver	Columbia	Eureka	Total	
Pacific hake		41,529	28,332	69,861	(50,737)
All flounders		2	0	2	(1)
Jack mackerel		405	144	549	(36)
POP		1	0	1	(10)
Other rockfish		192	1	193	(170)
Sablefish		5	2	7	(24)
Other fish		94	45	139	(105)
Total	0	42,228	28,524	70,752	(51,083)

Table 5. Final 1986 and initial 1987 foreign groundfish allocations (mt) for the Bering Sea/Aleutian area, Gulf of Alaska and Washington-California.

Bering Sea

Species	Japan 1986	Japan 1987	Poland 1986	ROK 1986	ROK 1987	PRC 1987	1987 Total initial TALFF
Pollock	298,013	675	7,226	87,746	500	25	1,200
Pacific cod	36,511	22,000	86	4,180	500	35	22,533
Yellowfin sole	52,667	50	10	10,599	1,477	69	1,596
Flounder	39,793	450	386	5,290	4,300	175	4,925
POP	59	1	4	12	1	1	3
Other rockfish	55	2	4	11	1	1	4
Sablefish	93	22	4	32	5	1	28
Atka mackerel	38	1	1	7	2	1	4
Turbot	12,082	850	10	200	5	1	856
Other fish	12,881	600	234	3,267	248	12	860
Total	452,192	24,651	7,965	111,344	7,039	321	32,011

Gulf of Alaska

Species	Japan (Total TALFF) 1986	1987
Pollock	140	0
Pacific cod	15,520	0
Flounders	120	0
Atka mackerel	30	0
Thornyhead	10	0
Sablefish	--	0
Other fish	280	0
Total	16,100	0

Washington, Oregon, California

Species	Poland 1986	Poland 1987	PRC 1987	ROK 1987
Pacific hake	70,000	11,400	1,600	500
Flounder	70	11	2	0
Sablefish	121	20	3	1
Jack mackerel	2,100	340	48	15
POP	43	7	1	0
Rockfish	516	84	12	4
Other fish	350	57	8	2
Total	73,200	11,919	1,674	522

increases occurred in pollock (+121%), yellowfin sole (+20%), and flounder (+35%) catches. Decreases were recorded in Pacific cod (-16%), and Atka mackerel (-18%). Gulf of Alaska catches decreased from 247,174 mt to 65,169 t, due almost entirely to a much reduced pollock OY as a result of estimated large decline in population size. Pacific cod and flounder catches were down again in 1986, this time by 40 and 60 percent, respectively. Joint venture catches in the Washington-California region increased by 162% in 1986. This increase resulted from a greater participation by the Polish J.V. company in the whiting fishery. Joint venture allocations in 1987 are 1,442,867 mt (+42%) in the Bering Sea, 23,250 mt (-76%) in the Gulf of Alaska, and 106,250 mt (-11%) in the Washington-California area.

Fishing effort was up in the Bering Sea where catcher vessel days increased from 7,429 to 9,851. Conversely, effort was down dramatically in the Gulf of Alaska from 2,360 days to 582 days. In the Washington-California region effort increased from 764 to 1695 days.

C. Foreign Fisheries

1. Canada

The USSR and Poland conducted national fisheries for Pacific whiting off southwest Vancouver Island (Area 3C) in 1986. Nine Polish and five Soviet vessels caught 22,939 mt of Pacific whiting. Five of the processing vessels involved in the joint-venture fishery occasionally fished directly (supplemental fishing) when domestic vessels could not supply sufficient quantities of whiting. This supplemental whiting catch of 803 mt is added to the national catch. A summary of foreign fishery catches follows:

Nation	Species	Quota (mt)	Catch (mt)	Supplemental catch (mt)	Total catch (mt)
Poland	Whiting	15,000	14,827	778	15,605
	Pollock	incidental	14	-	14
	Rockfish	incidental	137	tr.	137
	Other	incidental	tr.	-	tr.
USSR	Whiting	15,000	8,112	25	8,137
	Pollock	incidental	1	-	1
	Rockfish	incidental	103	1	104
	Other	incidental	tr.	-	tr.
Total	Whiting	30,000	22,939	803	23,742
	Pollock		15	-	15
	Rockfish		240	1	241
	Other		tr.	-	tr.

2. United States

Even greater decreases in foreign groundfish catches occurred in 1986 than in 1985 in the Bering Sea and Gulf of Alaska as a direct result of greater participation in the fishery by domestic vessels (Table 4). The total catch increased off the West Coast as a result of greater foreign harvest of Pacific whiting. In the Bering Sea catches were reduced by 54% for all species, but largest reductions were seen for pollock (-57%), yellowfin sole (-43%), turbot (-68%), and squid (-48%). Gulf of Alaska catches dropped by 62% from 40,972 mt in 1985 to 15.542 mt in 1986. Major decreases were recorded in pollock (-99%) and flounder (-58%) catches. Pacific cod catches increased from 9,084 mt to 15,211 because Japan was given a larger allocation. Pacific whiting catches in the Washington-California region increased from 50,737 mt in 1985 to 69,861 mt in 1986. Poland was the only foreign country to receive a whiting allocation in 1986.

Foreign fishing effort was reduced drastically from 12,495 vessel days in the Bering Sea in 1985 to 5,015 in 1986 (-60%). In the Gulf of Alaska, only 666 vessel days were recorded in 1986, a substantial decrease from the 1984 level of 2,693 vessel days. Only a Japanese longline fishery for Pacific cod occurred in the Gulf of Alaska in 1986. Foreign effort in the Pacific whiting fishery increased from 1,192 vessel days in 1985 to 1.497 in 1986.

The continuing trend of displacement of foreign fishing effort by domestic effort is a product of reduced foreign allocations as the United States harvesting capacity increases. Final 1986 foreign groundfish allocations are compared with 1987 allocations in Table 5. Dramatic reductions occurred in the Aleutian/Bering Sea and the Gulf of Alaska. In the Aleutian/Bering Sea the 1987 allocation represents only 14% (54,281 mt) of the 1986 allocation and is comprised mainly of Pacific cod and flounders. In the Gulf of Alaska in 1987, for the first time since foreign fishing began, there will be no foreign fishery. Directed foreign fishing in the Washington-California region in 1987 is expected from Poland, the Peoples Republic of China, and the Republic of Korea which were collectively allocated 63,750 mt of Pacific whiting, a slight increase over 1986.

D. Groundfish Management and Regulations -- Significant changes

1. Canada

a. Rockfish

A major shift in management policy for rockfishes occurred in 1986. As a result of problems in compliance with area-specific management, the Department adopted a policy of coastwide quotas for rockfishes, coupled to trip limits. The effect of these two elements was to concentrate fishing effort in those areas with both acceptable catch rates and close to a port of landing. The areas concerned (3D and 5E) were not considered to have stock biomasses sufficient to sustain removals at the 1986 levels. The coincident effect of underutilized production in such areas as 5C was not detrimental, but it did create problems. Industry did not perceive coastwide quotas to imply management on the basis of coastwide stocks,

rather than stock-specific management. The disparity between this variable productivity among stocks and distribution of fishing effort under coastwide quotas led to a return to stock-specific management in 1987.

2. United States

a. East Bering Sea-Gulf of Alaska

1. North Pacific Fishery Management Council (NPFMC)

Mr. Davis reviewed NPFMC actions on groundfish. The Bering Sea/Aleutian Islands plan was amended twice since the last meeting of the subcommittee. Amendment 10 to the plan closed an area in the Bering Sea to trawling and set prohibited species catch limits (PSCs) on crabs and halibut. The amendment also required weekly catch reporting by catcher/processor vessels; authorized reapportionments of quota among domestic and joint venture user; and expanded the National Marine Fisheries Service's (NMFS) authority to make inseason adjustments. Amendment 11, which was adopted by the NPFMC at their May 1987 meeting, revises the definition of the term "prohibited species" and "acceptable biological catch", and approved a seasonal apportionment (split season) for pollock in Bering Sea joint ventures. The purpose of the split season is to prevent joint ventures from taking the entire pollock quota during the spawning period and to encourage U.S. fishermen to deliver to domestic processors. This split season approach to pollock management will be tested for two years after which a continuation or new strategy will be adopted.

The Gulf of Alaska plan has also been amended. Amendment 15 established a single OY range of 116,000-800,000 mt and an administrative framework procedure to set annual species quotas within the range without requiring plan amendment. The amendment also established a framework procedure for setting PSCs for fully U.S. utilized groundfish species applicable to joint ventures and foreign fisheries; established time/area restrictions on non-pelagic trawling around Kodiak Island to protect king crab for three years; revised reporting requirements for at-sea processors; and expanded NMFS's inseason adjustment authority. Amendment 16 to the Gulf plan is currently undergoing public review. Primarily a housekeeping amendment, it proposes clarifying the term "prohibited species", and updates the descriptive chapters in the plan.

THe NPFMC is currently focusing its attention on several issues, the most challenging being the issue of bycatch. Having recognized the mixed species nature of the groundfish fishery, their desire to minimize wastage of the resource, and the goal to maximize the full potential of the groundfish resource as a whole, the NPFMC is working towards development of a comprehensive management policy with regard to incidental catch.

b. Washington-California

1. Pacific Fishery Management Council (PFMC)

Regulation of the groundfish fisheries seaward of three nautical miles is

managed by the federal government under the Pacific Coast Groundfish Fishery Management Plan (FMP) developed by the Pacific Fishery Management Council (PFMC). Federal regulations for Washington-California in 1986 are provided in Appendix A.

In 1986, the PFMC approved an amendment to the FMP which allows modification of gear regulations on both an annual an inseason basis. In addition, PFMC approved a measure to allocate the sablefish quota between trawl (52%) and non-trawl (48%) fishermen for the 1987 season.

Major issues of concern which PFMC will be addressing in 1987 and 1988 include 1) sablefish allocation, 2) prohibited species bycatch, 3) halibut allocation within U.S. waters, 4) limited entry for the groundfish fishery, and 5) management of the expanding Pacific whiting fishery.

2. WDF

a. Puget Sound

There were no permanent regulation changes in 1986, however, emergency regulations were enacted to manage the Puget Sound whiting fishery and to close the North Sound herring fishery.

b. Coastal Management Zone

During 1986 regulation changes by the Washington Department of Fisheries paralleled those of the Pacific Fisheries Management Council (see Appendix A).

3. Oregon

Numerous changes in trip limits for Sebastes complex, widow rockfish, Pacific ocean perch, and sablefish occurred in response to Pacific Fishery Management council (PFMC) recommendations and to match similar changes in federal regulations during 1986. These are shown in Appendix A.

Effective January 1, 1986 an angling license was required for all marine finfish. In addition, the daily bag limit was liberalized for perch and flatfish. The new bag limit is 25 fish in the aggregate. Rockfish and lingcod bag limits were unchanged.

3. International

a. Halibut (IPHC)

The International Pacific Halibut Commission received regulatory proposals for the 1986 halibut fishery from fishermen, vessel owners, processors, government agencies, treaty Indian tribes from Washington state, and the Commission's scientific staff. A summary of all proposals identified by source was distributed to interested groups prior to the meeting.

The scientific staff's proposals were affected by three significant

management problems identified in the 1986 fishery: high daily catch rate jeopardizes managing at the catch limit; illegal fishing is on the rise; and incidental fishing mortality within the longline fleet is increasing.

Daily catch rates continued high in 1986. The change to circle hooks from "J" hooks, increased abundance, and increased fishermen in some areas combined to produce potential daily catches of approximately 10 million pounds (6,000 mt) in Areas 3A and 3B (areas which represent about 60% of the total catch). Two day seasons in these areas may no longer permit management within the catch limits, and one day seasons may be necessary.

High prices, short seasons and large profits are apparently the cause of increased fishing before and after legal openings or in closed areas. Reports from fishermen of illegal fishing activities is at an all time high. In addition to other difficulties a high level of illegal fishing activity compromises CPUE data.

Efforts by fishermen to increase efficiency are causing increased incidental mortality. During short openings, some fishermen set more gear than can be hauled during an opening to be sure that maximum fishing occurs. In such cases, fishing occurs up to the end of the season, and all unretrieved gear abandoned for later pick-up. Bad weather also forces gear to be left. Incidental halibut mortality also occurs when fishermen improperly release undersized halibut; short intense seasons reduce the incentive of fishermen to exercise full care in releasing undersized fish.

VIII. GROUNDFISH RESEARCH

A. Stock Assessments

1. Pacific Cod

a. NMFS-NWAFC

Abundance of Pacific cod (*Gadus macrocephalus*) in the eastern Bering Sea remained high during 1986, when a near record catch of 141,000 mt was taken. Model projections indicated that the large 1977-78 year-classes, which had born the brunt of the fishery for a number of seasons, would constitute a relatively minor component of the catch in 1987 as the relatively strong 1982-84 year-classes moved into the fishery. Since abundance was at an all time high (1,134,100 mt in 1986), acceptable biological catch was set at 377,800 mt This figure resulted from a new model designed to calculate annual surplus production. The lack of a consensus regarding the best method of aging cod continues to plague modeling efforts, however. Tagging experiments currently in progress in both the eastern Bering Sea and Gulf of Alaska may help to resolve this issue.

As far as the status of the stock in 1987 is concerned, CPUE data through May indicate that relative abundance is holding up. Japanese longline CPUE in INPFC area 52 of the Bering Sea averaged 28.15 t/day for the first 21

weeks of 1987, compared with rates of 28.76, 28.73, and 23.06 in 1986, 1985, and 1984, respectively. Catch rates in the U.S.-Soviet JV trawl fleet have been higher in 1987 than in any of the previous three years. For weeks 8-11, CPUE (t/day) in INPFC area 51 has varied as follows: 1987 - 51.31, 1986 - 41.71, 1985 - 28.10, and 1984 - 42.86.

2. Rockfish

a. DFO

Analysis of the 1985 trawl survey for Pacific ocean perch in Area 3C(N) was completed in 1986. This survey replicated a survey conducted in 1979, and also replicated nine hauls from the 1985 NMFS survey in Area 3C(S). The estimated biomass of S. alutus in Area 3C(N) in 1985 was approximately 1850 t, a decline of 56% from the 1979 estimate of approximately 4220 mt While the validity of the absolute values of swept-area estimates of rockfish biomass are open to question, the relative change is thought to be significant. During this same period Canadian LPUE for S. alutus in Area 3C(N) declined by 49%. Biological samples collected during the survey indicate no substantial recruitment since 1979. The stock remains in poor condition.

Replicate tows of those made during the 1985 U.S. survey showed slightly higher catch rates, distributed more uniformly over the survey area, although fishing gear and time of year for these two surveys differed.

b. NMFS-NWAFC

A reappraisal of the Pacific ocean perch (*Sebastes alutus*) resource in waters off the Washington and Oregon coasts was conducted during the past year. The status of the resource was evaluated using a variety of assessment methods. First, Pacific ocean perch trawl surveys were used to examine recent trends in abundance and productivity. Next, historic catch-at-age data were re-evaluated using virtual population analysis and a lower estimate of natural mortality (M = 0.05) than had been used in previous analyses. Stock reduction analysis (SRA) was then applied to these stocks for the first time. Finally, the best SRA population parameter estimates were inserted into Schnute's extended form of the delay difference equation in order to estimate future stock sizes under a variety of recruitment and fishing rate scenarios.

The study concluded that the Pacific ocean perch resource is in poor and perhaps worsening condition, with the current biomass well below the level which produces MSY. Based on the 1985 trawl surveys, stock biomass was estimated at about 3,900 mt in the INPFC Vancouver area and approximately 8,700 mt in the Columbia area. The best estimate of the biomass which produces MSY (as determined by SRA) is roughly 25,000 mt for both stocks. Since it is desired to rebuild these stocks to more optimal levels, rebuilding scenarios were examined using a variety of recruitment and fishing rate assumptions. It was suggested that the acceptable biological catch (ABC) be set to zero if the objective of management is to rebuild these stocks at the maximum rate.

c. WDF

Black Rockfish. Objectives of the black rockfish stock assessment project are to conduct a multi-stage tagging experiment to estimate survival rates, exploitation rates, and abundance of the population adjacent to the Washington coast. A secondary objective is to obtain further information on growth and migration of black rockfish. The coast has been stratified into subareas from Tillamook Head to Neah Bay with equal tagging effort expended in each subarea. Current experimental design calls for annual tag releases from 1986 to 1988.

Previous WDF tagging studies have documented a significant and predominantly southward summertime movement of black rockfish. Fifteen percent of the recovered tagged rockfish had moved over 40 miles from the point of release. During 1986, 6,225 black rockfish were tagged. To date, 672 tags have been recovered. Port sampling activities with respect to black rockfish were also intensified. Fifty three bio-samples consisting of age, length, and maturity were conducted on landings from the various coastal fisheries harvesting black rockfish. A total of 1,325 otoliths were collected for ageing.

In addition to tagging, we are using acoustic surveys to estimate black rockfish population size along the Washington coast. The surveys began in 1986. The target area is stratified by bottom type. The project is in a pilot phase and no results are available to date.

c. CDFG

Bocaccio. The status of bocaccio rockfish in California (INPFC Eureka, Monterey, and Conception areas) was assessed during 1986. The majority of commercially harvested bocaccio are captured by bottom trawl gear in the INPFC Monterey area. Monterey area landings increased considerably during the 1977-1984 period, followed by a sharp drop in 1985. At least part of the 1985 landings decline can be attributed to less effort, however most of the decline reflects the significantly reduced contribution of the 1977 year-class. A general decline in 1985 landings was predicted as the 1977 year-class passed through the fishery. The analysis indicated that the bocaccio trawl fishery has become a recruitment fishery, reliant upon an occasional strong cohort to sustain catches, such as the large 1977 cohort. The stock is, at the least, moderately overexploited. Attempts to estimate stock biomass and yield levels using age-structured models were frustrated by the discovery of serious ageing errors in the 1985 data, as well as the need to incorporate data on gill net mortality into the analysis. A revised assessment was under way during 1987.

Chilipepper. The status of the chilipepper stock in Eureka, Monterey, Conception INPFC areas was updated in 1986 for the Pacific Fishery Management Council. For the 1986 assessment the cohort analysis procedures employed previously were reexamined with the addition of another year of catch-at-age data. The results of this suggested that age class linkage was still inappropriate, as was the assumption of constant fishing

mortality for age 10 chilipepper used in the previous analysis. The catch-at-age model developed by R. Deriso and others at the International Pacific Halibut Commission was used successfully to estimate fishing mortality rates, population abundance, and biomass. Mean fishing mortality rates for fully recruited fish ranged from 0.103 to 0.232 over the 1978-1983 study period. The estimated mean stock size was 45,025 mt with a mean equilibrium yield level of 2,480 mt The maximum sustainable yield (MSY) biomass was estimated to be 26,794 mt with an MSY level of 3,563 mt Based upon evidence of a single unit stock of chilipepper, the assessment report recommended the establishment of a single coastwide acceptable biological catch (ABC) of 3,500 mt to replace the separate ABC's in effect for the INPFC Monterey and Conception areas.

e. NMFS-SWFC

Cohort analysis and catch-at-age analysis were used to estimate fishing mortality rates and population size for widow rockfish (*Sebastes entomelas*), using 1980-1985 catch-at-age data. Fishing mortality was slightly lower in 1985 than in 1984, due to an increase in stock size and a reduction in harvest. Projected stock biomass in 1986 and 1987 should be similar to the estimated levels in 1984 and 1985. Estimates of MSY ranged from 8,400 to 12,000 mt, with an average of 10,000 mt. The recommended fishing mortality rate for fully recruited fish was 0.30. At this level of fishing effort, average yield in 1987 and 1988 (an estimate of ABC) would be 12,400 mt. Using spawning stock as a criterion for assessing stock status, yield in 1987 could range from 8,700 to 14,000 mt.

The estimate of acceptable biological catch (ABC) in 1985 was 9,300 mt, an increase of 1,900 mt over the 1984 ABC. The increase can be attributed not only to an increase in the length of the (relatively short) data series, but also to fluctuations in recruitment.

3. Sablefish

a. NMFS-NWAFC

Japanese longliners began fishing for sablefish (*Anoplopoma fimbria*) in the eastern Bering Sea in 1958. The fishery expanded rapidly and catches increased to a peak of 25,990 mt in 1962. After 1972, catches declined as a result of declining stock abundance. Catches since 1977 have remained at relatively stable and reduced levels because of continued low stock abundance and catch restrictions placed on the fishery. In 1986 the all nation catch of sablefish in the eastern Bering Sea was 3,189 mt In 1977, Japanese longline CPUE data indicate that sablefish abundance was 56% of the 1970 level. CPUE values continued to drop after 1978, reaching a low of 20% of the 1970 level in 1979. However, as a result of the implementation of the Magnuson Fishery Conservation and Management Act in 1977, revised fishing patterns and regulations make comparisons of pre-1978 and post-1977 CPUE data invalid. CPUE data show an upward trend beginning in 1980, which is a reflection of the recruitment to the fishery of the strong 1977 year-class. Increases in commercial catches and abundance estimates from the fishery and research surveys all indicate that sablefish

abundance has generally increased since 1980. The 1985 cooperative U.S.-Japan trawl survey showed a 16% decrease in biomass from the 1982 estimate of 42,900 mt to 36,100 mt, although these surveys did not include the entire eastern Bering Sea area. Relative indices of biomass from the U.S.-Japan cooperative longline surveys indicated a 53% increase from 1984 to 1985 and a 3% decrease from 1985 to 1986. The MSY for the eastern Bering Sea is estimated to be 13,000 mt based on general production models. Estimates of MSY from SRA range from 2,200-3,700 mt for the eastern Bering Sea region.

Sablefish catches in the Gulf of Alaska increased steadily from 1963 to 1972, at which time sablefish catches reached a peak of 37,503 mt Evidence of declining stock abundance led to significant fishery restrictions in 1977. The foreign harvest of sablefish declined from 15,961 mt in 1977 to 4,966 mt in 1983. The domestic sablefish fishery completely replaced the directed foreign fishery in the NPFMC central and eastern regulatory areas in 1984 and in the western area in 1985. Survey and commercial CPUE showed increases in most areas starting in 1980, which reflected the presence of the strong 1977 year-class. Increases in stock biomass due to the 1977 year-class appear to have ceased. Length frequencies from the 1984 trawl surveys in the Gulf show a small but distinct mode at 35-40 cm in length. These fish could be members of the 1983 year-class. Above average abundance of young sablefish (30-40 cm), possibly from the 1984 year-class, were observed in southeast Alaska's northern inside waters during the summer of 1985. MSY is estimated to be 25,100 mt and equilibrium yield estimates have ranged from 10,965 to 26,100 mt The total allowable catch for 1987 was set at 20,000 mt for the Gulf of Alaska.

The 1986 sablefish biomass for the WOC region has been estimated at 128,400 mt The 1986 estimate was then used as the terminal biomass estimate in SRA to estimate MSY under two recruitment assumptions. The SRA results indicated that MSY ranged from 11,800 mt with Beverton Holt recruitment, to 19,000 mt under a constant recruitment assumption. The 1987 optimal yield has been set at 12,000 for the WOC region.

b. ADFG

Work continued during the year in conjunction with National Marine Fisheries Service staff to determine the feasibility of using sablefish tag return data in a "closed" population such as Chatham Strait in Southeast Alaska as a sablefish biomass estimator. While there appears to be a high level of consistency in the results, no conclusions have been drawn and the analysis is continuing.

4. Flatfish

a. NMFS-NWAFC

The yellowfin sole (*Limanda aspera*) resource of the eastern Bering Sea, which supports the second largest fishery in that region, continued its decline since reaching a historic high level of abundance in 1983. The

1983 survey estimated abundance at 3,275,400 mt Estimated abundance in 1986 was 1,868,100 t, representing a decrease of 52%. Nevertheless, current abundance remains within the range of estimates of equilibrium unexploited biomass (1,300,000 mt - 2,000,000 t). The decline in abundance of yellowfin sole is expected to continue, but given the present age structure of the population, the decline should be slow. The strong 1973-77 year-classes will remain in the population for a few more years, and the moderately strong 1979-80 year-classes should further temper the decline. The stock has been managed according to a target exploitation rate of 10%, giving a 1987 ABC of 187,000 mt This would imply a decrease in catches from the historic high levels observed in 1985 and 1986 (227,107 mt and 208,560 mt, respectively).

The greenland turbot (*Reinhardtius hippoglossoides*) resource of the eastern Bering Sea also continued to decline in 1986, with almost a complete failure of recruitment observed since 1982. Biomass estimates from the shelf component of the stock have decreased from a high of 225,600 mt in 1979 to a low of 5,600 mt in 1986. However, the decline in the slope portion of the stock has not been so dramatic (123,000 mt in 1979 to 79,200 mt in 1985 - no estimate available for 1986). Although the survey probably reflects a real decline in abundance, the magnitude of recent commercial catches seems to indicate that the survey is systematically underestimating absolute abundance. Annual catches of 15,000 mt are projected to leave an adequate spawning stock through the early 1990's.

b. Oregon (ODFW)

English sole catch-at-age data spanning 1966-83 from the INPFC Columbia area and PMFC area 3B were used to conduct virtual population analysis (VPA). Estimated recruitment of three-year-old females was used in a dynamic pool model to estimate maximum sustainable yields (MSY) equilibrium biomass for a range of fishing mortality rates, recruitments, and assumed stock recruitment parameters using a Beverton and Holt recruitment model. Recruitment estimated by VPA has been lower than average and has had a declining trend since 1979. Using the low recruitment scenario, acceptable biological catch (ABC) for 1987 ranged from 551 to 1,088 mt in the INPFC Vancouver and Columbia areas. Recent catches have fallen within this range and there appears to be no point of concern at this time. Recent biomass levels appear to be capable of producing recruitment near the low recruitment scenario level of 4.51 million fish with the assumed stock recruitment relationship. The effects of the El Nino need to be monitored in the future to determine if recruitment of three-year-old fish falls below the low recruitment scenario levels.

b. CDFG

Dover sole. The results of California's Dover sole tagging in the INPFC Eureka area from 1969-1971 were published as CDFG Marine Administrative Report No. 87-3. A less extensive report was abstracted for publication in a multi-author, coastwide overview document, as recommended by the TSC Dover Sole Working Group.

Work continued during the year on preparation of a comprehensive dataset of fishery and biological data on the INPFC Eureka area Dover sole stock for a planned stock assessment. The target completion date of the assessment report is late spring, 1988.

5. Pacific whiting (hake)

a. NMFS-NWAFC

The status of the Pacific whiting (*Merluccius productus*) stock as assessed in 1986 is good. The potential yield is currently high due to strong 1980 and 1984 year-classes. New estimates of offshore whiting fishery production were made using an age-structured management model. The recommended catch for 1987 was 264,000 mt for the U.S. and Canadian fisheries combined.

The whiting fishery has historically been supported by a small number of strong year-classes. Therefore, a major portion of assessment research in 1987 has focused on improving our understanding of factors influencing year-class strength in Pacific whiting. In addition, improvements have been made to the age-structured management model to account for the wide variability in the egg recruit relationship for whiting.

b. WDF

In recent years the Puget Sound biomass of Pacific whiting as determined by acoustic survey has declined. This decline has generated concern among managers, based in part on evidence from research in British Columbia, that the exploitation rate on this species has been too high.

In 1986 the whiting biomass in Central Puget Sound remained at a low level of 18 million pounds (8,165 mt), about the same observed for 1985. This compares to a biomass of 45 million pounds (20,412 mt) in 1983. The reason for this decline is unclear, but as a result the allowable harvest rate in 1985 was lowered from 33% to 26% of the biomass level. In September of 1986 a fishery management plan was adopted which uses a variable exploitation rate for the upcoming season of fishing. A 1 million pound (454 mt) quota was established, down from the previous quota of 3 million pounds (1361 mt). Under the management plan, no additional fishing will be allowed if the biomass is less than 12 million pounds (5443 mt), a 15% exploitation rate will be allowed if the biomass is between 12 and 15 million pounds (5,443 - 6,804 mt), a 26% exploitation rate will be allowed if the biomass is between 25 and 35 million pounds (11,340 - 15,876 mt), and a 33% exploitation rate will be allowed if the biomass exceeds 35 million pounds (15,876 mt).

6. Spiny dogfish

a. DFO

Mr. Mark Saunders reported that the offshore stock is back to historic levels, while the Strait of Georgia stock is down. The coastal stock is

treated as a coastwide stock for modelling purposes. Tagging has revealed an offshore and southward movement in winter between British Columbia and Canada. Tagging off the Southwest of Vancouver Island and off Port Hardy is being conducted to look at fish movement between inside and outside waters.

7. Walleye Pollock

a. NMFS-NWAFC

The walleye pollock (*Theragra chalcogramma*) resource in the eastern Bering Sea supports the largest single species fishery in the northeast Pacific. During the last year, NWAFC survey data have been re analyzed to provide annual abundance estimates for pollock in a standardized survey area in the eastern Bering Sea. The 1986 bottom trawl survey on the continental shelf (4,977,900 mt) shows a slight increase over 1984-85 estimates (4,633,000 mt and 4,524,900 t, respectively). However, since significant portions of the stock reside over the slope and in midwater, a total abundance estimate cannot be obtained from the bottom trawl data. Assuming that abundance of the bottom tending portion of the stock is a good index of overall stock abundance, it was concluded that the acceptable biological catch could be increased from the 1986 level of 1,100,000 mt to 1,200,000 in 1987.

In recent years, the pollock fishery in the GOA region has been pursued predominantly in Shelikof Strait during the early spring spawning aggregations. These aggregations, which have been monitored by hydroacoustic surveys since 1981, have shown a steady decline from a level of 3,410,000 mt in 1981 to a level of 620,000 in 1986, representing nearly an 82% decrease in abundance. However, age-structured models predict an upswing in 1987 based on recruitment of the strong 1984 year-class. Research is continuing on the possibility of a density dependent spawner recruit relationship for this stock. An acceptable biological catch level of 95,000 was suggested for the western and central portions of the Gulf in 1987, which should allow some rebuilding to take place.

8. Halibut (IPHC)

Assessment of the Pacific halibut stock is based primarily on methods of catch-age analysis (Quinn et al. 1985). The information used in 1986 for the assessment is comprised primarily of logbook catch and effort data, port samples of otolith length frequency with age estimates for a sub-sample, commercial landings, habitat size estimates, bottom area estimates, tag return information, and standard stock assessment surveys. Comparison of individual landings reported on fish tickets with landing weights estimated by fishermen indicated that fishermen over-estimated catches. Use of estimated landing weights resulted in stock abundance estimates for 1985 being biased upward by about 12%. Stock abundance calculations for 1986 were delayed until fish ticket data became available.

The abundance of Pacific halibut in 1986, combined over all areas, was approximately the same as 1985. Exploitable biomass of Pacific halibut continued to grow slightly in 1986 by 3.5% according to catch-age analysis.

However, overall CPUE from the fishery dropped by 6% from 1985 levels. Only regulatory area 3A showed an increase in exploitable biomass in 1986, as compared to 1985 levels, according to catch-age estimates. Stable to slightly decreasing biomass estimates from 1985 to 1986 were obtained for Area 2A, 2B, 2C, and 4. Area 3B biomass decreased in 1986 from 1985 levels.

CPUE numbers have been standardized to a fixed "J" hook standard and adjusted for regional differences in catchability. Standardized CPUE values ranged in 1986 from a low of 48.1 pounds per skate in regulatory area 2A to 146.5 pounds per skate in the Chirikof-Shumagin regions. Overall CPUE for all areas combined is 127.8 pounds per skate, down from 135.8 estimated for 1985, which was the highest estimate in recent years. Halibut fishermen currently use circle hooks rather "J" hooks. Circle hook CPUE is obtained by multiplying "J" hook CPUE by 2.2.

A range of harvest levels is obtained from abundance estimates using two methods: annual surplus production (ASP) and constant exploitation yield (CEY). ASP is the excess of biomass above what is needed to replenish the population each year. The range of total ASP for the stock as a whole is 82 to 85 million pounds (37,195 - 38,556 mt). Total removals in 1986 were perhaps as high as 90.5 million pounds (40,824 mt), comprised of approximately 76% commercial, 4% sports, 9% maximum estimate of wastage, and 11% incidental. Setline ASP is the amount of production left after subtracting other catches (incidental, sports, wastage). The median estimate of setline ASP of 67.0 million pounds (30,391 mt) was obtained by subtracting sports catch, wastage, and incidental catch from the median estimate of total ASP (83.5 million pounds or 37,875 mt). The wastage estimate used in the subtraction is an approximation of the portion of wastage unaccounted for in our abundance estimates.

CEY estimates have been the preferred numbers to consider for setting catch quotas the last two years. A constant exploitation fraction (0.35) was multiplied to exploitable biomass to get total CEY for the entire stock. Setline CEY is found by subtracting other catches (incidental, sports, wastage) from the total CEY numbers. This reduction amounts to about 7% for the entire population biomass, which gives a setline exploitation fraction of about 28%, although it differs by regulatory area.

9. Lingcod

a. DFO

Dr. Laura Richards reported that growth rates as determined using age structures collected from the commercial catch agreed well with tag recapture data. DFO is presently conducting a population modelling effort for lingcod off the Southwest coast of Vancouver Island using a weight structured model.

a. NMFS-SWFC

Overall landings of lingcod are generally well below the ABC's established in the Groundfish Management Plan. The exceptions are the Vancouver and Eureka areas where the total catch exceeds the ABC of 500 mt. The increase in trawl landings in the Vancouver area is the principal concern. Catches there have doubled in the last two years, indicating a much stronger targeting on this species. This is a substantial change in the fishery and deserves closer monitoring. The ABC's in both the Vancouver and Eureka areas were set on the basis of current catch levels, so exceeding the ABC's is themselves is not a major cause for alarm. Accurate evaluation of the impact of this increased harvesting would require age-composition data. In the current Eureka area situation, lingcod catches of this level have been substantiated for a number of years and this is not the immediate problem that the Vancouver area is.

In future collection of catch statistics, individual trawl landings which include lingcod should be examined by area to determine the ability of the fishery to target on lingcod. Also, collection of data on commercial fisheries other than trawl needs to be improved, particularly in the Monterey and Conception area.

Mr. Norm Abramson reported that a study is underway to validate the spine aging procedure using tetracycline. Initial results indicate the possibility that the innermost ring may disappear.

b. WDF

WDF is conducting a multi-stage tagging experiment to determine survival rates, exploitation rates, and population size of lingcod in the Neah Bay - Cape Flattery area. An additional objective is to determine the mixing rates of the off-shore and near-shore portions of the population. Results from this study will be used to develop a management plan for the coastal recreational and commercial lingcod fisheries.

In 1986, two tag types were tested; a standard Floy dart tag, and an opercular tag (resembling a twist tie) which has been successfully used on halibut. The opercular tag was selected, based on evidence of better retention, less fowling, and improved legibility upon recovery.

Tags have been released in the Neah Bay area from the Sekiu River west to Cape Flattery. Of 965 tags released in the spring of 1986, 87 were recovered in the subsequent 1986 sport fishery. Following the sport fishery, 232 tags were released in the fall of 1986. In the spring of 1987, an additional 564 tags were released. In 1987, 34 tags have been recovered to date from the sport fishery. An additional release of tags is planned for the summer of 1987 and continued annual tag releases are planned for the next 2-4 years.

B. Related studies

1. Age determination

a. DFO

A report will be available soon on validaticn of rock sole aging. It is anticipated that a study will be conducted to validate the aging methodology for English sole.

b. ODFW

Work has been conducted to develop a method for long term storage of otoliths. Canary rockfish otoliths have been embedded in resin to preserve readability.

c. CDFG

Tagging and OTC age validation work is being conducted on California halibut using a variety of structures.

d. IPHC

Ongoing work to validate aging of Pacific halibut is being conducted. Returns of tagged fish with OTC marked otoliths, and examination of fish held in captivity are being used to confirm the aging technique.

2. Rockfish tagging

a. WDF

Black rockfish tagging has been conducted in 1986 as part of the black rockfish stock assessment project, discussed under item VIII.A.2.c.

b. ODFW

Approximately 8,000 black rockfish were were tagged in 1985, with 192 fish recovered through 1986 (approximately a 2.5% recovery rate). The maximum time at liberty was 408 days. Most of the recoveries occurred in the coastal charter boat fishery, and many were taken at the "wheat ship" site-- which seems to be an attractant in an area with few other bottom features.

3. Economics

Groundfish economics reports have been submitted by DFO, NMFS-NWAFC, and NMFS-SWFC, and are included as Appendices C, D, and E, respectively.

a. DFO

Groundfish economics projects in 1986 included: (1) a micro-computer based groundfish economic database, (2) sablefish Individual Transferable Quota

(ITQ) analysis, (3) analysis of regulatory strategies, (4) hake reduction analysis, and (5) halibut marketing potential analysis. This work is discussed in Appendix C.

b. NMFS

NWAFS. Groundfish economics projects conducted in 1986 are discussed under item VI.B.1.b. Additional information is contained in Appendix D.

SWFC. Three groundfish economics projects in 1986 included: (1) a recreational fishery study designed to measure participation rates as a function of fishing success, (2) the collection of cost data for the sablefish fixed gear fishery off Washington, Oregon, and California to assess the economic impact of allocation among gear types, and (3) production of a coastwide economic research database. This work is discussed in Appendix E.

c. IPHC

The International Pacific Halibut Commission contracted with Dr. Robert Stokes of the University of Washington to analyse the economic tradeoffs of halibut as a directed catch vs halibut as a bycatch in other fisheries. The study is a pilot, with preliminary results due in late 1987.

4. Pacific whiting (hake) management report (PFMC)

It was noted that the working group is scheduled to meet on July 12th, when modelling and other topics regarding Pacific whiting management will be discussed.

5. Other

a. WDF

Grays Harbor juvenile lingcod research. In 1986, WDF completed an experiment to determine the distribution, abundance, seasonal movements and timing of out migration of juvenile lingcod in the Grays Harbor estuary. Between May 12 and September 23, 1986, five monthly trawl surveys were conducted in Grays Harbor to determine the effects of time of year and depth on the distribution and abundance of juvenile lingcod and other groundfish. A separate trawl survey was conducted in July to determine the effects of tidal stage and station position relative to the Grays Harbor navigation channel on the density of juvenile lingcod and other groundfish. Thirty-two randomly selected stations in three depth strata (3.7-5.5 m, 5.5-9.1 m, and > 9.1 m) were sampled during each monthly survey, 9 arbitrarily selected stations were sampled twice at three tidal stages (low tide, mid tide, and high tide), and 18 other stations were sampled opportunistically throughout the 5-month survey period.

After completing 248 tows no juvenile lingcod were captured. The most abundant commercially important species in the catch were English sole (*Parophrys vetulus*) and Dungeness crab (*Cancer magister*). English sole

were present in all depth strata throughout the survey period. They were most abundant in the shallow depth stratum. Mean density was statistically different with depth during June and August, but not during other months. Mean density peaked in July although there were no statistically significant differences in density with respect to time.

The observed temporal distribution of English sole density may be biased as a result of under sampling small sole during May and June. The size distribution of English sole was trimodal in May and June becoming unimodal in September. Mean size differed by depth, with smaller fish in the shallowest depth stratum and largest fish in the deepest depth stratum. There was an apparent migration to deeper habitat as English sole grew, and a suspected emigration from the estuary as the sole reached a size of 115 to 125 mm. Although we could find no statistically significant differences in English sole density with respect to tidal stage or station relative to the Grays Harbor navigation channel, there were consistent observable trends. Highest densities were always observed at low tide and at stations south of the navigation channel, while lowest densities were observed at high tide and at stations north of the navigation channel.

Target strength. The WDF Technical Services Division is conducting an experiment to examine the variations in acoustic target strength of Pacific whiting and herring in Puget Sound. Acoustic assessments are the principal tools used by WDF to determine the stock size of these two species. Acoustic target strength is known to vary with the size and aspect of the fish. Increased knowledge of this variability is expected to improve biomass estimates.

Artificial reef investigations. WDF is comparing three methods of artificial reef construction: 1) plain concrete scrap, 2) quarry rock, and 3) quarry rock overlain with concrete scrap. WDF has strict guidelines for the size and quality of materials employed as substrate in artificial reef construction. We are experimenting to determine which configuration of these materials provides optimum habitat for the rockfish and lingcod species assemblage desired at the reefs.

Other artificial reef work concentrated on enhancing fishing opportunities for recreational boat and pier anglers through the construction of fishing piers and artificial reefs. A total of 2,438 tons of material was added to existing reefs. Major research findings included the determination that production on an artificial reef can be predicted prior to reef construction by use of a biota index developed for the Puget Sound region. Additionally, it was determined that the production of prey items on artificial reefs resulted in a shift of feeding from outlying habitats to feeding based primarily on the artificial reefs, for recreationaly important marine fish.

Otter trawl impact on Dungeness crab. There has been renewed concern among Dungeness crab fishermen, operating in the Gulf of Georgia and Bellingham Bay areas of Puget Sound, that otter trawl fishing is causing excessive mortality to crab. Beginning in 1984, crab caught incidentally in trawls were sampled opportunistically to determine incidence of injury. In 1985,

WDF conducted a controlled experiment to determine, timing of the crab molt, shell condition of the crab and mortality inflicted by incidental capture in trawls. Principal concern regarded potential wastage of male crab. It was determined that 7% of the hardshell, 11% of the intermediate shell, and 40% of the soft shell crab died after capture in the trawl. Crab molting began in April, peaked in late May and early June, and was complete by July. As a result of these experiments a management strategy was adopted to minimize the incidental mortality to crab.

In 1986, an otter trawl vessel was chartered to confirm crab concentration by depth and area. As a result, fishery advisories were sent to otter trawl fishermen requesting them to avoid areas identified where concentrations of newly molted crab were present. Fishermen followed the advisories and avoided fishing in the areas of concern.

Recreational fisheries. In Puget Sound a new project was initiated for recreational fisheries, with the assistance of Wallop-Breaux funds from the Fish and Wildlife Service. Components of this project include implementation of a voluntary fishing logbook program for charter boats, habitat studies for rockfish, and stock assessments of key recreational important species. Response to the charter logbook program has been excellent.

b. IPHC (Pacific halibut)

In 1986, the Commission conducted annual field research that included setline surveys of the adult population, a trawl survey of juveniles, tag releases in the Kodiak, Charlotte, and Southeastern regions, collection of logbook information from commercial and sport fishermen, and sampling of the commercial landings for age information.

Additional special projects for 1986 included investigation of the growth and development of larval and juvenile halibut and a project which gathered information on the use and effectiveness of automated hook strippers, which are gaining in popularity in the commercial fishery.

Adult Setline Surveys. The setline surveys of the adult population were conducted in the Charlotte, Southeastern, and Kodiak regions in 1986. Past results from these surveys have generally mirrored CPUE trends in the commercial fishery and have provided information on the percentage of males and females in the population. In addition, the catch of undersize fish provides a measure of potential recruitment to the fishable population. Results from the 1986 surveys confirm that stocks are at very high levels in the Southeastern and Kodiak areas and relatively low in the Charlotte region. The results also indicate that recruitment may be declining in the Kodiak and Charlotte regions, as the catch of fish below legal size dropped from 1985 levels.

Juvenile Trawl Survey. The juvenile halibut population is best examined through our trawl survey, which has been conducted annually since 1963. The survey covers several key areas from Unimak Pass to Cape St. Elias and, with the exception of 1983-1985, the Bering Sea. Although the survey

results may not be a good predictor of recruitment to the adult population, the survey does enable the Commission to study the distribution, growth, and migrations of juvenile halibut. Over the past few years, catches have been declining most noticeably in the Bering Sea.

Standardized Tagging Program. Annual tagging programs are conducted in conjunction with the juvenile and adult surveys. These experiments are designed so that a periodic release of tagged fish takes place in the same area each year. Principal objectives include monitoring changes in growth and migration rates. These releases have shown that juveniles migrate extreme distances, but adults move very little from one summer to the next. A high proportion of the adult halibut recovered in later years during our own survey fishing are caught exactly where released. In 1986, slightly more than 7,000 fish were tagged and released.

Logbook Data Collection. Annual monitoring of the commercial and sport fisheries includes sampling for age information and the collection of logbook data. Although only recently initiated, the voluntary sport/charter boat logbook program is being well-received by that segment of the industry. Participation has been steadily increasing the in last few years. In the commercial sector, logbook data have collected since the initial days of the Commission. In 1986, commercial logbook data were collected from 2,400 commercial fishing trips ranging from the Pribilof and Aleutian Islands in the Bering Sea to the Oregon coast, and represent over 28 percent of the commercial fishing trips that occurred last year.

Otolith Sampling. Sampling otoliths from the commercial landings has been a Commission program since 1933. The information collected is used to estimate the age structure of the population. Mathematical models have been developed which use this age information, along with other information, to estimate population abundance and develop recommendations for catch limits. During 1986, Commission employees sampled 350 vessel trips, originating from grounds in the Bering Sea to those off Oregon, collecting nearly 31,000 otoliths.

Larval Halibut Distribution. Using a specially-designed Tucker trawl net, research fishing was conducted May-July, 1986 from Dixon Entrance to the Bering Sea for larval halibut. Larvae were found in all areas, and primarily in the upper portion of the water column, where their movement is dictated by the current, tides and winds. Catches were highest in the Bering Sea and western Gulf of Alaska and lowest in southeast Alaska. Plankton samples were collected for the U.S. National Marine Fisheries Service for identification of larvae of other species.

Laboratory Observation of Larvae Development. In tandem with the larval halibut project is a cooperative study with the U.S. Fish and Wildlife Service and the University of Washington School of Fisheries being conducted at the Service's lab on Marrowstone Island in Puget Sound. Commission charter vessels delivered 15 live halibut to the lab during 1985. These fish ranged up to 50 pounds in size and included several gravid females. Unfortunately, equipment malfunction in the fall of 1986 resulted in the loss of most of these fish. In October, 1986, ten

additional fish were caught on Swiftsure Bank and taken to the Marrowstone Island lab. As these fish spawn, the fertile eggs will be collected and closely watched as they develop. Specimens will be taken periodically to observe the formation of the otolith and the metamorphosis of the fish itself.

Age Validation with OTC. Over the past five years, the Commission has been conducting an experiment to validate its aging techniques. During 1982 and 1983, nearly 1,800 halibut were tagged and released after being injected with oxytetracycline (OTC). Upon absorption by the fish's otoliths, the OTC leaves a mark visible under ultraviolet light. When the halibut is recaptured and the otoliths examined, the number of annual rings visible since the OTC mark can be compared to the known time at liberty. Several fish have been recovered and the preliminary results indicate that fish are being aged correctly.

Observation of an Automatic Hook Stripper. During the 1986 field season, the Commission staff observed several vessels with a set of closely spaced rollers located between the rail and the gurdy that allow the groundline and hooks to pass freely while pulling the hooks from the fish as they are drawn against the rollers. These hook strippers, commonly known as crucifiers, are only used on vessels fishing with fixed-hook gear. Interviews conducted with 20 skippers of boats which used hook strippers in 1986 indicated that the gear cost in gangions and bent and broken hooks is high, but that with shorter fishing periods this disadvantage is more than compensated by an approximate 30 percent increase in the amount of gear that can be hauled.

If sublegal, or pre-recruit halibut are stripped by the crucifier, the resultant injuries decrease the chance of survival. With proper handling, halibut can be released with little harm. The IPHC prohibited use of hook strippers for the 1987 season.

C. Cooperative research with other nations

Mr. Tom Dark reported that in 1986 the United States was again involved in cooperative research with the fishery agencies of the U.S.S.R and Japan, however, the recent trend has been a decline in cooperative research activity coincident with the "Americanization" of the Alaska groundfish fisheries. The result is less ship time for sampling, and U.S. ships will probably have to pick up the slack.

Additionally, a U.S./Canada study on Pacific whiting parasites has been completed. The Pacific whiting workshop was a project facilitated by the Technical Subcommittee.

IX. OTHER TOPICS FOR DISCUSSION

A. PacFIN - PMFC Data Series Merger Project -- Progress Report

Mr. Will Daspit reported on the status of the Data Series Merger project

(detailed in a memorandum dated May 20th, 1987 -- Appendix G). Progress has been slow due to poor compliance by ADFG, WDF, and CDFG in converting to the enhanced PacFIN specification. Mr. Guy Thornberg suggested that the TSC could recommend that PMFC establish a data reporting requirement linked to the distribution of PMFC funds. Mr. Jack Tagart suggested a recommendation from TSC to PMFC in support of the Data Series Merger project, requesting compliance from the lagging agencies to supply the needed data. Considerable discussion ensued, resulting in a recommendation from the Technical Subcommittee to the Parent Committee (item XI.B.1).

B. Pacific ocean perch Working Group -- Progress Report

The POP report by Kimura, Ito, and Wilkens has been completed. Area 3C quotas of 100 mt (Canada) and 400 mt (Washington) have been established. Mr. Bob Demory stated that though the stock is in dismal shape, the management action that could be taken was taken and the POP working group is no longer needed.

C. Dover sole Working Group -- Progress Report

The purpose of the Dover sole working group is to compile coastwide tagging data into an overview document. Mr. Bob Demory reported that everyone has made contributions but Oregon, and he will take action to see that this is done.

D. Trans-boundary Management Issues

The Canadian Section proposed that the TSC establish a working group for trans-boundary stocks, with the purpose of (1) identifying important trans-boundary species, and (2) identifying issues likely to arise in the near future regarding the management of these stocks. Dr. Laura Richards pointed out that Pacific whiting and Pacific ocean perch already are species of concern. Species of potential interest in the future might include lingcod, rockfish, and sablefish on the coast, and pollock, lingcod, and rockfish in inside waters. Mr. Tom Dark commented that a report discussing trans-boundary groundfish was prepared in the late 1970's.

It was decided that further discussion on this item would be postponed until next year's meeting, while research is conducted to find existing material on this topic.

E. Pacific Halibut Allocation

The U.S. Section reported it's concern regarding the status of our knowledge of bycatch and bycatch mortality of Pacific halibut. Dr. Bob Trumble reported that this is an issue with international implications, due to the migratory behavior of this species. He noted that groundfish harvests in Alaska have the potential to intercept large quantities of juvenile halibut, thus impacting potential adult harvests in more southern areas including British Columbia, Washington, and Oregon. Likewise, bycatch of halibut in British Columbia impacts the potential harvest of

adult halibut in Washington and Oregon fisheries.

Considerable discussion occurred which resulted in the drafting of a recommendation from the TSC to the Parent Committee (see item XI.B.2).

F. Offshore Oil and Gas Development

Concern was voiced that the Minerals Management Service (MMS) is going forward with plans to lease offshore tracts off Washington and Oregon in the 1990's, though little has been done to assess the potential impacts to groundfish stocks and habitat. Mr. Demory reported that Kim Jones and Dan Bottom (ODFW) have been contracted to collect information on the potential effects of this offshore development on groundfish. Dr. Laura Richards reported that the Canadian government Habitat Management group has compiled information on this issue.

G. Marine Mammals Impact on Fisheries Resources

Discussion centered on the issue of the apparent increase in the number of marine mammals in recent years and the potential impacts of increased predation on groundfish resources. The participants agreed that this is an important problem which needs to be addressed by groundfish managers.

X. PROGRESS ON 1986 RECOMMENDATIONS

A. The TSC to itself

No recommendations were made.

B. To the Parent Committee

1. PacFIN - PMFC Data Series Merger

With no additional discussion, the recommendation (item XI.B.1) was approved.

2. Discussion of International Implications of Halibut Bycatch

Following a protracted discussion, the TSC approved the recommendation to the Parent Committee as it appears below (item XI.B.2).

3. Discussion of CARE recommendation

The U.S. Section proposed that the TSC should recommend to the Parent Committee that funding and coordination for the continuation of CARE be sought from the PMFC (or other appropriate bodies). Following discussion, the TSC approved the recommendation as it appears below (item XI.B.3).

4. Loss of fisheries monitoring data

The consensus of the group was that last years TSC statement of concern over the loss of fisheries monitoring data facilitated action to provide funds for the gathering and reporting of fisheries statistics needed for fisheries management.

XI. 1987 TECHNICAL SUB COMMITTEE RECOMMENDATIONS

B. To the Parent Committee

1. PacFIN - PMFC Data Series Merger

The TSC applauds the accomplishments of the Canadian Department of Fisheries and Oceans and the Oregon Department of Fish and Wildlife regarding the merger of the PMFC Groundfish Data Series and the PACFIN database; however, we are concerned that the Washington Department of Fisheries, Alaska Department of Fish and Game, and the California Department of Fish and Game have shown little progress in their efforts to comply with this task. We note that compliance with this endeavor had been promised by all agencies no later than December 1986. We further note that the PMFC ceased compilation of the Groundfish Data Series in 1984; consequently, there is currently no single source of finalized year-end landings and effort data for the west coast groundfish fisheries. The TSC strongly urges WDF, ADFG, and CDFG to give high priority to the PacFIN - PMFC Data Series merger, and to complete their reporting obligations as quickly as possible.

2. International Implications of Bycatch and Discard Mortalities in the Groundfish Fisheries

Bycatch and at-sea discard rates in groundfish fisheries are poorly known. Until such rates are known, total catch and associated mortality can not be accurately estimated, and the attendant economic effects of bycatch mortality can not be determined.

The U.S. Section identified halibut bycatch as an example with international implications. The rapidly growing domestic fisheries, especially in Alaska, have the potential to intercept large quantities of juvenile halibut which migrate southward into British Columbia, Washington and Oregon areas. This interception impacts potential adult harvest in more southern areas.

As a second example, bycatch of crab is currently constraining development of groundfish fisheries in the Central Gulf of Alaska, and yet the bycatch problem has not been quantified.

To provide the data necessary for improved groundfish management, the Technical Subcommittee strongly recommends that the responsible management agencies take appropriate measures to determine bycatch, bycatch mortality, and at-sea discard rates in the groundfish fisheries.

3. TSC Recommendation Concerning CARE

The TSC recognizes the continuing need for the development and description of agreed upon standards and age reading quality control procedures within and among agencies responsible for management of groundfish on the northeast Pacific rim.

The TSC applauds accomplishments to date by the Committee of Age Reading Experts (CARE), but is concerned about the lack of activity during the past year. The TSC wishes to stress the importance of the long-term monitoring and training functions of CARE to improve groundfish ageing accuracy and precision levels.

Therefore, The TSC reemphasizes its endorsement of CARE and the Terms of Reference established for that body. Further, the TSC asks the Parent Committee to seek funding and coordination for CARE from the PMFC (or other appropriate bodies) to continue the valuable service provided by CARE.

Attachments: Terms of Reference for CARE (Appendix H)

C. From the Parent Committee

No recommendations were made.

XII. SCHEDULE OF FUTURE MEETING

The next meeting of the Technical Subcommittee was scheduled for the week of June 6th, 1988, in Monterey, California. A discussion of next years agenda revolved around not foregoing the "review of the fisheries" item which in recent years has been dropped from the meeting discussions. The group reached a consensus that discussion of this agenda item should be scheduled for next years meeting.

XIII. ELECTION OF CHAIRPERSON

Traditionally, the TSC chairperson serves a two year term. Mr. Bob Demory will continue as chairperson to serve the second year of his term next year.

XIV. ADJOURNMENT

The twenty-eighth meeting of the Technical Subcommittee was adjourned at 12:18 pm on June 11th, 1987.

APPENDIX A

AGENDA FOR THE 28TH ANNUAL MEETING OF THE
TECHNICAL SUBCOMMITTEE OF THE CANADA-U.S. GROUNDFISH COMMITTEE
SEATTLE, WASHINGTON JUNE 9-11, 1987

I. CALL TO ORDER

II. APPOINTMENT OF SECRETARY

III. INTRODUCTIONS

IV. APPROVAL OF THE 1986 REPORT AND 1987 AGENDA

V. TERMS OF REFERENCE OF THE SUBCOMMITTEE

VI. REVIEW OF AGENCY GROUNDFISH PROGRAMS

VII. REVIEW OF NORTHEAST PACIFIC GROUNDFISH FISHERIES

A. Canada-U.S. fisheries
   1. Commercial fisheries
      a. Canada-U.S.
      b. Alaska
      c. British Columbia
      d. Washington
      e. Oregon
      f. California

   2. Recreational fisheries
      a. Canada-U.S.
      b. Alaska
      c. British Columbia
      d. Washington
      e. Oregon
      f. California

B. Joint-venture fisheries
   1. Canada
   2. United States
      a. East Bering Sea
      b. Gulf of Alaska
      c. Washington-California

C. Foreign fisheries
   1. Canada
   2. United States
      a. East Bering Sea
      b. Gulf of Alaska
      c. Washington-California

D. Groundfish Management and Regulations--significant changes
    1. Canada
    2. United States
        a. East Bering Sea
        b. Gulf of Alaska
        c. Washington-California

VIII. GROUNDFISH RESEARCH
A. Stock assessments
    1. Pacific cod
    2. Rockfish
    3. Sablefish
    4. Flatfish
    5. Pacific whiting (hake)
    6. Spiny dogfish
    7. Walleye pollock
    8. Pacific halibut
    9. Lingcod
    10. Other

B. Related studies
    1. Age determination
    2. Rockfish tagging
    3. Economics
    4. Pacific hake (whiting) management report (from PFMC)
    5. Other

C. Cooperative research with other nations

IX. OTHER TOPICS FOR DISCUSSION
A. PMFC Data Series/PacFin - progress report
B. POP working group - progress report
C. Dover sole working group
D. Trans-boundary management issues
E. Pacific halibut allocation
F. Offshore oil and gas development
G. Marine mammal impacts on fisheries resources

X. PROGRESS ON 1986 RECOMMENDATIONS
A. The TSC to itself
B. To the Parent Committee
C. Loss of fisheries monitoring data from the Parent Committee

XI. 1987 TECHNICAL SUBCOMMITTEE RECOMMENDATIONS
A. To the TSC
B. To the Parent Committee

XII. SCHEDULE OF FUTURE MEETING

XIII. ELECTION OF CHAIRPERSON

XIV. ADJOURNMENT

APPENDIX B

Federal Regulations for Washington-California in 1986

(a) Effective January 1, 1986

- Recommended coastwide widow rockfish (trip limit of 30,000 pounds per week; no biweekly option (coastwide OY = 10,200 mt; ABC = 9,300 mt).

- Harvest Guideline for Sebastes complex north of Coos Bay, Oregon fixed at 10,100 mt.

- For Sebastes complex north of Coos Bay; recommended 25,000 pound weekly trip limit of which no more than 10,000 pounds may be yellowtail rockfish (or 50,000 pounds biweekly of which no more than 20,000 pounds may be yellowtail rockfish; or 12,500 pounds twice per week of which no more than 5,000 pounds may be yellowtail rockfish. Biweekly and twice weekly landings require appropriate declaration to state in which fish are landed.

- For Sebastes complex south of Coos Bay: recommended 40,000 pound trip limit; no trip frequency.

- Recommended landings of Sebastes complex and widow rockfish be unrestricted if less than 3,000 pounds.

- Recommended that fishermen fishing the Sebastes complex on both sides of the Coos Bay line during a trip must conform with the northern (more restrictive) trip limit.

- Recommended continuance of 22-inch size limit on sablefish in all areas north of Point Conception; retain 5,000 pound incidental landing limit for sablefish smaller than 22 inches; coastwide OY = 13,600 mt; ABC = 10,300 mt.

- Recommended the Pacific ocean perch limit in the area north of Cape Blanco should be 20 percent (by weight) of all fish on board or 10,000 pounds whichever is less; landings of Pacific ocean perch be unrestricted if less than 1,000 pounds regardless of percentage on board; Vancouver OY = 600 mt; Columbia OY = 950 mt.

- Recommended an ABC and OY of 227,500 mt for Pacific whiting.

- Recommended an ABC of 3,900 mt for yellowtail rockfish.

(b) Effective April 11, 1986

- Recommended increasing Pacific whiting ABC and OY to 295,800 mt, up 30 percent from 227,500 mt established at the beginning of 1986.

- Recommended increasing yellowtail rockfish ABC to 4,000 mt, up 100 mt from 3,900 mt established at beginning of 1986. (Yellowtail rockfish is in the multispecies Sebastes complex and does not have a numerical OY.) The 100 mt increase is assigned entirely to the Columbia area north of Coos Bay.

(c) Automatic Action (See (f) below)

- Recommended in April to impose a 3,000 pound trip limit without a trip frequency to be implemented when the widow rockfish ABC is reached.

(d) Effective August 22, 1986 (Emergency Regulation)

- Recommended allocating the estimated remaining sablefish OY between trawl and fixed gear at 55 and 45 percent, respectively.

- Recommended an 8,000 pound sablefish trip limit on trawl gear.

- Recommended retention of the current regulation of a 5,000 pound trip limit on sablefish smaller than 22 inches.

- Recommended prohibition of any further landings of sablefish by trawl gear after trawl quota is reached.

- Recommended prohibition of any further landings of sablefish by fixed gear after fixed gear quota is reached.

- Recommended prohibition of any further landings of sablefish after the coastwide OY is reached.

(e) Effective August 31, 1986

- For Sebastes complex north of Coos Bay, Oregon: recommended the following increase in trip limits: weekly -- 30,000 pounds of which no more than 12,500 pounds may be yellowtail rockfish; biweekly -- 60,000 pounds of which no more than 25,000 pounds may be yellowtail rockfish; and twice-weekly -- 15,000 pounds of which no more than 6,500 pounds may be yellowtail rockfish.

(f) Effective September 28, 1986

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

(g) Effective October 23, 1986

- Fixed gear sablefish quota reached; fixed gear fishery closed.

- Trawl gear trip limit increased to 12,000 pounds for remainder of year or until trawl gear quota is reached.

APPENDIX C

REPORTS PUBLISHED (OR IN PRESS) BY MEMBER AGENCIES
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APPENDIX D

An Overview and Economic Status Report on the British Columbia Groundfish Fishery

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1.0 Introduction

1.1 Purpose and Organization

This overview examines the economic status of the groundfish fishery and shows how catch and value have changed over time. The report will primarily be useful as a reference document for researchers requiring time series data on the B.C. groundfish fishery.

The paper is organized into two major sections, Section 2, describes catch and values of groundfish by species from 1977 to 1986. The second part of this paper, Section 3, describes the groundfish fleets, presenting general operating characteristics, size and age of vessels, interactions with other fisheries and catch by gear-type.

Economic research into groundfish and shellfish fisheries, planned for the 1987/88 fiscal year (April 1 - March 31), is presented in Appendix I. Historical groudfish catch by gear by species for 1977-1986 is provided in Appendix II.

1.2 Methodology

Information on catch and landed value by species and by geartype for the 1977 to 1986 period was obtained from Department Fisheries Oceans (DFO) Catch Statistics File annual summary reports. This data is derived from copies of sales slips returned to the Department and then keypunched into a regional mainframe computer.

Vessel data were obtained from DFO Licence File and Income Study printouts. These reports describe the owner, vessel size, age and licences held as well as detailed descriptions of landings and values by vessel. The information is a compilation of data obtained from vessel owners and sales slip entries.

Information on wholesale value and, in some cases, landed catch and value was obtained from statistics published by the Province of British Columbia in its annual Fisheries Production Statistics reports.

Landed prices are expressed in current year dollars; i.e. the nominal value paid in a particular year. Current dollar prices have been converted to "real" prices, using a 1981 base, by deflating with Consumer Price Index (CPI) data (all items; Canada). This index reflects general price

movements in the economy and allows one to better discern the real changes in groundfish prices independent of inflation.

Other information is not published in any form and has been obtained through discussions with individuals in DFO.

2.0 Catch and Value: By Major Fisheries and Species

2.1 Total Domestic and Joint-Venture Fishery Values

Domestic groundfish landings, in 1986, had a combined landed value of $58.6 million, not including the value of catches through foreign-domestic cooperative ventures. The wholesale value is not yet available but is estimated at $92.4 million (Table 1). It can be seen from Figure 1 that the value of the fishery remained fairly flat between 1979 and 1982. Since 1982, values appear to be increasing rapidly. The landed value of groundfish stocks in 1986 increased by 36% over 1985 and by 2½ times their value in 1982.

Joint ventures with foreign processing vessels resulted in a further landed value to fishermen of $4.7 million in 1986. Combined with domestic landings, the total 1986 landed value for all groundfish was $63.2 million, 40% higher than in 1985 (Table 2).

All values in Tables 1 and 2 are in current year dollars. When total landed values (Table 2) are deflated using Consumer Price Index data and compared to current values a somewhat different pattern emerges (Figure 2). The real value of groundfish catches show a much steeper decline from the 1979 peak and a more moderate upswing since 1982. In constant dollars, the 1986 landed value marks the first year the groundfish fishery has surpassed the level it attained in 1978.

2.2 Catch and Value by Species

Detailed catch and value data for each of the B.C. groundfish species or species groupings are presented in Tables 3 - 16. The most valuable groundfish species in 1986 is halibut, with a landed value of $22.8 million (Table 3). The dramatic rise in landed value in 1986 primarily reflects a 53% increase in price compared to 1985. Catch increased as well, leading to an exceptional gain in value of 65% compared to a year earlier.

The next most valuable groundfish species, was sablefish, with a landed value of $12.2 million in 1986 (Table 4). Unlike halibut, this species shows no appreciable change in value compared to 1985. The main reason for this was a softening in the price of sablefish in foreign markets. This may have been due partially to the sharp increase in Alaskan production in 1986. It may also reflect convergence between traditionally high quality Canadian product and perceived lower U.S. quality in foreign markets.

The largest quantity of catch and third most valuable groundfish species grouping is the rockfish category, worth $11.1 million in 1986 on landings of 18866 tonnes (Table 5). The value of this species group is entirely quantity driven since landed prices are generally low and have remained fairly constant, in real terms. The rockfish category, along with lingcod and pacific ocean perch are emerging as a very valuable component of the groundfish catch. Combined, these species were worth $17.2 million in 1986, second only to halibut in value and representing over a 500% increase in (current) dollar value since 1977. The increasing value of this group is particularly important to the trawl fishery which harvests a vast majority of the production. On the other hand, Pacific cod which had been the mainstay of the trawl fishery in earlier years, has declined precipitously and shows only gradual signs of reversing the downward trend. Changes in the economic importance of different species for each geartype are discussed in more detail in the following section.

[1] All 1986 values are preliminary. Species catches and aggregate totals in Tables 1-16 are derived from catch statistics data obtained from J. Leaman, DFO. These numbers are not strictly comparable to data in Tables 28-33 which were obtained directly from catch statistics computer printouts.

TABLE 1. TOTAL VALUE ALL GROUNDFISH SPECIES*

YEAR	LANDED (,000 $)	WHOLESALE
1986	58557	92389
1985	42965	79642
1984	31057	58643
1983	27448	50781
1982	23381	39422
1981	25796	46345
1980	26187	43547
1979	32758	52291
1978	22699	33807
1977	17061	30171

*NOT INCLUDING JOINT VENTURE CATCHES

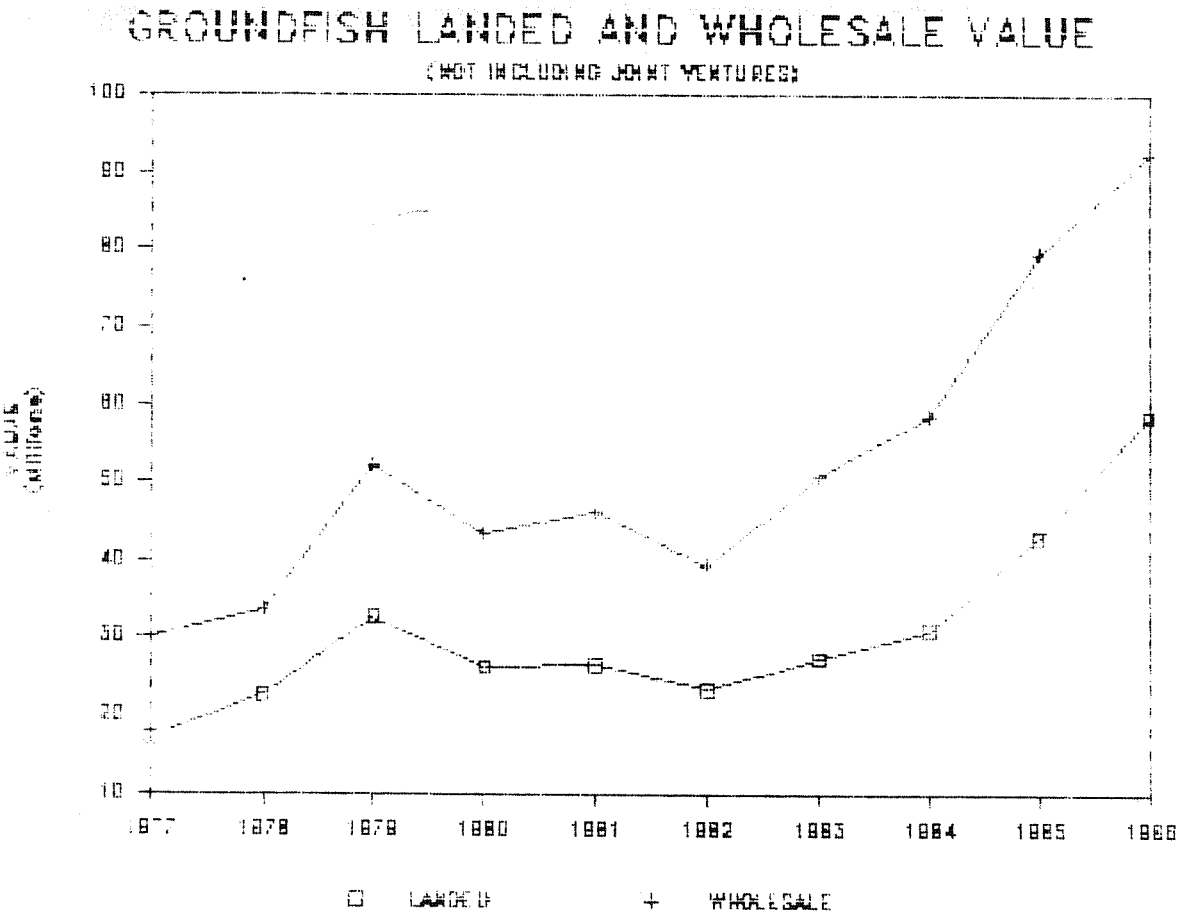

TABLE 2. TOTAL LANDED VALUE - DOMESTIC & JOINT VENTURE (J.V.)

YEAR	NON-J.V.	J.V. ('000 $)	TOTAL
1986	58557	4655	63212
1985	42965	2275	45240
1984	31057	5000	36057
1983	27448	4725	32173
1982	23381	3159	26540
1981	25796	2518	28314
1980	26187	1857	28044
1979	32758	560	33318
1978	22699	240	22939
1977	17061	0	17061

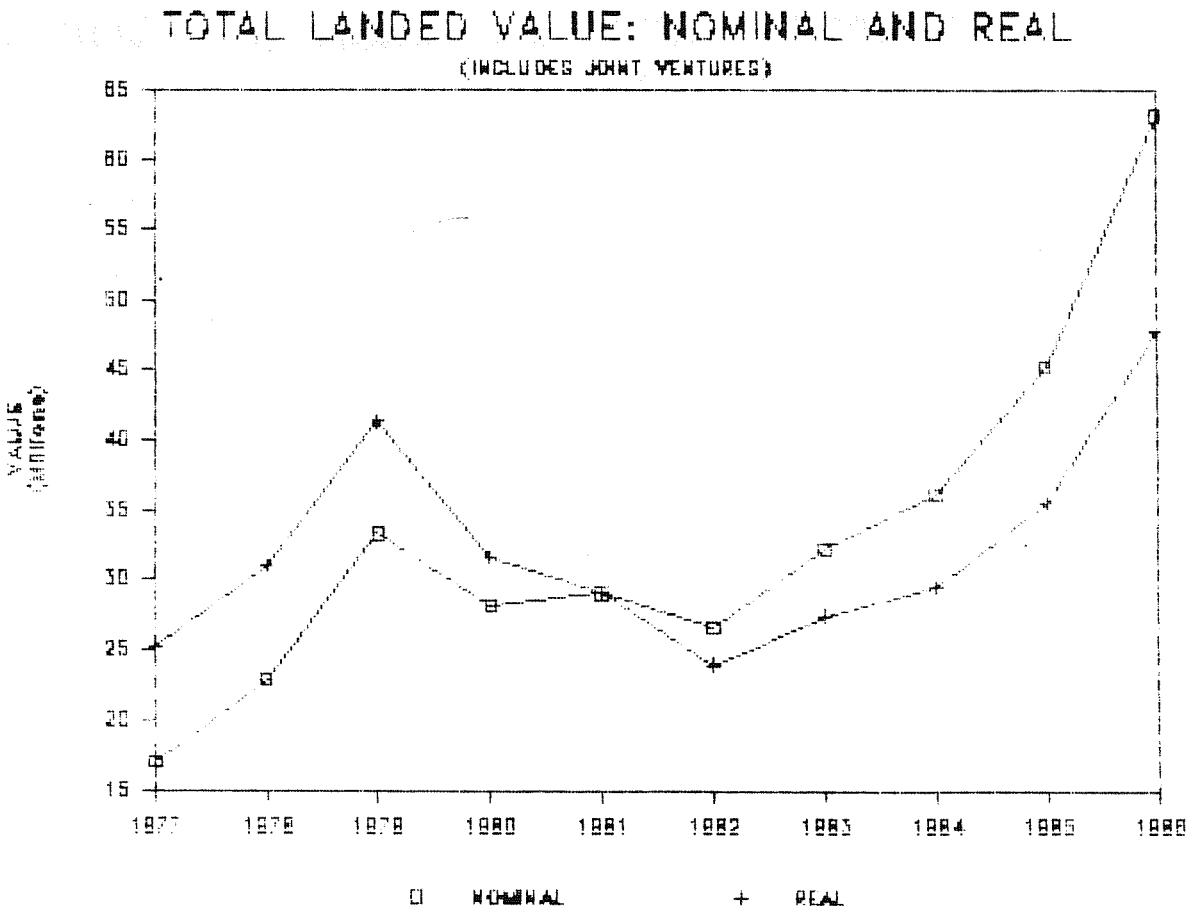

TABLE 3. HALIBUT

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	5092	22811	4.48	30659	3.38	1.34
1985	4714	13797	2.93	19080	2.30	1.38
1984	4033	9419	2.34	13837	1.91	1.47
1983	2398	8304	3.46	11194	2.95	1.35
1982	1698	4740	2.79	5488	2.52	1.16
1981	2159	6355	2.94	10548	2.94	1.66
1980	2668	7341	2.75	9962	3.10	1.36
1979	2410	14004	5.81	17692	7.20	1.26
1978	2294	10001	4.36	12827	5.89	1.28
1977	2817	8307	2.95	9767	4.34	1.18
AVERAGE	3028	10508	3.48	14105	3.65	1.34

TABLE 4. SABLEFISH

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	4647	12291	2.64	13907	2.00	1.13
1985	4268	12075	2.83	14889	2.23	1.23
1984	3852	6998	1.82	8829	1.49	1.26
1983	4414	6520	1.48	7447	1.26	1.14
1982	3976	6627	1.67	7081	1.50	1.07
1981	3888	7599	1.95	6090	1.95	0.80
1980	3793	5690	1.50	5205	1.69	0.91
1979	2031	4432	2.18	4446	2.70	1.00
1978	831	1451	1.75	1687	2.36	1.16
1977	1088	1012	0.93	1615	1.37	1.60
AVERAGE	3279	6469	1.87	7120	1.85	1.13

NOTE: 1986 WHOLESALE VALUE ESTIMATED

TABLE 5. ROCKFISH

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	18866	11131	0.59	15225	0.45	1.37
1985	11909	5899	0.50	11140	0.39	1.89
1984	8512	4495	0.53	6625	0.43	1.47
1983	7024	3212	0.46	4864	0.39	1.51
1982	5093	2146	0.42	2758	0.38	1.29
1981	4857	1684	0.35	1684	0.35	1.00
1980	4476	1423	0.32	1423	0.36	1.00
1979	5962	1937	0.32	4159	0.40	2.15
1978	6608	1601	0.24	1601	0.33	1.00
1977	5235	1059	0.20	1059	0.30	1.00
AVERAGE	7854	3459	0.39	5054	0.38	1.37

* INCLUDES REEDI, GREENIES, OTHER ROCKFISH, IDIOTS,SILVER

TABLE 6. MISCELLANEOUS GROUNDFISH

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	882	617	0.70	16963	0.53	27.49
1985	740	429	0.58	3582	0.46	8.35
1984	570	183	0.32	3513	0.26	19.15
1983	635	216	0.34	2845	0.29	13.17
1982	747	159	0.21	3206	0.19	20.21
1981	554	199	0.36	4075	0.36	20.46
1980	826	290	0.35	1781	0.40	6.13
1979	558	158	0.28	2365	0.35	14.94
1978	461	34	0.07	3565	0.10	104.77
1977	297	74	0.25	2994	0.37	40.25
AVERAGE	627	236	0.35	4489	0.33	27.49

* INCLUDES SQUID, STURGEON, SHARK AND OTHER UNSPECIFIED FISH

NOTE: 1986 WHOLESALE VALUE ESTIMATED

TABLE 7. PACIFIC COD

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	3651	2154	0.59	7162	0.45	3.32
1985	2340	1225	0.52	9535	0.41	7.78
1984	3465	1688	0.49	8038	0.40	4.76
1983	4505	2081	0.46	7452	0.39	3.58
1982	4810	2152	0.45	7603	0.40	3.53
1981	6708	3472	0.52	9534	0.52	2.75
1980	8703	4444	0.51	6949	0.57	1.56
1979	9554	4813	0.50	8712	0.62	1.81
1978	6750	2841	0.42	5794	0.57	2.04
1977	7717	2624	0.34	5530	0.50	2.11
AVERAGE	5820	2749	0.48	7631	0.48	3.32

TABLE 8. PACIFIC OCEAN PERCH

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	5772	3088	0.53	9308	0.40	3.01
1985	6069	2830	0.47	7361	0.37	2.60
1984	6698	2829	0.42	8038	0.35	2.84
1983	5655	2171	0.38	6964	0.33	3.21
1982	5983	2024	0.34	2641	0.31	1.30
1981	5103	1494	0.29	4789	0.29	3.21
1980	5290	1559	0.29	5879	0.33	3.77
1979	2819	844	0.30	2190	0.37	2.59
1978	3864	2228	0.58	2825	0.78	1.27
1977	2716	537	0.20	3401	0.29	6.34
AVERAGE	4997	1960	0.38	5340	0.38	3.01

NOTE: 1986 WHOLESALE VALUE ESTIMATED

TABLE 9. FLOUNDER

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	54	25	0.46	73	0.35	2.90
1985	66	30	0.45	73	0.36	2.43
1984	169	53	0.31	74	0.26	1.40
1983	64	22	0.34	58	0.29	2.64
1982	168	61	0.36	108	0.33	1.77
1981	198	44	0.22	142	0.22	3.23
1980	119	27	0.23	145	0.26	5.37
1979	296	60	0.20	193	0.25	3.22
1978	74	19	0.26	63	0.35	3.32
1977	89	16	0.18	44	0.26	2.75
AVERAGE	130	36	0.30	97	0.29	2.90

TABLE 10. LINGCOD

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	3823	3020	0.79	4263	0.60	1.41
1985	5668	3428	0.60	5397	0.48	1.57
1984	3688	2172	0.59	3931	0.48	1.81
1983	3755	2134	0.57	3814	0.48	1.79
1982	4162	2512	0.60	3685	0.54	1.47
1981	2467	2251	0.91	2612	0.91	1.16
1980	2151	1762	0.82	2400	0.92	1.36
1979	2098	2513	1.20	2656	1.48	1.06
1978	2004	1957	0.98	1498	1.32	0.77
1977	2248	1666	0.74	2865	1.09	1.72
AVERAGE	3206	2341	0.78	3312	0.83	1.41

NOTE: 1986 WHOLESALE VALUE ESTIMATED

TABLE 11. SOLE

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	2570	1737	0.68	4782	0.51	2.75
1985	2626	1592	0.61	5189	0.48	3.26
1984	3121	2005	0.64	4913	0.53	2.45
1983	2559	1572	0.61	4093	0.52	2.60
1982	2659	1493	0.56	4723	0.51	3.16
1981	4282	2186	0.51	5854	0.51	2.68
1980	4727	2330	0.49	5976	0.55	2.56
1979	4208	2169	0.52	5438	0.64	2.51
1978	3189	1294	0.41	3718	0.55	2.87
1977	3809	1260	0.33	3371	0.49	2.67
AVERAGE	3375	1764	0.54	4806	0.53	2.75

TABLE 12. TURBOT

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	860	198	0.23	1739	0.17	8.78
1985	764	164	0.22	2178	0.17	13.24
1984	369	77	0.21	1246	0.17	16.21
1983	323	69	0.21	1124	0.18	16.36
1982	525	109	0.21	1182	0.19	10.85
1981	945	171	0.18	1011	0.18	5.91
1980	1448	264	0.18	746	0.21	2.82
1979	1826	287	0.16	1210	0.19	4.21
1978	2326	342	0.15	1421	0.20	4.16
1977	1599	185	0.12	975	0.17	5.27
AVERAGE	1099	187	0.19	1283	0.18	8.78

NOTE: 1986 WHOLESALE VALUE ESTIMATED

TABLE 13. SKATE

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	199	117	0.59	538	0.44	4.60
1985	145	22	0.15	131	0.12	5.97
1984	155	22	0.14	120	0.12	5.39
1983	137	18	0.13	163	0.11	9.04
1982	129	36	0.28	122	0.25	3.42
1981	242	64	0.27	223	0.27	3.47
1980	254	63	0.25	206	0.28	3.27
1979	170	35	0.21	138	0.25	3.95
1978	141	25	0.18	82	0.24	3.28
1977	237	34	0.14	123	0.21	3.62
AVERAGE	181	44	0.23	185	0.23	4.60

TABLE 14. DOGFISH

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	3348	901	0.27	1549	0.20	1.72
1985	2815	753	0.27	1809	0.21	2.40
1984	2510	567	0.23	858	0.18	1.51
1983	3274	744	0.23	836	0.19	1.12
1982	3875	876	0.23	1392	0.20	1.59
1981	1151	209	0.18	381	0.18	1.82
1980	4545	843	0.19	2389	0.21	2.83
1979	4757	870	0.18	2046	0.23	2.35
1978	3126	537	0.17	872	0.23	1.62
1977	1730	232	0.13	48	0.20	0.21
AVERAGE	3113	653	0.21	1218	0.20	1.72

NOTE: 1986 WHOLESALE VALUE ESTIMATED

TABLE 15. WALLEYE POLLOCK

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	577	145	0.25	978	0.19	6.75
1985	1895	402	0.21	2023	0.17	5.04
1984	800	183	0.23	1485	0.19	8.13
1983	1070	249	0.23	2372	0.20	9.51
1982	924	231	0.25	2084	0.23	9.01
1981	1251	268	0.21	1687	0.21	6.30
1980	2201	440	0.20	1839	0.23	4.18
1979	3387	677	0.20	2978	0.25	4.40
1978	2407	404	0.17	1419	0.23	3.51
1977	890	129	0.15	1373	0.21	10.64
AVERAGE	1540	313	0.21	1824	0.21	6.75

TABLE 16. HAKE*

YEAR	CATCH (MT)	LANDED VALUE (,000)	LANDED PRICE ($/KG)	WHOLESALE VALUE (,000)	REAL PRICE ($/KG)	WHOLESALE TO LANDED RATIO
1986	6802	939	0.14	2207	0.10	2.35
1985	6055	749	0.12	837	0.10	1.12
1984	4600	549	0.12	649	0.10	1.18
1983	3122	353	0.11	400	0.10	1.13
1982	2826	374	0.13	555	0.12	1.48
1981	5691	740	0.13	1790	0.13	2.42
1980	606	79	0.13	428	0.15	5.42
1979	819	117	0.14	433	0.18	3.70
1978	2	0.3	0.13		0.17	
1977	2	0.3	0.13		0.18	
AVERAGE	3053	390	0.13	912	0.13	2.35

*NON-JOINT VENTURE

NOTE: 1986 WHOLESALE VALUE ESTIMATED; 1977,78,80,81 LANDED VALUES ESTIMATED

3.0 Licenced Fleet Characteristics and Catches

3.1 Licensed Fleet Charateristics

There are 4 licence categories and six principal geartypes that harvest B.C. groundfish: the "T" licence trawl fleet consisting of mid-water and bottom trawl geartypes; the "L" licence halibut fleet consisting of mostly longline vessels; the "K" licence sablefish fleet consisting of trap and longline boats; and the "C" licence troll and handline line fishery. Each of these is discussed below.

The Trawl Fleet

The trawl fleet consists of two basic components; bottom trawlers (also called draggers) and mid-water trawlers. Both are operated under a trawl "T" licence. The trawl licence was introduced in 1977 to contain the level of overcapacity in the fishery. Licences are transferable and carry a foot-for-foot vessel replacement restriction. Since 1977, the number of licences issued has averaged 145. In some years as much as 40% of the T fleet remains idle (Table 17).

Trawl vessels typically hold licences for several different fisheries and employ a multi - fishery strategy for earnings. Examining the 1986 fleet (Table 18), for example, shows that of 142 licences, only 33 (23%) were held by vessels only licenced to fish in the trawl fishery. Twenty-eight (27%) were held in common with a salmon "A" licence and 71 (50%) were held in common with assorted other licence combinations. Over three-quarters of the fleet were licenced for more than just the trawl fishery.

Table 19 provides a profile of the 1985 active trawl fleet. In general, the fleet is characterized by large, older vessels. Most vessels exceed 15 m (49 ft.) in length and 50 m^3 in volume (18 gross tons). The average age of the fleet, in 1985, was almost 23 years.

Table 17 - T Licences Issued/Active*

Year	No. Licences Issued	No. Licences Active
1986	142	98**
1985	145	87
1984	145	119
1983	147	119
1982	148	113
1981	147	110

* Pers. comm., Suzanne Benoit
** Preliminary

Table 18 - T Licence Combinations (1986)*

Licences Held	Number of Vessels	Percentage
T only	33	23%
T + A only	38	27%
T + other	71	50%

* Pers. comm., Suzanne Benoit

Table 19 - Trawl Fleet Vessel Characteristics (1985)*

Length Category (meters)	No. of Vessels	Volume Category cubic meters	No. of Vessels	Age Category (years)	No of. Vessels
0-10	2	0- 50	27	0-10	31
11-15	22	51-100	38	11-20	37
16-20	43	101-150	23	21-30	25
21-25	34	151-200	17	31-40	10
+26	25	201-250	9	41-50	14
		+251	12	+51	9
Total	126		126		126

Average:
20.6 (m) 125.9 (m^3) 22.8 (yrs)

* This table consists of T vessels active in any fishery. Due to the different derivation the number of boats does not compare exactly to Table 17.

The Halibut Fleet

Halibut vessels are licenced under two management authorities. Since 1979, Canadian halibut vessels have been required to hold limited entry "L" licences issued by the Department of Fisheries and Oceans. These licences are transferable and carry a foot-for-foot vessel replacement restriction. Implementation of these licences came about when the reciprocal fishing privilege with the U.S. was terminated following the establishment of extended fishing zones by both nations. Loss of access to U.S. halibut stocks, which accounted for almost 60% of the total Canadian catch, resulted in a problem of severe over-capacity for the Canadian fleet. Licence limitation, along with other measures, served to reduce some, but not all, of the excess capacity.

Halibut vessels are also licenced by the International Pacific Halibut Commission (IPHC). It is the IPHC which manages the fishery although its licences are unrestricted and the agency has no enforcement authority.

There are about 432 "L" licences issued annually (Table 20). As many as 26% of these are inactive in any given year.

An examination of the 1985 licenced halibut fleet revealed that a vast majority, 83%, are multi-fishery vessels. Only 17% of vessels have only the L licence. The majority, 61%, are vessels participating in the salmon and halibut fisheries only (Table 21).

The halibut fleet is characterized by smaller, fairly recent, vessels. The 1985 sample revealed that most vessels are less than 15 m (49 ft.) in length and 40 m^3 (14 gross tons) in volume. Almost 70% of the fleet is less than 20 years old (Table 22).

Table 20 - L Licences Issued/Active*

Year	No. Licences Issued	No. Licences Active
1986	432	366
1985	434	392
1984	433	390
1983	429	347
1982	433	321
1981	431	360

* Pers. comm., Barry Ackerman, Bruce Turris

Table 21 - L Licence Combinations (1985)*

Licence Tabs Held	Number of Vessels	Percentage
L only	74	17%
L + A only	259	61%
L + other	95	22%

* Pers. comm., Bruce Turris

Table 22 - Halibut Fleet Vessel Characteristics (1985)**

Length Category (meters)	No. of Vessels	Volume Category cubic meters	No. of Vessels	Age Category (years)	No of. Vessels
0-10	6	0- 20	25	0-10	42
11-15	92	21- 40	75	11-20	48
16-20	27	41- 60	16	21-30	22
21-25	7	61- 80	5	31-40	9
+26	0	81-100	3	41-50	7
		+101	8	+51	4
Total	132		132		132
Average: 13.4 (m)		38.8 (m^3)		17.9 (yrs)	

**Vessels for this table were drawn from a one third random sample of the 1985 active fleet.

The Sablefish Fleet

The sablefish "K" limited entry licence was initiated in 1979 in conjunction with fleet management measures for the halibut fishery. Under the Alaska Halibut Fleet Relocation Plan, halibut vessels were offered gear conversion grants to switch to sablefish and relinquish their halibut licences. Increased entry into the sablefish fishery resulting from this program and Japanese market developments resulted in limited entry being implemented - but not until 3 to 4 times the needed capacity had joined the fishery. A foot-for-foot replacement restriction applies to all vessels.

There are, approximately, 47 "K" licences issued annually. On average, only about half (24) the licences have been active each year although a substantially increased landed price in 1985 appears to have prompted new entry into the fishery in 1986 (Table 23).

Nearly half of the vessels participating in the sablefish fishery are specialized for fishing either sablefish alone or sablefish in combination with halibut. A survey of 1986 licence combinations (Table 24) shows that 23% of the sablefish fleet only fish for sablefish and an equal number fish sablefish and halibut only.

The sablefish fleet, reflecting its recent development, consists of large, mostly newer vessels. A review of the 1985 licenced fleet (Table 25) shows that a majority are over 16 m (52 ft.) in length and 80 m^3 (28 gross tons) in volume. A vast majority of vessels, as of 1985, were less than 20 years old.

The sablefish fleet has undergone a period of rapid growth in the decade prior to this review. Most notably, there has been a major expansion in the number and catch of trap vessels compared to those fishing with longline gear. Trap vessels now account for a dominant share of this fishery.

Table 23 - K Licences Issued/Active*

Year	No. Licences Issued	No. Licences Active
1986	46	39
1985	47	28
1984	46	20
1983	48	23
1982	47	22
1981	48	26

* Pers. comm. Suzanne Benoit

Table 24 - Sablefish K Licence Combinations* (1986)

Licence Tabs Held	Number of Vessels	Percentage
K only	11	23%
K + L only	11	23%
K + other	25	54%

* Numbers between Tables 23 and 24 do not correspond exactly reflecting different sources for these data.

Table 25 - Sablefish Fleet Vessel Characteristics (1985)

Length Category (meters)	No. of Vessels	Volume Category (cubic meters)	No. of Vessels	Age Category (years)	No of. Vessels
0-10	1	0- 20	0	0-10	18
11-15	7	21- 40	8	11-20	10
16-20	16	41- 60	5	21-30	3
21-25	10	61- 80	4	31-40	3
+26	5	81-100	6	41-50	3
		+101	16	+51	2
Total	39		39		39
Average: 19.9 (m)		133.3 (m^3)		17.6 (yrs)	

The Troll and Handline Fleet

The groundfish troll and handline fleet is licenced under the "C" category. This licence was introduced in 1968 at the time that limited entry was first implemented in the salmon fishery. The "C" licence was originally non-limited and available to anyone. In 1976 it was limited to existing licences that could show at least $500 worth of landings in either of the two preceding years.

The "C" licence was originally designed as the "catch all" for all non-salmon fisheries. Over the years, as species have become economically important, they have been removed from the "C" group and managed under separate limited entry licences. In 1983 the "C" licence species and permissible geartypes were defined under Schedule II in the regulations. At the same time, a "Z" licence was created and species described under Schedule III in the regulations. The main condition under a "Z" licence is that the fisherman must maintain a logbook of catch information. Since 1983, some species have been transferred to the "Z" category from the "C" category. The groundfish species and geartypes fished under the "C" and "Z" licences are set out below.

"C" Licence Groundfish Species (As per Schedule II)

Fish	Gear
Spring Dogfish	hook and line
Skate	hook and line
Flounder and Sole species	hook and line
Lingcod	hook and line
Pacific Cod	hook and line
Turbot	hook and line

"Z" Licence Groundfish Species (As per Schedule III)

Fish	Gear
Surf and Pile Perch	hook and line or dragseine
Rockfishes (Sebastes spp.)	hook and line
Six Gill Sharks	longline

Table 26 sets out the number of "C" and "Z" licences issued annually since 1981. While there were 1092 "C" licences issued in 1986, the number of vessels eligible to fish the Schedule II species is actually much higher since, under existing licencing rules, all licenced vessels in B.C. can fish for "C" licence species. Similar rules apply to the "Z" category except that vessels must first apply for the "Z" licence before fishing Schedule III species. In 1986, there was a total of 6291 vessels in B.C. eligible to fish these species.

Due to this complicated licencing approach, complete figures on the number of active licences or multi-licence combinations do not exist. Table 27 provides a breakdown of "C" licenced vessel length, volume and age characteristics. It bears repeating that these figures apply to vessels fishing with only the "C" licence since vessels licenced under other limited entry fisheries and fishing "C" species do not have to obtain a "C" licence and therefore cannot be identified. The data shows that the troll and handline fleet consists of small, older vessels. Almost two thirds of the fleet are less than 10.4 m (34 ft) in length and 96% are 50 m^3 (18 G.T.) or less in capacity. About 40% of the fleet exceeds 20 years of age.

Table 26. "C" and "Z" Licences Issued

Year	No. "C" Licences	No. "Z" Licences
1986	1092	2305
1985	1122	890
1984	1111	1077
1983	1221	-
1982	1072	-
1981	1114	-

Table 27. Troll and Handline Vessal Characteristics (1985)*

Length Category (meters)	No. of Vessels	Volume Category (cubic meters)	No. of Vessels	Age Category (years)	No. of Vessels
0-7.3	71	0-50	222	0-10	56
7.4-10.4	72	51-100	5	11-20	80
+10.5	88	101-150	1	21-30	33
		151-200	0	31-40	34
		201-250	0	41-50	19
		+250	3	+51	7
Total	231		231		231

Average:

9.6 (m)	19.7 (m^3)	21.0 (yrs)

* Vessels for this table were drawn from a one quarter random sample of the 1985 active fleet.

3.2 Catch and Value by Geartype

Annual total catch and value for trawl, mid-water trawl, long-line, trap and troll/handline gear are presented in Table 28. It is clear that between 1977 (the year of extended jurisdiction implementation) and 1986 most geartypes have attained a substantial increase in catch and value. For example, trawl gear catch increased by 54% over this period while catch value tripled. Mid-Water trawl gear has shown an even greater expansion during this periods; the 1986 catch was 15 times greater than in 1977 while the value of catch is 21 times as great. Trap catches have increased by almost 300% while value has grown more than ten-fold. Longline catches show little change over this period although the 1986 value of catch is up by over 100% compared to 1977. Troll and handline catches of groundfish have remained virtually constant between 1977 and 1986. The value of catch has increased slightly but represents no real change when inflation is taken into account.

A detailed description of 1986 catch and value by species and a comparison to 1985 performance for each of the groundfish geartypes is presented in Tables 29-33. The principal species caught with trawl gear were pacific ocean perch, ling cod, and "other rockfish". Together, these three constituted 55% of total trawl landings - by weight and value. For mid-water trawls, the principal species is hake - accounting for 69% of the total weight and 39% of the total value of catch. Another species that became very important in the mid-water trawl catch was greenies. This species comprise 15% of the mid-water catch and 35% of landed value in 1986. The dominant species on longline gear is halibut, accounting for 57% of the total weight and 82% of the total value of catch. Trap gear is mostly dependent on sablefish which accounted for 73% of the total weight and 63% of the total value of catch caught by this geartype. The two most important species for the troll and handline fishery are red, rock, bass and lingcod. Lingcod accounted for 46% of the weight and 32% of the value of catch. Red, rock bass accounted for 31% of the weight and 38% of the value of catch.

The trawl catch increased by 15% between 1986 and 1985. Most of the increase was attributable to a significant increase in the catch of sablefish, skate and Pacific cod. Lingcod, red snapper, pollock and Pacific ocean perch all declined. Red, rock bass has been incorporated into the other rockfish category, in 1986, making it impossible to determine how these two important components of the catch performed. The value of catch was up by 30% due primarily to increases in the price and quantity of cod, sablefish, reedi and greenies (Table 29).

Mid-water trawl catch was up 20% from 1985's levels but the value rose much higher, increasing by 132%. These gains can be attributed primarily to greater quantities and better prices for greenies, other rockfish and hake (non-joint venture) (Table 30).

Longline catch and value were both up from 1985. Overall, catch increased by 25% primarily due to increases in halibut, sablefish and red snapper landings. Value of catch was up by 72% compared to 1985, largely on the strength of higher landings and better prices for these same species (Table 31). It appears that a considerable increase in other rockfish catch and value also contributed to the better 1986 performance.

Trap catches decreased slightly in 1986 compared to 1985. Most of this was due to a 7% drop in sablefish landings. Value of catch declined even further indicating weakness in sablefish prices. Overall, the value of catch was down 3% from a year earlier (Table 32).

The final groundfish gear, troll and handline, showed mixed results in 1986. The quantity of catch increased slightly by 4% due mostly to increases in other rockfish and red snapper. The value of catch, however, increased by 31% reflecting healthy increases in the prices for halibut, lingcod, other rockfish and red snapper (Table 33).

Table 28 - Catch and Value by Geartype by Year, 1977 - 1986[2]

	Trawl		Mid-Water Trawl		Long-Line		Trap		Troll & Handline	
Year	Catch	Value	Catch	Value	Catch	Value	Catch	Value	Catch	Value
86	34447	18943	9241	2668	8212	27134	4593	14526	1099	1929
85	30022	14521	7673	1152	6557	15815	4696	15039	1059	1468
84	24545	11188	2372	3723	4082	8268	4402	10606	1029	1453
83	23055	9960	4508	5256	2680	7211	4567	8586	1049	1291
82	24643	9857	1814	240	3086	5715	4066	8108	1092	1188
81	23813	12825	421	120	3225	7508	3681	7838	731	1210
80	28470	10579	905	198	5545	9933	3653	5959	718	712
79	28925	11062	132	78	7307	18071	2097	4417	844	1013
78	24899	7524	126	23	6214	16936	1603	2597	833	1114
77	22151	6226	609	139	4941	10811	1170	1346	1063	1231

(catch = tonnes; value = ,000 $)

[2] Geartype catch and value data (Tables 28-33) have been obtained directly from DFO catch statistics computer printouts. Totals will not correspond exactly with catch and value data presented earlier which was based on data revised by J. Leaman. All 1986 values are preliminary.

TABLE 29. DETAILED TRAWL CATCH AND VALUE, 1986/85 (Kg; current $)

	CATCH 1986	CATCH 1985	PERCENT CHANGE	VALUE 1986	VALUE 1985	PERCENT CHANGE
SQUID	2569	891	188%	2145	1632	31%
OCTOPUS	5318	4401	21%	10379	7350	41%
CRAB		77	-100%		298	-100%
SCALLOPS	26	358	-93%	29	558	-95%
HALIBUT						
SOLE	2728105	2768196	-1%	1836263	1676259	10%
RED,ROCK BASS	*	207839	-100%	*	166070	-100%
LINGCOD	2953515	4821474	-39%	2010257	2739930	-27%
COD	3650543	2326353	57%	2152578	1215499	77%
SABLEFISH	524113	237334	121%	896845	353751	154%
P.O.PERCH	5901994	6327441	-7%	3160214	2948806	7%
REEDI	2226849	1333834	67%	1213288	673105	80%
GREENIES	2289111	556574	311%	1207591	208987	478%
OTH. ROCK.	10114024	7642668	32%	5154881	3517434	47%
RED SNAP	349405	635691	-45%	157427	233837	-33%
FLOUNDER	53858	65895	-18%	25275	30039	-16%
SKATE	498740	362546	38%	275221	54025	409%
STURGEON	755	889	-15%	1168	1002	17%
IDIOT	75817	56543	34%	41392	51470	-20%
SIL PERCH	6200	1875	231%	6142	3257	89%
OTH. FISH	391	895	-56%	696	860	-19%
TURBOT	891432	747062	19%	201692	160717	25%
WALLEYE P.	75615	401999	-81%	23255	101977	-77%
DOGFISH	2095711	1424721	47%	561757	359770	56%
HAKE	2769	95997	-97%	3863	14010	-72%
SHARK	315	23	1270%	245	60	308%
TOTAL	34447175	30021576	15%	18942603	14520703	30%

* Red, rock bass have been incorporated into the other rockfish category in 1986.

TABLE 30. DETAILED M-W TRAWL CATCH AND VALUE, 1986/85 (Kg; current $)

	CATCH 1986	CATCH 1985	PERCENT CHANGE	VALUE 1986	VALUE 1985	PERCENT CHANGE
SQUID						
OCTOPUS						
CRAB						
SCALLOPS						
HALIBUT						
SOLE		8117				6081
RED,ROCK BASS						
LINGCOD		2149				1579
COD		17				9
SABLEFISH						
P.O.PERCH		10700	-100%		7111	-100%
REEDI	26026					18361
GREENIES	1417583	142453	895%	1036830	61049	1598%
OTH. ROCK.	777677	56354	1280%	569237	36149	1475%
RED SNAP		1091	-100%		385	-100%
FLOUNDER						
SKATE	33	78	-58%	59	10	490%
STURGEON						
IDIOT						
SIL PERCH						
OTH. FISH						
TURBOT		628	-100%		111	-100%
WALLEYE P.	522828	1287449	-59%	126937	256282	-50%
DOGFISH	121650	268980	-55%	31288	62517	-50%
HAKE	6365344	5905178	8%	877250	727898	21%
SHARK		136	-100%		249	-100%
TOTAL	9241424	7673047	20%	2667631	1151761	132%

TABLE 31. DETAILED LONGLINE CATCH AND VALUE, 1986/85 (Kg; current $)

	CATCH 1986	CATCH 1985	PERCENT CHANGE	VALUE 1986	VALUE 1985	PERCENT CHANGE
SQUID						
OCTOPUS	1037	2030	-49%	2216	3911	-43%
CRAB						
SCALLOPS						
HALIBUT	5091659	4575473	11%	22810632	13383610	70%
SOLE	1719	581	196%	2513	456	451%
RED,ROCK BASS	*	134547	-100%	*	165331	-100%
LINGCOD	352838	203866	73%	383774	170940	125%
COD	3798	1799	111%	3190	1356	135%
SABLEFISH	846912	507122	67%	2454413	1416076	73%
P.O.PERCH		4				3
REEDI						
GREENIES						
OTH. ROCK.	351866	82871	325%	467558	95187	391%
RED SNAP	540444	214489	152%	725585	258852	180%
FLOUNDER						
SKATE	13654	6242	119%	3564	1868	91%
STURGEON		20	-100%		23	-100%
IDIOT	4714	7305	-35%	6322	19016	-67%
SIL PERCH		8	-100%		13	-100%
OTH. FISH	82	39	110%	201	155	30%
TURBOT						
WALLEYE P.						
DOGFISH	1001429	806103	24%	269875	245852	10%
HAKE						
SHARK	2301	14285	-84%	3730	52568	-93%
TOTAL	8212457	6556780	25%	27133576	15815214	72%

* Red, rock bass have been incorporated into the other rockfish category in 1986.

TABLE 32. DETAILED TRAP CATCH AND VALUE, 1986/86 (Kg; current $)

	CATCH 1986	CATCH 1985	PERCENT CHANGE	VALUE 1986	VALUE 1985	PERCENT CHANGE
SQUID						
OCTOPUS	4023	5832	-31%	11316	17759	-36%
CRAB	1312651	1160166	13%	5623354	4701120	20%
SCALLOPS						
HALIBUT						
SOLE						
RED,ROCK BASS						
LINGCOD	354	366	-3%	294	466	-37%
COD		11	-100%		15	-100%
SABLEFISH	3275991	3527919	-7%	8890459	10315768	-14%
P.O.PERCH						
REEDI						
GREENIES						
OTH. ROCK.	1	300	-100%	2	549	-100%
RED SNAP	197	1734	-89%	304	3448	-91%
FLOUNDER						
SKATE						
STURGEON						
IDIOT						
SIL PERCH						
OTH. FISH						
TURBOT						
WALLEYE P.						
DOGFISH						
HAKE						
SHARK						
TOTAL	4593217	4696328	-2%	14525729	15039125	-3%

TABLE 33. DETAILED TROLL/HANDLINE CATCH & VALUE; 1986/85 (Kg; current $)

	CATCH 1986	CATCH 1985	PERCENT CHANGE	VALUE 1986	CATCH 1985	PERCENT CHANGE
SQUID						
OCTOPUS	1224	1210	1%	3443	3523	-2%
CRAB						
SCALLOPS						
HALIBUT	43841	36072	22%	230456	106379	117%
SOLE	9560	1183	708%	10971	1107	891%
RED,ROCK BASS	*	332232	-100%	*	742065	-100%
LINGCOD	491408	553351	-11%	589395	458588	29%
COD	8842	9867	-10%	7270	6817	7%
SABLEFISH		752				1552
P.O.PERCH	89	72	24%	87	63	38%
REEDI						
GREENIES						
OTH. ROCK.	395639	14440	2640%	903382	30841	2829%
RED SNAP	141627	103012	37%	179430	115706	55%
FLOUNDER						
SKATE	3759	619	507%	1032	229	351%
STURGEON		35				98
IDIOT						
SIL PERCH	1029	283	264%	794	373	113%
OTH. FISH	262	70	274%	207	87	138%
TURBOT		141				109
WALLEYE P.						
DOGFISH	908	6532	-86%	253	2339	-89%
HAKE						
SHARK		264				490
TOTAL	1099380	1058943	4%	1928969	1468117	31%

* Red, rock bass have been incorporated into the other rockfish category in 1986.

APPENDIX E

Alaska Groundfish Fisheries

by

Joseph Terry

Prepared for the

TWENTY-EIGHTH ANNUAL MEETING
of the
TECHNICAL SUBCOMMITTEE
of the
CANADA/UNITED STATES GROUNDFISH COMMITTEE

June 9-11, 1987
Seattle, Washington

Northwest and Alaska Fisheries Center
National Marine Fisheries Service
7600 Sand Point Way NE
Seattle, Washington 98115

The first table presents annual catch data for the commercial groundfish fisheries off Alaska by species and fleet for 1976 through 1986. One of the important trends is the decrease in the percentage of the catch taken by foreign fleets. The foreign fleets' share of total catch fell from 99.3 per cent in 1979, to 92.9 per cent in 1981, to 51.5 per cent in 1985, and to 26.4 per cent in 1986. Foreign catch is expected to continue to fall as the growth of domestic and joint venture fleets continues in 1987.

The second set of tables presents domestic catch and ex-vessel price data by species, port, month, and year through 1986.

Annual Groundfish Catch Off Alaska by Species, and Fleet 1976-1986.

Year	1,000 metric tons round weight			
	Domestic	Joint Venture	Foreign	Total
Pollock				
1976	0.2	0.0	1335.1	1335.3
1977	0.2	0.0	1096.2	1096.5
1978	1.1	0.0	1074.0	1075.1
1979	2.0	0.6	1047.2	1049.8
1980	1.0	11.7	1119.1	1131.9
1981	0.8	58.9	1117.3	1177.0
1982	2.4	128.4	1051.9	1182.8
1983	1.2	283.1	972.8	1257.2
1984	8.4	444.1	1032.2	1484.7
1985	46.1	615.4	851.9	1513.4
1986	58.2	897.7	352.4	1308.4
Pacific cod				
1976	0.2	0.0	65.0	65.3
1977	0.3	0.0	37.9	38.2
1978	0.8	0.0	58.2	59.0
1979	1.6	0.7	54.6	56.9
1980	6.2	8.9	71.5	86.6
1981	15.2	9.2	74.1	98.5
1982	27.1	13.7	55.1	95.9
1983	46.2	16.8	71.3	134.2
1984	41.9	35.4	74.4	151.7
1985	48.8	43.5	66.3	158.6
1986	42.4	65.3	55.1	162.7
Sablefish				
1976	1.2	0.0	31.4	32.5
1977	1.2	0.0	20.6	21.8
1978	1.7	0.0	9.1	10.9
1979	3.4	0.0	9.1	12.5
1980	2.4	0.0	8.5	10.9
1981	1.9	0.2	10.9	13.1
1982	3.1	0.1	9.5	12.7
1983	3.9	0.4	8.1	12.4
1984	9.9	0.9	3.0	13.8
1985	14.7	0.3	0.4	15.4
1986	26.5	0.5	0.1	27.1

Annual Groundfish Catch Off Alaska by Species, and Fleet 1976-1986.

Year	Domestic	Joint Venture	Foreign	Total
	1,000 metric tons round weight			
Flatfish				
1976	0.2	0.0	143.4	143.6
1977	0.7	0.0	152.6	153.3
1978	0.9	0.0	250.1	251.0
1979	0.4	0.1	204.5	204.9
1980	0.2	12.6	181.8	194.6
1981	0.4	22.1	187.6	210.1
1982	0.3	26.7	164.3	191.2
1983	0.4	37.0	175.8	213.3
1984	0.5	53.6	189.2	243.2
1985	0.5	175.2	147.8	323.5
1986	8.7	217.8	78.0	304.5
Rockfish				
1976	0.3	0.0	91.9	92.2
1977	0.3	0.0	34.4	34.6
1978	0.2	0.0	17.6	17.8
1979	0.5	0.1	19.5	20.1
1980	0.4	0.1	25.1	25.7
1981	0.4	0.0	25.2	25.6
1982	0.3	0.0	15.3	15.6
1983	0.4	2.4	9.8	12.7
1984	2.4	2.6	4.1	9.1
1985	3.7	0.8	0.1	4.6
1986	7.7	0.6	0.0	8.3
Atka mackerel				
1976	0.0	0.0	40.8	40.8
1977	0.0	0.0	41.2	41.2
1978	0.0	0.0	43.8	43.8
1979	0.0	0.0	34.2	34.2
1980	0.0	0.3	33.4	33.7
1981	0.0	1.6	36.8	38.4
1982	0.0	12.5	14.2	26.6
1983	0.0	11.3	12.7	24.0
1984	0.0	36.5	0.6	37.2
1985	0.0	39.7	0.0	39.7
1986	0.0	32.0	0.0	32.0

Annual Groundfish Catch Off Alaska by Species, and Fleet 1976-1986.

Year	1,000 metric tons round weight			
	Domestic	Joint Venture	Foreign	Total
Total 1/				
1976	2.0	0.0	1707.6	1709.6
1977	2.6	0.0	1382.9	1385.6
1978	4.7	0.0	1452.8	1457.6
1979	7.9	1.5	1369.1	1378.5
1980	10.2	33.7	1439.5	1483.3
1981	18.7	92.0	1451.9	1562.6
1982	33.2	181.4	1310.3	1524.8
1983	52.1	351.0	1250.6	1653.7
1984	63.1	573.1	1303.5	1939.7
1985	113.8	874.9	1066.5	2055.2
1986	143.5	1213.9	485.6	1843.0

1/ Total for species listed above.

Sources: 1976-1980 various NMFS and ADF&G reports.
1981-1986 Pac FIN.

...THE FOREIGN AND JV BERING SEA FLATFISH STATISTICS FOR 1981-1984 ARE IN ERROR. CONTACT JERRY BERGER @ 4193 FOR DETAILS...

NPFMC GROUNDFISH BY PORT GROUP REPORT: COMMERCIAL DATA FOR ALL GEARS

LANDED CATCH (MTONS)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	2428	8601	10158	5292	4547	4033	3266	2631	236				41191
	CENTRAL	16	424	59	2707	1685	34	3	461	10	3			5402
	SOUTHEAST	89	147	264	4414	483	307	92	99	1637	61			7593
	FLOATING	1040	9531	9059	9483	4704	2282	2272	1794	3687				43852
	ADFG-JV			297	131	200	4							632
	BAIT-DLV	142	85	201	16									444
	CP/AKR			19	3145	639	2553	4380	3493	7738	7425	7404	2915	39910
	N PUGET S					2	3			127				131
	S PUGET S				3036	1692	2		3	78		78	188	5078
	ALL PORTS	3715	18788	20058	28223	13950	9219	10214	8479	13512	7489	7482	3103	144232
1985	WESTWARD	2140	4192	6559	7822	9140	2163	4467	5079	2729	4153	2382	3278	54104
	CENTRAL	TR	159	173	1050	1325	53	39	80	684	27	335	2	3927
	SOUTHEAST	190	541	942	798	465	365	101	138	501	902	89	172	5204
	CP/AT SEA						85							85
	FLOATING		894	1222	1609	1155	2023	1765	4516	9857	10681	3039	991	37751
	ADFG-JV	538	1766	808	715									3827
	BAIT-DLV	102	114	67	283	102		TR	6	32	68		5	780
	N PUGET S						22		42	10				75
	S PUGET S					5663	1				40	100	3102	8906
	ALL PORTS	2970	7666	9770	12278	17850	4711	6372	9860	13814	15871	5944	7550	114658
1984	WESTWARD	1436	2692	6558	6846	1404	1033	2366	1282	2791	1930	3672	5424	37434
	CENTRAL	2	9	8	22	84	247	469	436	179	12	18	4	1489
	SOUTHEAST	171	106	233	641	1045	1271	636	542	815	30	106	129	5723
	N PUGET S	27			7			42	4	17				97
	S PUGET S				8985	954		17	2326				6132	18413
	ALL PORTS	1636	2806	6798	16501	3486	2551	3530	4590	3802	1972	3796	11689	63157
1983	WESTWARD	2266	7504	6647	7886	3892	5449	2915	2354	183	704	825	540	41165
	CENTRAL	19	21	20	23	28	51	15	26	16	8	17	6	252
	SOUTHEAST	69	96	200	399	671	640	363	406	475	457	34	185	3995
	N PUGET S		34	31									38	103
	S PUGET S				11	3995			2764		18	690	2548	10027
	COAST WA.					TR					TR			TR
	ALL PORTS	2354	7654	6899	8320	8586	6140	3293	5550	674	1188	1565	3317	55541
1982	WESTWARD	953	1376	2939	1472	1198	1816	2001	1452	906	1595	2100	2096	19903
	CENTRAL	17	20	21	7	12	11	1	38	19	7	21	7	180
	SOUTHEAST	72	40	134	116	197	474	659	469	684	61	41	152	3099
	N PUGET S		29	25			7						27	89
	S PUGET S			78	3152	TR	1	3973	33	26			2724	9987
	COL R WA.								6					6
	ALL PORTS	1042	1465	3197	4748	1407	2309	6633	1998	1634	1663	2162	5006	33265

THIS REPORT INCLUDES ONLY DATA FOR NORTH PACIFIC COUNCIL INPFC AREAS

TR => LANDED CATCH LESS THAN 0.5 METRIC TONS (OR 50 LBS OR 50 FISH) * => CANNOT COMPUTE (DIVISOR=0)

...THE FOREIGN AND JV BERING SEA FLATFISH STATISTICS FOR 1981-1984 ARE IN ERROR. CONTACT JERRY BERGER @ 4193 FOR DETAILS...

NPFMC GROUNDFISH BY PORT GROUP REPORT: COMMERCIAL DATA FOR ALL GEARS

LANDED CATCH (MTONS)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
82-85	WESTWARD	1699	3941	5676	6007	3908	2615	2937	2541	1652	2096	2245	2835	38152
AVERAGE	CENTRAL	10	52	56	276	362	90	131	145	225	13	98	4	1462
	SOUTHEAST	125	196	377	489	594	688	439	389	619	363	67	159	4505
	CP/AT SEA						21							21
	FLOATING		224	305	402	289	506	441	1129	2464	2670	760	248	9438
	ADFG-JV	134	441	202	179									957
	BAIT-DLV	26	29	17	71	26		TR	1	8	17		1	195
	N PUGET S	7	16	14	2		7	11	12	7			16	91
	S PUGET S			19	3037	2653	TR	998	1281	7	14	197	3627	11833
	COAST WA.					TR					TR			TR
	COL R WA.								2					2
	ALL PORTS	2000	4898	6666	10462	7832	3928	4957	5500	4981	5173	3367	6890	66655
1986	WESTWARD	143%	218%	179%	88%	116%	154%	111%	104%	14%				108%
AS % OF	CENTRAL	168%	813%	107%	982%	465%	38%	3%	318%	4%	19%			370%
82-85	SOUTHEAST	71%	75%	70%	903%	81%	45%	21%	26%	265%	17%			169%
AVERAGE	FLOATING	*	4263%	2966%	2357%	1629%	451%	515%	159%	150%				465%
	ADFG-JV			147%	73%	*	*							66%
	BAIT-DLV	557%	295%	1209%	22%									228%
	CP/AKR			*	*	*	*	*	*	*	*	*	*	*
	N PUGET S					*	37%			1873%				144%
	S PUGET S				100%	64%	524%		0%	1199%		39%	5%	43%
	ALL PORTS	186%	384%	301%	270%	178%	235%	206%	154%	271%	145%	222%	45%	216%

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NPFMC GROUNDFISH BY PORT GROUP REPORT: COMMERCIAL DATA FOR ALL GEARS

$-VALUE ($1000)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	1090.3	2005.0	2965.4	3377.2	3899.0	1328.4	652.0	433.0	34.3				15784.6
	CENTRAL	10.4	431.9	20.6	3455.5	2349.4	26.5	2.4	199.0	4.4	1.4			6501.4
	SOUTHEAST	89.5	142.4	307.0	6243.5	634.0	309.2	83.2	92.4	2715.3	57.2			10673.7
	FLOATING	214.9	1252.7	1260.3	2478.6	1680.5	1308.9	958.2	1201.6	589.6				10945.4
	ADFG-JV			83.5	34.6	48.2	0.9							167.2
	BAIT-DLV	106.0	45.9	151.9	8.2									312.1
	CP/AKR			22.8	555.4	265.4	676.6	1047.2	1530.4	2625.7	2140.0	1705.5	727.5	11296.6
	N PUGET S					0.5	2.8			245.4				248.7
	S PUGET S				1869.5	915.1	2.0		4.0	146.2		101.0	122.9	3160.8
	ALL PORTS	1511.2	3878.0	4811.6	18022.3	9792.0	3655.3	2743.0	3460.5	6361.0	2198.6	1806.5	850.4	59090.4
1985	WESTWARD	523.5	862.3	1574.7	2581.8	6727.0	2057.8	1990.5	1150.6	673.6	864.3	1518.6	814.0	21338.7
	CENTRAL	0.0	64.8	223.1	1386.6	1959.0	75.3	50.2	114.9	334.9	22.2	172.6	0.8	4404.4
	SOUTHEAST	227.6	704.3	1211.9	1057.1	570.7	465.0	106.2	142.3	690.1	1432.1	78.5	86.2	6772.0
	CP/AT SEA						87.2							87.2
	FLOATING		219.9	309.6	389.4	274.3	728.0	364.0	579.1	1015.2	1134.6	316.9	279.4	5610.4
	ADFG-JV	116.2	267.6	96.9	170.0									650.8
	BAIT-DLV	78.1	85.7	51.5	173.5	62.5		0.4	4.3	17.9	38.6		2.6	515.0
	N PUGET S						12.1		23.3	4.5				39.9
	S PUGET S					3292.3	1.3				101.4	94.5	512.8	4002.2
	ALL PORTS	945.4	2204.6	3467.7	5758.4	12885.8	3426.7	2511.2	2014.5	2736.3	3593.1	2181.1	1695.7	43420.5
1984	WESTWARD	376.3	690.5	2097.9	2548.1	559.4	632.2	1245.8	789.0	1321.2	629.2	1104.0	1979.8	13973.3
	CENTRAL	1.2	5.4	5.4	15.5	61.9	195.4	345.8	340.7	152.2	8.0	16.3	1.9	1149.8
	SOUTHEAST	116.8	84.0	187.5	500.0	773.0	596.4	557.9	303.3	573.7	37.6	93.0	95.5	3918.6
	N PUGET S	16.7			6.3			73.9	7.0	8.1				112.0
	S PUGET S				3364.6	240.4		23.7	718.5				2119.6	6466.9
	ALL PORTS	511.0	779.8	2290.8	6434.5	1634.7	1424.1	2247.1	2158.5	2055.1	674.8	1213.2	4196.7	25620.6
1983	N PUGET S		20.0	18.5									23.7	62.1
	S PUGET S				16.2	2028.8			1252.0		23.0	138.4	1418.8	4877.2
	COAST WA.					0.0					0.2			0.2
1982	N PUGET S		14.3	12.2			9.9						16.0	52.4
	S PUGET S			142.4	1530.9	0.0	1.5	1915.1	42.6	47.3			1552.8	5232.6
	COL R WA.								37.3					37.3

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NPFMC GROUNDFISH BY PORT GROUP REPORT: COMMERCIAL DATA FOR ALL GEARS

PRICE PER POUND		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	0.204	0.106	0.132	0.289	0.389	0.149	0.091	0.075	0.066				0.174
	CENTRAL	0.292	0.462	0.157	0.579	0.632	0.349	0.313	0.196	0.209	0.250			0.546
	SOUTHEAST	0.454	0.441	0.527	0.642	0.596	0.457	0.409	0.423	0.752	0.426			0.638
	FLOATING	0.094	0.060	0.063	0.119	0.162	0.260	0.191	0.304	0.073				0.113
	ADFG-JV			0.127	0.120	0.109	0.108							0.120
	BAIT-DLV	0.338	0.246	0.342	0.239									0.319
	CP/AKR			0.552	0.080	0.188	0.120	0.104	0.199	0.154	0.131	0.104	0.113	0.128
	N PUGET S					0.158	0.470			0.877				0.861
	S PUGET S				0.279	0.245	0.395		0.661	0.848		0.588	0.296	0.282
	ALL PORTS	0.184	0.094	0.109	0.290	0.318	0.180	0.122	0.185	0.214	0.133	0.110	0.124	0.186
1985	WESTWARD	0.111	0.093	0.109	0.150	0.334	0.432	0.202	0.103	0.112	0.094	0.289	0.113	0.179
	CENTRAL	0.250	0.185	0.583	0.599	0.671	0.645	0.586	0.652	0.222	0.374	0.234	0.210	0.509
	SOUTHEAST	0.543	0.591	0.584	0.601	0.556	0.578	0.479	0.468	0.625	0.720	0.398	0.227	0.590
	CP/AT SEA						0.465							0.465
	FLOATING		0.112	0.115	0.110	0.108	0.163	0.094	0.058	0.047	0.048	0.047	0.128	0.067
	ADFG-JV	0.098	0.069	0.054	0.108									0.077
	BAIT-DLV	0.346	0.340	0.350	0.278	0.278		0.340	0.340	0.256	0.257		0.247	0.300
	N PUGET S						0.250		0.250	0.198				0.243
	S PUGET S					0.264	0.637				1.157	0.431	0.075	0.204
	ALL PORTS	0.144	0.130	0.161	0.213	0.327	0.330	0.179	0.093	0.090	0.103	0.166	0.102	0.172
1984	WESTWARD	0.119	0.116	0.145	0.169	0.181	0.278	0.239	0.279	0.215	0.148	0.136	0.166	0.169
	CENTRAL	0.249	0.281	0.312	0.321	0.335	0.359	0.334	0.355	0.385	0.316	0.403	0.236	0.350
	SOUTHEAST	0.311	0.361	0.365	0.354	0.336	0.213	0.398	0.254	0.319	0.568	0.399	0.336	0.311
	N PUGET S	0.281			0.380			0.793	0.789	0.219				0.521
	S PUGET S				0.170	0.114		0.626	0.140				0.157	0.159
	ALL PORTS	0.142	0.126	0.153	0.177	0.213	0.253	0.289	0.213	0.245	0.155	0.145	0.163	0.184
1983	N PUGET S		0.270	0.270									0.281	0.274
	S PUGET S				0.655	0.230			0.205		0.591	0.091	0.253	0.221
	COAST WA.					0.180					0.248			0.248
1982	N PUGET S		0.220	0.220			0.636						0.270	0.268
	S PUGET S			0.830	0.220	0.295	0.777	0.219	0.587	0.822			0.259	0.238
	COL R WA.								2.713					2.713

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NPFMC ATKA MACKEREL BY PORT GROUP REPORT: COMMERCIAL DATA FOR ALL GEARS

LANDED CATCH (MTONS)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	FLOATING							4						4
	CP/AKR											TR	1	1
	ALL PORTS							4				TR	1	5
1984	WESTWARD										31	TR		31
	ALL PORTS										31	TR		31
82-85	WESTWARD										8	TR		8
AVERAGE	ALL PORTS										8	TR		8
1986	FLOATING							*						*
AS % OF	CP/AKR											*	*	*
82-85	ALL PORTS							*				253%	*	61%

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NPFMC ATKA MACKEREL BY PORT GROUP REPORT: COMMERCIAL DATA FOR ALL GEARS

$-VALUE ($1000)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	FLOATING							1.7						1.7
	CP/AKR											0.0	0.2	0.3
	ALL PORTS							1.7				0.0	0.2	2.0
1984	WESTWARD										11.6	0.1		11.6
	ALL PORTS										11.6	0.1		11.6

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PRICE PER POUND		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	FLOATING							0.210						0.210
	CP/AKR											0.128	0.128	0.128
	ALL PORTS							0.210				0.128	0.128	0.193
1984	WESTWARD										0.169	0.169		0.169
	ALL PORTS										0.169	0.169		0.169

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LANDED CATCH (MTONS)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	424	757	314	123	69	20	25	157	26				1915
	CENTRAL	7	12	4	5	TR			TR	TR	TR			27
	SOUTHEAST	TR	2	TR	TR		TR	TR		TR	TR			3
	FLOATING	382	1083	710	31		248	556	211	311				3532
	BAIT-DLV		TR											TR
	CP/AKR				334	33	358	213	128	505	661	633	138	3003
	S PUGET S				71							10	109	191
	ALL PORTS	813	1854	1029	564	102	626	795	496	842	661	643	247	8671
1985	WESTWARD	4	3	2		1		4	5	14	2	29	25	88
	CENTRAL	TR	11	1	3			TR		TR	1	7	2	25
	SOUTHEAST	32	2	1	2	TR	1	1		TR	1	15	130	185
	FLOATING			8						30	28	11	133	209
	N PUGET S								TR	TR				TR
	S PUGET S					TR						6	29	35
	ALL PORTS	37	16	12	5	1	1	5	5	44	31	68	318	543
1984	WESTWARD	69	74	85	9	4			3	TR	6	10	6	265
	CENTRAL	TR	2	TR	TR						1	1	1	5
	SOUTHEAST	63	TR	TR	TR	TR	TR	TR		1	1	32	55	154
	N PUGET S	27								1				28
	S PUGET S												4	4
	ALL PORTS	159	76	85	9	4	TR	TR	3	2	8	43	66	455
1983	WESTWARD	7	1	3	9	13	1	TR		1	3	5	1	43
	CENTRAL	13	9	6	1	TR				TR	3	12	1	46
	SOUTHEAST	60	45		TR				TR			16	128	249
	N PUGET S		34	31									38	102
	S PUGET S												9	9
	ALL PORTS	80	88	40	10	13	1	TR	TR	1	7	33	176	449
1982	WESTWARD				TR	2			4	1				8
	CENTRAL	14	17	19	6	TR		TR	TR	TR	3	8	2	68
	SOUTHEAST	29	25				TR		1			TR	65	121
	N PUGET S		29	25									27	82
	ALL PORTS	43	72	44	6	2	TR	TR	6	1	3	8	93	279
82-85 AVERAGE	WESTWARD	20	19	22	4	5	TR	1	3	4	3	11	8	101
	CENTRAL	7	10	7	3	TR		TR	TR	TR	2	7	1	36
	SOUTHEAST	46	18	TR	1	TR	TR	TR	TR	TR	1	16	95	177
	FLOATING			2						7	7	3	33	52
	N PUGET S	7	16	14					TR	TR			16	53
	S PUGET S					TR						1	10	12
	ALL PORTS	80	63	45	8	5	TR	1	3	12	12	38	163	432

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$-VALUE ($1000)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	51.0	95.0	47.7	18.1	10.9	4.9	6.6	22.6	3.5				260.4
	CENTRAL	3.8	6.5	2.0	2.2	0.0			0.0	0.2	0.0			14.7
	SOUTHEAST	0.0	1.0	0.1	0.0		0.0	0.9		0.0	0.0			2.0
	FLOATING	112.3	357.1	219.9	10.9		110.8	251.5	109.1	138.3				1309.7
	BAIT-DLV		0.1											0.1
	CP/AKR				39.4	14.8	70.0	66.5	55.8	220.6	228.8	243.7	46.2	985.8
	S PUGET S				51.9							17.0	59.2	128.2
	ALL PORTS	167.1	459.7	269.7	122.4	25.7	185.7	325.4	187.5	362.6	228.8	260.8	105.4	2700.8
1985	WESTWARD	0.7	0.4	0.2		0.6		1.9	1.3	12.8	2.0	10.8	5.3	36.0
	CENTRAL	0.0	6.2	0.4	0.7			0.0		0.1	0.4	3.7	0.7	12.3
	SOUTHEAST	12.1	1.0	0.4	1.0	0.0	1.8	2.4		0.3	0.4	6.7	44.8	70.9
	FLOATING			1.8						6.5	2.9	2.5	27.0	40.7
	N PUGET S								0.1	0.1				0.2
	S PUGET S					0.0						7.3	3.8	11.1
	ALL PORTS	12.9	7.5	2.9	1.7	0.7	1.8	4.3	1.5	19.8	5.8	31.1	81.5	171.4
1984	WESTWARD	22.7	22.2	28.0	2.7	1.1			0.9	0.1	1.8	1.7	1.4	82.5
	CENTRAL	0.2	0.7	0.1	0.1						0.5	0.5	0.3	2.4
	SOUTHEAST	25.3	0.0	0.0	0.0	0.0	0.2	0.0		0.5	0.5	12.9	18.2	57.6
	N PUGET S	16.5								0.4				16.9
	S PUGET S												0.9	0.9
	ALL PORTS	64.6	22.9	28.2	2.9	1.1	0.2	0.0	0.9	1.0	2.7	15.1	20.8	160.3
1983	N PUGET S		20.0	18.5									23.4	61.8
	S PUGET S												4.6	4.6
1982	N PUGET S		14.3	12.2									16.0	42.5

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1986	WESTWARD	0.055	0.057	0.069	0.067	0.072	0.111	0.121	0.065	0.062				0.062
	CENTRAL	0.260	0.255	0.218	0.215	0.208			0.100	0.220	0.246			0.243
	SOUTHEAST	0.105	0.189	0.234	0.196		0.718	0.930		0.488	0.233			0.299
	FLOATING	0.133	0.150	0.140	0.162		0.203	0.205	0.235	0.202				0.168
	BAIT-DLV		0.400											0.400
	CP/AKR				0.053	0.202	0.089	0.141	0.198	0.198	0.157	0.175	0.152	0.149
	S PUGET S				0.330							0.750	0.246	0.305
	ALL PORTS	0.093	0.112	0.119	0.098	0.114	0.135	0.186	0.172	0.195	0.157	0.184	0.194	0.141
1985	WESTWARD	0.078	0.062	0.060		0.297		0.222	0.119	0.426	0.488	0.170	0.094	0.185
	CENTRAL	0.250	0.250	0.150	0.104			0.146		0.200	0.250	0.250	0.206	0.223
	SOUTHEAST	0.171	0.248	0.207	0.202	0.240	1.500	1.398		0.373	0.251	0.197	0.156	0.174
	FLOATING			0.100						0.100	0.048	0.100	0.092	0.088
	N PUGET S								0.720	0.700				0.711
	S PUGET S					0.059						0.585	0.059	0.145
	ALL PORTS	0.160	0.218	0.108	0.144	0.238	1.500	0.416	0.128	0.205	0.084	0.207	0.116	0.143
1984	WESTWARD	0.149	0.136	0.150	0.142	0.136			0.163	0.163	0.138	0.077	0.102	0.141
	CENTRAL	0.179	0.180	0.157	0.175						0.250	0.250	0.150	0.194
	SOUTHEAST	0.182	0.300	0.300	0.152	0.152	0.190	0.300		0.172	0.175	0.182	0.150	0.170
	N PUGET S	0.280								0.239				0.279
	S PUGET S												0.100	0.100
	ALL PORTS	0.184	0.137	0.150	0.143	0.136	0.190	0.300	0.163	0.194	0.156	0.158	0.142	0.160
1983	N PUGET S		0.270	0.270									0.280	0.274
	S PUGET S												0.243	0.243
1982	N PUGET S		0.220	0.220									0.270	0.236

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NPFMC PACIFIC COD BY PORT GROUP REPORT: COMMERCIAL DATA FOR ALL GEARS

LANDED CATCH (MTONS)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	1061	4654	5854	934	22	799	1351	247	34				14956
	CENTRAL	TR		54	1	8	17	2	2	9	TR			96
	SOUTHEAST	20	37	25	24	16	4	1	TR	1	5			134
	FLOATING	346	2873	5001	3982	2156	764	927	750	786				17584
	ADFG-JV			297	131	200	4							632
	BAIT-DLV	39	84	201	1									325
	CP/AKR			TR	310	71	224	351	294	736	922	1017	743	4670
	N PUGET S						TR							TR
	S PUGET S				2627	1266	TR						65	3958
	ALL PORTS	1465	7649	11433	8010	3739	1814	2633	1292	1567	928	1017	808	42354
1985	WESTWARD	1717	3281	5736	6914	6885	575	2527	574	346	963	513	724	30758
	CENTRAL				1	1	1	1	TR	TR	17	TR		21
	SOUTHEAST	5	19	18	4	5	2	1	19	1	4	20	8	106
	FLOATING		840	1161	1327	305	812	1440	514	236	253	330	221	7441
	ADFG-JV	538	1766	808	715									3827
	BAIT-DLV	91	92	67	283	102		TR	6		TR		4	645
	N PUGET S						TR							TR
	S PUGET S					5450							529	5979
	ALL PORTS	2351	5998	7790	9245	12749	1389	3969	1113	584	1238	863	1487	48777
1984	WESTWARD	1267	2536	6220	6757	1269	603	1647	449	1295	860	1791	2915	27609
	CENTRAL	TR	TR	TR	TR	TR	TR	1	TR				TR	2
	SOUTHEAST	1	TR	3	TR	6	12	TR	1	9	1	1	1	35
	N PUGET S	TR												TR
	S PUGET S				8809	933			1508				2993	14243
	ALL PORTS	1269	2536	6223	15566	2208	615	1648	1958	1303	861	1791	5910	41889
1983	WESTWARD	2194	7391	6284	7429	3025	4373	2121	1917	67	694	797	521	36812
	CENTRAL	TR			TR	2	6	TR		TR	1	TR	TR	10
	SOUTHEAST	2	2	1	2	2	2	TR	TR	1	2	2	2	18
	N PUGET S												TR	TR
	S PUGET S					3827			2647			554	2308	9336
	COAST WA.										TR			TR
	ALL PORTS	2196	7393	6284	7430	6857	4381	2121	4565	68	698	1354	2831	46177
1982	WESTWARD	824	1011	2653	1143	1083	1767	1982	1418	899	1503	1898	1275	17455
	CENTRAL					3	7			15	TR	2	TR	27
	SOUTHEAST	TR	2	7	1	6	2	1	20	1	3	1	3	48
	S PUGET S				3134			3928					2552	9615
	ALL PORTS	824	1013	2661	4278	1092	1776	5911	1438	915	1506	1901	3830	27144

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NPFMC PACIFIC COD BY PORT GROUP REPORT: COMMERCIAL DATA FOR ALL GEARS

$-VALUE ($1000)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	256.2	1031.8	1321.5	218.6	5.7	90.8	159.8	52.0	7.5				3143.9
	CENTRAL	0.1		17.9	0.3	2.2	8.9	1.2	1.0	4.0	0.1			35.8
	SOUTHEAST	10.0	18.8	14.7	14.6	8.8	1.8	0.5	0.1	0.7	2.0			72.0
	FLOATING	74.7	354.5	722.0	850.5	405.7	82.5	101.0	81.0	84.9				2756.8
	ADFG-JV			83.5	34.6	48.2	0.9							167.2
	BAIT-DLV	30.9	45.5	151.9	0.7									229.0
	CP/AKR			0.1	70.9	15.5	32.7	55.2	62.6	165.0	206.5	228.5	169.4	1006.5
	N PUGET S						0.2							0.2
	S PUGET S				1737.2	819.6	0.0						54.1	2611.0
	ALL PORTS	371.9	1450.6	2311.7	2927.4	1305.7	217.8	317.8	196.6	262.2	208.7	228.5	223.6	10022.5
1985	WESTWARD	416.5	709.0	1238.7	1494.5	4127.3	344.7	546.1	118.8	72.5	160.6	151.7	181.6	9561.9
	CENTRAL				0.7	0.6	0.3	0.4	0.0	0.1	11.9	0.0		14.1
	SOUTHEAST	2.8	13.7	11.0	2.4	2.8	0.7	0.4	11.2	0.6	2.0	13.9	4.2	65.6
	FLOATING		163.8	250.9	284.3	123.1	175.5	295.0	107.9	51.2	52.4	71.1	48.0	1623.3
	ADFG-JV	116.2	267.6	96.9	170.0									650.8
	BAIT-DLV	70.0	70.7	51.5	173.5	62.5		0.4	4.3		0.1		2.3	435.3
	N PUGET S						0.1							0.1
	S PUGET S					3268.0							166.6	3434.6
	ALL PORTS	605.5	1224.9	1649.1	2125.4	7584.2	521.4	842.2	242.2	124.4	227.0	236.7	402.7	15785.6
1984	WESTWARD	339.1	652.9	1987.7	2523.2	474.5	246.2	693.3	186.8	501.7	280.4	616.3	1646.8	10148.8
	CENTRAL	0.0	0.0	0.1	0.0	0.1	0.0	0.4	0.2				0.1	0.9
	SOUTHEAST	0.3	0.1	0.9	0.3	3.5	8.7	0.1	0.1	2.7	0.2	0.1	0.3	17.4
	N PUGET S	0.2												0.2
	S PUGET S				3293.7	237.7			627.9				1717.5	5876.6
	ALL PORTS	339.6	653.0	1988.7	5817.2	715.8	254.9	693.8	815.0	504.4	280.6	616.4	3364.6	16044.0
1983	N PUGET S												0.3	0.3
	S PUGET S					1991.1			1225.6			111.2	1277.2	4605.1
	COAST WA.										0.2			0.2
1982	S PUGET S				1527.1			1905.2					1348.2	4780.5

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NPFMC PACIFIC COD BY PORT GROUP REPORT: COMMERCIAL DATA FOR ALL GEARS

PRICE PER POUND		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	0.110	0.101	0.102	0.106	0.116	0.052	0.054	0.096	0.101				0.095
	CENTRAL	0.250		0.150	0.152	0.125	0.217	0.227	0.222	0.203	0.220			0.170
	SOUTHEAST	0.231	0.232	0.264	0.270	0.251	0.205	0.214	0.291	0.238	0.180			0.244
	FLOATING	0.098	0.056	0.065	0.097	0.085	0.049	0.049	0.049	0.049				0.071
	ADFG-JV			0.127	0.120	0.109	0.108							0.120
	BAIT-DLV	0.361	0.246	0.342	0.350									0.319
	CP/AKR			0.249	0.104	0.099	0.066	0.071	0.097	0.102	0.102	0.102	0.103	0.098
	N PUGET S						0.260							0.260
	S PUGET S				0.300	0.294	0.260						0.376	0.299
	ALL PORTS	0.115	0.086	0.092	0.166	0.158	0.054	0.055	0.069	.0.076	0.102	0.102	0.125	0.107
1985	WESTWARD	0.110	0.098	0.098	0.098	0.272	0.272	0.098	0.094	0.095	0.076	0.134	0.114	0.141
	CENTRAL				0.417	0.227	0.161	0.270	0.303	0.283	0.313	0.250		0.304
	SOUTHEAST	0.275	0.322	0.278	0.273	0.231	0.168	0.222	0.269	0.202	0.237	0.315	0.244	0.281
	FLOATING		0.088	0.098	0.097	0.183	0.098	0.093	0.095	0.098	0.094	0.098	0.098	0.099
	ADFG-JV	0.098	0.069	0.054	0.108									0.077
	BAIT-DLV	0.350	0.350	0.350	0.278	0.278		0.340	0.340		0.340		0.248	0.306
	N PUGET S						0.250							0.250
	S PUGET S					0.272							0.143	0.261
	ALL PORTS	0.117	0.093	0.096	0.104	0.270	0.170	0.096	0.099	0.097	0.083	0.124	0.123	0.147
1984	WESTWARD	0.121	0.117	0.145	0.169	0.170	0.185	0.191	0.189	0.176	0.148	0.156	0.256	0.167
	CENTRAL	0.134	0.134	0.134	0.134	0.462	0.312	0.264	0.276				0.135	0.224
	SOUTHEAST	0.142	0.143	0.155	0.275	0.286	0.316	0.111	0.111	0.141	0.115	0.116	0.125	0.227
	N PUGET S	0.440												0.440
	S PUGET S				0.170	0.115			0.189				0.260	0.187
	ALL PORTS	0.121	0.117	0.145	0.170	0.147	0.188	0.191	0.189	0.176	0.148	0.156	0.258	0.174
1983	N PUGET S												0.440	0.440
	S PUGET S					0.236			0.210			0.091	0.251	0.224
	COAST WA.										0.250			0.250
1982	S PUGET S				0.221			0.220					0.240	0.226

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NPFMC ROCKFISH BY PORT GROUP REPORT: COMMERCIAL DATA FOR ALL GEARS

LANDED CATCH (MTONS)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	71	9	115	54	375	344	4	2					975
	CENTRAL	1	106		382	17	3	1	457	TR	2			969
	SOUTHEAST	61	97	128	128	102	72	74	85	74	50			871
	FLOATING			1	51	5	12	10	47	1				127
	BAIT-DLV	TR	TR											TR
	CP/AKR					70	362	332	785	2059	581	328	183	4700
	N PUGET S					1	1			TR				3
	S PUGET S					1	1			2		3	1	7
	ALL PORTS	133	213	244	616	572	793	421	1376	2137	633	331	183	7652
1985	WESTWARD	1		1	TR	2	2	31	31	6	29		31	134
	CENTRAL		144	TR	9	11	2	5	3	665	2	247		1088
	SOUTHEAST	35	38	89	103	128	85	72	84	84	46	46	30	839
	FLOATING				167	360	317	50	370	256				1522
	N PUGET S						22		39	8				69
	S PUGET S						1					2	1	3
	ALL PORTS	36	181	90	280	501	429	158	528	1020	77	295	62	3655
1984	WESTWARD	3	TR	7	6	13	8	30	76	607	454	293	6	1504
	CENTRAL			1	1	1	5	9	7	2	1	11	TR	38
	SOUTHEAST	39	29	85	135	131	88	81	60	52	24	64	40	828
	N PUGET S									15				15
	S PUGET S							TR						TR
	ALL PORTS	42	29	93	142	146	101	121	143	676	479	368	46	2386
1983	WESTWARD					1	4	TR	TR	3	4	7	8	28
	CENTRAL				8	2	3	2	1	1	TR	TR		17
	SOUTHEAST	2	9	28	55	62	54	34	30	27	27	13	50	390
	S PUGET S				1								7	8
	COAST WA.										TR			TR
	ALL PORTS	2	9	28	63	65	61	37	31	31	31	21	65	443
1982	WESTWARD			1	TR	2	1	3	6	3	3		TR	18
	CENTRAL		TR	TR	TR	3	2	TR	1	3		1		10
	SOUTHEAST	11	6	22	13	24	17	46	32	28	18	19	4	239
	S PUGET S			3		TR				TR			3	6
	ALL PORTS	11	6	26	13	29	19	49	38	33	20	20	7	273
82-85 AVERAGE	WESTWARD	1	TR	2	2	5	4	16	28	155	122	75	11	421
	CENTRAL		36	TR	5	4	3	4	3	168	1	65	TR	288
	SOUTHEAST	22	20	56	77	86	61	58	51	48	28	36	31	574
	FLOATING				42	90	79	13	93	64				381
	N PUGET S						5		10	6				21
	S PUGET S			1	TR	TR	TR	TR		TR		TR	3	4
	COAST WA.										TR			TR
	ALL PORTS	23	56	59	125	185	153	91	185	440	152	176	45	1689

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NPFMC ROCKFISH BY PORT GROUP REPORT: COMMERCIAL DATA FOR ALL GEARS

LANDED CATCH (MTONS)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	7717%	10066%	5042%	3403%	8253%	9284%	23%	8%					231%
AS % OF	CENTRAL	*	295%		8470%	407%	92%	14%	15920%	0%	260%			336%
82-85	SOUTHEAST	280%	475%	230%	168%	119%	117%	128%	165%	156%	175%			152%
AVERAGE	FLOATING			*	121%	6%	15%	82%	51%	1%				33%
	BAIT-DLV	*	*											*
	CP/AKR					*	*	*	*	*	*	*	*	*
	N PUGET S					*	17%			8%				13%
	S PUGET S					10041%	731%			3941%		774%	26%	165%
	ALL PORTS	587%	376%	413%	493%	309%	519%	462%	744%	486%	417%	189%	409%	453%

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$-VALUE ($1000)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	31.8	6.3	43.7	17.0	186.3	122.1	2.4	0.8					410.4
	CENTRAL	1.7	57.6		250.9	15.3	3.0	0.7	195.3	0.2	0.9			525.7
	SOUTHEAST	70.7	113.1	139.3	102.7	88.2	64.1	71.3	84.1	75.3	50.8			859.6
	FLOATING			0.1	17.3	5.0	9.2	6.2	19.2	0.2				57.2
	BAIT-DLV	0.1	0.1											0.1
	CP/AKR					24.4	136.2	146.9	334.3	781.1	257.7	139.0	82.1	1901.7
	N PUGET S					0.5	0.6			0.3				1.3
	S PUGET S					0.4	0.8			0.8		3.0	0.5	5.6
	ALL PORTS	104.3	177.0	183.1	387.9	320.1	336.2	227.5	633.6	857.9	309.4	142.1	82.6	3761.7
1985	WESTWARD	0.3		1.3	0.4	1.1	0.8	11.8	9.0	3.9	12.5		18.6	59.9
	CENTRAL		55.1	0.3	12.0	10.8	2.1	5.1	2.9	311.9	2.0	112.3		514.5
	SOUTHEAST	41.7	41.0	96.8	90.0	106.4	71.5	69.1	79.0	64.8	43.9	51.2	32.9	788.3
	FLOATING				44.0	108.1	76.4	14.5	106.3	83.6				432.9
	N PUGET S						12.0		21.6	3.7				37.3
	S PUGET S						0.3					2.3	0.2	2.8
	ALL PORTS	42.0	96.1	98.4	146.5	226.4	163.1	100.5	218.9	467.9	58.4	165.8	51.7	1835.6
1984	WESTWARD	0.6	0.1	2.4	2.4	5.0	3.4	11.0	20.5	161.1	119.6	97.5	2.3	426.0
	CENTRAL			1.0	0.8	1.4	5.0	9.3	7.1	1.4	1.0	9.7	0.2	36.9
	SOUTHEAST	40.0	30.0	81.6	136.3	96.7	72.7	70.4	55.3	42.6	24.9	70.5	63.2	784.0
	N PUGET S									7.5				7.5
	S PUGET S							0.3						0.3
	ALL PORTS	40.6	30.0	85.0	139.5	103.1	81.1	91.0	82.8	212.6	145.5	177.7	65.7	1254.6
1983	S PUGET S				0.2								5.2	5.4
	COAST WA.										0.0			0.0
1982	S PUGET S			5.3		0.0				0.1			5.7	11.1

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PRICE PER POUND		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	0.202	0.302	0.172	0.142	0.226	0.161	0.291	0.162					0.191
	CENTRAL	1.200	0.246		0.298	0.401	0.488	0.507	0.194	0.406	0.229			0.246
	SOUTHEAST	0.529	0.530	0.492	0.363	0.391	0.406	0.434	0.450	0.460	0.463			0.447
	FLOATING			0.113	0.155	0.415	0.355	0.270	0.184	0.124				0.205
	BAIT-DLV	1.305	0.400											0.656
	CP/AKR					0.158	0.171	0.201	0.193	0.172	0.201	0.192	0.204	0.184
	N PUGET S					0.150	0.303			0.237				0.216
	S PUGET S					0.278	0.397			0.242		0.417	0.310	0.354
	ALL PORTS	0.356	0.378	0.340	0.286	0.254	0.192	0.245	0.209	0.182	0.222	0.195	0.204	0.223
1985	WESTWARD	0.152		0.599	0.572	0.308	0.227	0.174	0.131	0.313	0.194		0.270	0.203
	CENTRAL		0.174	0.539	0.579	0.446	0.407	0.459	0.491	0.213	0.500	0.206		0.214
	SOUTHEAST	0.539	0.496	0.496	0.396	0.378	0.380	0.437	0.425	0.348	0.437	0.505	0.503	0.426
	FLOATING				0.119	0.136	0.109	0.131	0.130	0.148				0.129
	N PUGET S						0.250		0.250	0.200				0.244
	S PUGET S						0.250					0.606	0.150	0.452
	ALL PORTS	0.528	0.240	0.497	0.237	0.205	0.172	0.289	0.188	0.208	0.345	0.255	0.381	0.228
1984	WESTWARD	0.100	0.100	0.157	0.182	0.172	0.186	0.165	0.122	0.120	0.119	0.151	0.171	0.128
	CENTRAL			0.416	0.454	0.425	0.454	0.461	0.454	0.383	0.490	0.404	0.512	0.437
	SOUTHEAST	0.460	0.471	0.437	0.459	0.335	0.374	0.392	0.417	0.370	0.475	0.499	0.722	0.430
	N PUGET S									0.220				0.220
	S PUGET S							0.250						0.250
	ALL PORTS	0.437	0.466	0.416	0.447	0.321	0.362	0.340	0.262	0.143	0.138	0.219	0.649	0.238
1983	S PUGET S				0.200								0.320	0.312
	COAST WA.										0.210			0.210
1982	S PUGET S			0.830		0.180				0.250			0.830	0.813

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NPFMC SABLEFISH BY PORT GROUP REPORT: COMMERCIAL DATA FOR ALL GEARS

LANDED CATCH (MTONS)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	777	519	1006	2456	2776	623	263	44					8465
	CENTRAL		306		2319	1659	13	TR	2					4298
	SOUTHEAST			103	4252	348	216			1555				6473
	FLOATING	1		44	999	713	813	491	753	52				3865
	BAIT-DLV				1									1
	CP/AKR			19	130	143	243	313	741	700	448	228	181	3146
	N PUGET S						1			126				127
	S PUGET S					1	1		3	77		64	12	158
	ALL PORTS	778	825	1172	10157	5640	1910	1066	1542	2509	448	292	194	26534
1985	WESTWARD	122	35	272	896	1863	1213	1173	582	340	416		318	7229
	CENTRAL		3	171	1037	1313	47	33	77	16	5	16		2719
	SOUTHEAST	114	480	829	683	316	269	15	27	405	846			3984
	CP/AT SEA						85							85
	FLOATING		38	38	38	TR	297	27	37	2			106	583
	S PUGET S					TR	TR				40	92	8	140
	ALL PORTS	236	556	1310	2653	3492	1911	1247	724	763	1307	108	432	14741
1984	WESTWARD	4	7	85	21	95	422	600	749	798	207	431	136	3554
	CENTRAL	1	6	6	21	82	242	459	428	177	9	5	2	1437
	SOUTHEAST	62	75	138	497	893	1138	540	478	750	TR		30	4601
	N PUGET S				7			42	4	TR				54
	S PUGET S				41			16					226	284
	ALL PORTS	67	89	229	587	1070	1802	1657	1659	1727	216	436	394	9930
1983	WESTWARD	TR				42	20	35	98	4	3	15	3	221
	CENTRAL	3		10	15	23	33	11	26	14	2	2	5	141
	SOUTHEAST	5	40	171	341	604	575	318	372	447	425	TR		3298
	S PUGET S				11	1			2		18		160	191
	ALL PORTS	8	40	181	366	670	627	363	498	466	447	17	168	3852
1982	WESTWARD	2	2					16	23	2	56	17	10	131
	CENTRAL						TR	TR	36	1	2	5		45
	SOUTHEAST		7	104	102	162	449	603	413	653	40	20	72	2625
	N PUGET S						7							7
	S PUGET S			75		TR	1		33	26			144	278
	ALL PORTS	2	9	179	102	162	457	620	505	682	99	43	226	3085
82-85	WESTWARD	32	11	89	229	500	414	456	363	286	171	116	117	2784
AVERAGE	CENTRAL	1	2	47	268	355	80	126	142	52	4	7	2	1085
	SOUTHEAST	45	150	311	406	494	608	369	322	564	328	5	26	3627
	CP/AT SEA						21							21
	FLOATING		9	10	9	TR	74	7	9	TR			27	146
	N PUGET S				2		2	11	1	TR				15
	S PUGET S			19	13	TR	TR	4	9	6	14	23	135	223
	ALL PORTS	78	173	475	927	1349	1199	972	846	909	517	151	305	7902

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LANDED CATCH (MTONS)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	2423%	4735%	1130%	1072%	555%	151%	58%	12%					304%
AS % OF	CENTRAL		12345%		865%	468%	16%	0%	1%					396%
82-85	SOUTHEAST			33%	1048%	70%	36%			276%				178%
AVERAGE	FLOATING	*		455%	10650%	8731611%	1094%	7378%	8127%	10346%				2651%
	BAIT-DLV				*									*
	CP/AKR			*	*	*	*	*	*	*	*	*	*	*
	N PUGET S						53%			120512%				839%
	S PUGET S					317%	326%		32%	1183%		279%	9%	71%
	ALL PORTS	994%	476%	247%	1096%	418%	159%	110%	182%	276%	87%	193%	63%	336%

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$-VALUE ($1000)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	728.7	536.7	1178.3	2911.7	3531.5	829.0	284.1	70.7					10070.6
	CENTRAL		367.6		3202.1	2331.7	14.4	0.4	2.6					5918.7
	SOUTHEAST			146.4	6119.1	525.7	233.2			2634.6				9658.9
	FLOATING	0.5		28.9	1192.1	1030.4	1048.0	560.7	977.0	34.1				4871.7
	BAIT-DLV				1.5									1.5
	CP/ARR			22.7	157.3	152.4	225.1	330.4	874.5	964.9	774.5	405.0	198.3	4105.0
	N PUGET S						1.6			245.1				246.8
	S PUGET S					1.6	0.9		4.0	145.4		80.9	8.9	241.7
	ALL PORTS	729.3	904.3	1376.3	13583.7	7573.3	2352.1	1175.6	1928.7	4024.2	774.5	485.9	207.1	35115.0
1985	WESTWARD	71.2	40.3	259.5	1085.6	2554.9	1670.9	1349.5	592.2	361.4	383.2		320.2	8688.7
	CENTRAL		3.5	221.9	1372.7	1947.4	70.9	43.3	112.0	21.2	6.8	19.6		3819.4
	SOUTHEAST	167.2	646.7	1099.5	959.1	451.9	386.3	26.4	47.2	619.3	1382.0			5785.6
	CP/AT SEA						87.2							87.2
	FLOATING		54.6	55.7	54.3	0.0	427.2	32.7	38.7	1.5			157.6	822.2
	S PUGET S					0.7	1.0				101.4	84.9	6.9	194.7
	ALL PORTS	238.4	745.1	1636.5	3471.7	4955.0	2643.6	1451.9	790.0	1003.4	1873.3	104.4	484.6	19397.8
1984	WESTWARD	1.5	3.7	62.0	13.7	75.6	382.6	531.7	580.2	648.1	172.2	232.0	67.6	2771.0
	CENTRAL	0.9	4.5	4.2	14.6	59.4	190.4	336.1	332.4	150.0	6.0	3.3	1.1	1102.8
	SOUTHEAST	43.3	52.8	97.1	348.4	662.4	497.2	475.3	245.7	526.3	0.0		11.5	2960.0
	N PUGET S				6.3			73.9	6.5	0.1				86.8
	S PUGET S				55.8			23.3					78.8	158.0
	ALL PORTS	45.7	61.1	163.2	438.7	797.4	1070.2	1440.3	1164.8	1324.6	178.1	235.4	159.0	7078.5
1983	S PUGET S				15.9	0.7			1.0		23.0		114.7	155.4
1982	N PUGET S						9.9							9.9
	S PUGET S			137.1		0.0	1.3		42.6	47.2			188.5	416.8

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LANDED CATCH (MTONS)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	87	2662	2868	1724	1305	2248	1624	2180	176				14874
	CENTRAL		TR	1										1
	SOUTHEAST	TR									TR			TR
	FLOATING	312	5436	3183	4421	1829	446	284		2537				18448
	BAIT-DLV	22	TR		14									36
	CP/AKR				2371	279	1278	3314	1545	3734	4742	5193	1650	24106
	S PUGET S				338	424								762
	ALL PORTS	421	8098	6052	8867	3838	3972	5222	3725	6448	4742	5193	1650	58228
1985	WESTWARD	294	874	548	12	389	373	733	3883	2024	2743	1840	2180	15892
	SOUTHEAST		TR	TR	TR								TR	TR
	FLOATING		17	14	77	489	596	248	3567	9194	9930	2698	531	27360
	BAIT-DLV	10	23							32	68			132
	S PUGET S					213							2536	2748
	ALL PORTS	304	913	562	89	1091	970	981	7451	11250	12741	4537	5246	46134
1984	WESTWARD	93	75	161	53	23	TR	88	6	90	372	1145	2361	4469
	S PUGET S				135	20			818				2908	3881
	ALL PORTS	93	75	161	188	44	TR	88	823	90	372	1145	5269	8350
1983	WESTWARD	65	91	100	182	135	60	TR	27	60			6	726
	CENTRAL		TR							TR	1			1
	S PUGET S					168			115			136	64	483
	ALL PORTS	65	91	100	182	303	60	TR	142	60	1	136	70	1210
1982	WESTWARD	116	361	266	329	109	48			TR	32	185	812	2257
	CENTRAL				TR	TR	TR		TR	TR	TR			1
	SOUTHEAST	25											1	26
	S PUGET S				18			45					25	88
	ALL PORTS	141	361	266	348	109	48	45	TR	TR	32	185	837	2372
82-85	WESTWARD	142	350	269	144	164	121	205	979	544	787	793	1339	5836
AVERAGE	CENTRAL		TR		TR	TR	TR		TR	TR	TR			TR
	SOUTHEAST	6	TR	TR	TR								TR	7
	FLOATING		4	3	19	122	149	62	892	2299	2483	674	133	6840
	BAIT-DLV	2	6							8	17			33
	S PUGET S				38	100		11	233			34	1383	1800
	ALL PORTS	151	360	272	202	386	270	279	2104	2850	3286	1501	2856	14516
1986	WESTWARD	61%	760%	1067%	1197%	796%	1865%	791%	223%	32%				255%
AS % OF	CENTRAL		112%	*										265%
82-85	SOUTHEAST	1%									*			2%
AVERAGE	FLOATING	*	131699%	93777%	23006%	1495%	299%	459%		110%				270%
	BAIT-DLV	905%	5%		*									108%
	CP/AKR				*	*	*	*	*	*	*	*	*	*
	S PUGET S				884%	423%								42%
	ALL PORTS	279%	2248%	2224%	4397%	993%	1473%	1875%	177%	226%	144%	346%	58%	401%

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PRICE PER POUND		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	0.425	0.469	0.531	0.538	0.577	0.604	0.491	0.730					0.540
	CENTRAL		0.545		0.626	0.637	0.516	0.594	0.642					0.625
	SOUTHEAST			0.644	0.653	0.686	0.489			0.769				0.677
	FLOATING	0.300		0.300	0.541	0.656	0.585	0.518	0.589	0.300				0.572
	BAIT-DLV				0.669									0.669
	CP/AKR			0.555	0.548	0.483	0.419	0.479	0.535	0.625	0.784	0.807	0.496	0.592
	N PUGET S						0.800			0.880				0.879
	S PUGET S					0.727	0.484		0.661	0.860		0.571	0.326	0.694
	ALL PORTS	0.425	0.497	0.533	0.607	0.609	0.559	0.500	0.567	0.727	0.784	0.755	0.485	0.600
1985	WESTWARD	0.264	0.524	0.433	0.550	0.622	0.625	0.522	0.461	0.482	0.418		0.457	0.545
	CENTRAL		0.465	0.588	0.601	0.673	0.690	0.602	0.658	0.584	0.571	0.545		0.637
	SOUTHEAST	0.666	0.611	0.602	0.637	0.649	0.652	0.797	0.781	0.694	0.741			0.659
	CP/AT SEA						0.465							0.465
	FLOATING		0.657	0.657	0.657	0.390	0.652	0.557	0.473	0.344			0.672	0.640
	S PUGET S					1.050	1.200				1.157	0.418	0.394	0.629
	ALL PORTS	0.458	0.608	0.567	0.594	0.644	0.627	0.528	0.495	0.596	0.650	0.437	0.509	0.597
1984	WESTWARD	0.199	0.249	0.332	0.303	0.363	0.411	0.402	0.351	0.368	0.377	0.244	0.225	0.354
	CENTRAL	0.318	0.318	0.318	0.318	0.328	0.357	0.332	0.352	0.384	0.318	0.318	0.318	0.348
	SOUTHEAST	0.318	0.318	0.318	0.318	0.336	0.198	0.399	0.233	0.318	0.175		0.175	0.292
	N PUGET S				0.380			0.793	0.826	0.150				0.733
	S PUGET S				0.615			0.641					0.158	0.252
	ALL PORTS	0.312	0.313	0.323	0.339	0.338	0.269	0.394	0.319	0.348	0.374	0.245	0.183	0.323
1983	S PUGET S				0.677	0.372			0.223		0.591		0.325	0.369
1982	N PUGET S						0.636							0.636
	S PUGET S			0.830		0.370	0.931		0.587	0.826			0.594	0.679

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$-VALUE ($1000)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	19.3	335.2	374.3	211.8	164.5	281.6	199.1	286.9	23.2				1896.1
	CENTRAL		0.1	0.7										0.7
	SOUTHEAST	0.0									0.0			0.0
	FLOATING	27.5	479.3	235.8	407.8	239.4	58.4	37.2		332.0				1817.4
	BAIT-DLV	12.4	0.3		6.0									18.6
	CP/AKR				287.8	35.1	162.3	411.1	203.4	493.1	626.4	685.8	218.1	3123.1
	S PUGET S				80.4	93.4								173.8
	ALL PORTS	59.2	814.9	610.8	993.9	532.4	502.3	647.4	490.3	848.4	626.5	685.8	218.1	7029.9
1985	WESTWARD	34.7	112.7	74.9	1.3	43.1	41.4	81.2	428.1	223.0	306.1	1356.1	288.3	2990.9
	SOUTHEAST		0.0	0.0	0.0								0.0	0.0
	FLOATING		1.5	1.2	6.8	43.1	48.8	21.8	314.5	810.8	870.8	243.3	46.8	2409.4
	BAIT-DLV	7.5	15.0							17.9	38.5			78.9
	S PUGET S					23.6							335.4	359.0
	ALL PORTS	42.1	129.1	76.1	8.1	109.8	90.2	103.1	742.6	1051.8	1215.3	1599.4	670.6	5838.2
1984	WESTWARD	12.4	11.6	17.9	6.0	3.1	0.0	9.8	0.6	10.0	43.7	155.4	261.7	532.2
	S PUGET S				15.2	2.7			90.6				322.4	430.9
	ALL PORTS	12.4	11.6	17.9	21.2	5.8	0.0	9.8	91.3	10.0	43.7	155.4	584.1	963.1
1983	S PUGET S					37.0			25.4			27.2	17.0	106.6
1982	S PUGET S				3.8			9.9					10.4	24.0

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PRICE PER POUND		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	WESTWARD	0.100	0.057	0.059	0.056	0.057	0.057	0.056	0.060	0.060				0.058
	CENTRAL		0.300	0.300										0.300
	SOUTHEAST	0.040									0.213			0.153
	FLOATING	0.040	0.040	0.034	0.042	0.059	0.059	0.059		0.059				0.045
	BAIT-DLV	0.256	0.400		0.200									0.236
	CP/AKR				0.055	0.057	0.058	0.056	0.060	0.060	0.060	0.060	0.060	0.059
	S PUGET S				0.108	0.100								0.103
	ALL PORTS	0.064	0.046	0.046	0.051	0.063	0.057	0.056	0.060	0.060	0.060	0.060	0.060	0.055
1985	WESTWARD	0.053	0.059	0.062	0.050	0.050	0.050	0.050	0.050	0.050	0.051	0.334	0.060	0.085
	SOUTHEAST		0.040	0.040	0.082								0.040	0.051
	FLOATING		0.040	0.040	0.040	0.040	0.037	0.040	0.040	0.040	0.040	0.041	0.040	0.040
	BAIT-DLV	0.350	0.300							0.256	0.256			0.271
	S PUGET S					0.050							0.060	0.059
	ALL PORTS	0.063	0.064	0.061	0.041	0.046	0.042	0.048	0.045	0.042	0.043	0.160	0.058	0.057
1984	WESTWARD	0.060	0.070	0.050	0.051	0.060	0.059	0.050	0.050	0.050	0.053	0.062	0.050	0.054
	S PUGET S				0.051	0.060			0.050				0.050	0.050
	ALL PORTS	0.060	0.070	0.050	0.051	0.060	0.059	0.050	0.050	0.050	0.053	0.062	0.050	0.052
1983	S PUGET S					0.100			0.100			0.091	0.120	0.100
1982	S PUGET S				0.095			0.100					0.190	0.124

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APPENDIX F

Washington, Oregon, and California Groundfish Fisheries

by

Charles S. Korson and Wesley Silverthorne

Prepared for the

TWENTY-EIGHTH ANNUAL MEETING
of the
TECHNICAL SUBCOMMITTEE
of the
CANADA/UNITED STATES GROUNDFISH COMMITTEE

June 9-11, 1987
Seattle, Washington

Southwest Region
National Marine Fisheries Service
300 South Ferry Street
Terminal Island, California 90731

Summary

The following tables and figures present annual catch, exvessel value, and fishing vessel fleet data for the commercial groundfish fisheries off Washington, Oregon, and California from 1981 through 1986. During the 1986 fishing year shoreside landings fell by 10 percent to 82,200 mt. Joint venture pacific whiting landings more than tripled to over 81,000 mt, resulting in a 33 percent increase in the total commercial landed catch when compared to the 1985 fishing year. The combination of a negligible change in the exvessel value of shoreside landings and an improved JV fishery increased the total exvessel value of the 1986 commercial fishery by 7 percent to $66.6 million. Landings by different gear groups were lower for trawl gear and pot/traps, but were higher for longline, net, and other (unspecified) commercial gears. Following the trend established over the last few years, trawl and pot fishing fleets declined in size from 1985. In contrast the number of longline vessels participating in Oregon and Washington groundfish fisheries increased in 1986. As in past years the number of setnet vessels participating in the groundfish fishery cannot be determined.

The figures presented in this document characterize the trends in the West Coast groundfish fishery over the past several years. Landings and exvessel value by gear and for the major components of the fishery (i.e., shoreside and JV) are graphed from 1981-1986. Real exvessel values presented in the accompanying tables and figures are adjusted for inflation, where the base year is 1986=1.00.

Table 1 - Landings and Exvessel Values of Landings in Washington, Oregon, and California, Including Joint Venture Deliveries in Waters off These States.

	1985	1986	% Change
Shoreside (mt)	91,313	82,238	-9.9
Joint Venture (mt)	31,747	81,855	+357.8
Total WOC Landings	123,060	164,093	+33.3
Shoreside Values $			
Current	58,343,000	57,895,000	-0.77
Real[1]	59,899,000	57,895,000	-3.3
Joint-Venture Value			
Current	3,779,000	8,760,000	+131.8
Real	3,880,000	8,760,000	+125.8
Total WOC Groundfish Landed Value			
Current	62,121,000	66,655,000	+7.3
Real	63,779,000	66,655,000	+4.5

[1] Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GNP implicit price deflator, with a base year of 1986. The GNP deflators are 1.00 in 1986 and 0.974 in 1985.

Source: Pacific Coast Fishery Information Network (PacFIN), April 1987 Groundfish Report Series, Preliminary Data
NMFS, Northwest Region

Table 2 - California, Oregon, and Washington Shoreside Commercial Groundfish Landings (Metric Tons) and Exvessel Values (Thousands of Dollars) from 1977-1986.

Year	California		Oregon		Washington		Total Coast	
	mt	$	mt	$	mt	$	mt	$
1977	32,082	12,185	10,172	4,150	12,712	4,362	54,966	20,697
1978	36,805	18,457	16,469	7,871	19,285	8,213	72,559	34,541
1979	36,392	19,566	28,935	17,264	22,508	11,112	87,835	47,942
1980	36,862	16,551	28,515	11,425	22,514	9,119	87,891	37,095
1981	42,698	21,460	37,487	14,711	23,683	10,653	103,868	46,824
1982	52,608	27,795	41,021	20,444	25,474	12,100	119,002	60,339
1983	39,498	21,984	35,200	18,420	22,970	11,796	97,668	52,200
1984	40,570	22,914	28,211	15,237	21,074	11,117	89,855	49,268
1985	43,061	26,516	29,023	17,095	19,229	14,731	91,313	58,342
1981-85 Average	43,687	24,134	34,188	17,184	22,486	12,079	100,341	53,451
1986	41,246	28,522	24,911	16,796	16,081	12,576	82,238	57,894

Source: State Fishery Agencies
PacFIN, Groundfish Report Series, April 1987

Table 3 - Commercial Landings (mt) of Individual Groundfish Species by State for 1985 and 1986.

Species	California		Oregon		Washington	
	1986	1985	1986	1985	1986	1985
Lingcod	514	695	653	1,052	714	2,135
Pacific Cod	-	1	33	39	303	388
Pacific Whiting	2,982	2,996	420	885	61	14
Sablefish	6,099	5,128	4,666	5,275	2,388	3,869
Pacific Ocean Perch	30	67	667	797	649	542
Widow Rockfish	2,468	3,068	4,322	4,353	2,765	1,666
Other Rockfish	14,414	14,966	6,754	7,947	4,731	4,228
Dover Sole	10,987	12,047	4,814	5,713	1,479	2,804
English Sole	1,074	1,062	553	468	403	399
Petrale Sole	711	857	711	577	313	405
Other Flatfish	1,701	1,848	1,283	1,869	1,982	2,418

Source: PacFIN, Groundfish Report Series

Table 4 - Average Annual Exvessel Prices Paid for Some Commercially Important Groundfish Species from 1977-1986.

	Sablefish		All Rockfish Combined		Widow Rockfish		Dover Sole		English Sole		Petrale Sole	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
1977	.154	.261	.163	.277	-	-	.161	.273	.237	.402	.315	.535
1978	.283	.448	.181	.286	-	-	.207	.327	.245	.388	.371	.587
1979	.356	.518	.199	.290	-	-	.215	.313	.286	.416	.447	.651
1980	.199	.265	.159	.212	-	-	.211	.281	.328	.437	.458	.611
1981	.215	.262	.170	.207	.139	.169	.222	.270	.297	.362	.512	.624
1982	.260	.298	.196	.225	.158	.181	.233	.267	.318	.365	.606	.696
1983	.250	.276	.224	.247	.194	.214	.224	.247	.322	.356	.683	.755
1984	.233	.248	.251	.267	.226	.241	.231	.246	.322	.343	.709	.755
1985	.399	.410	.282	.289	.250	.257	.240	.246	.333	.342	.736	.756
1986	.426	.426	.314	.314	.277	.277	.258	.258	.360	.360	.777	.777

Source: PacFIN, Groundfish Report Series

NOTE: Real prices were adjusted for inflation using the GNP implicit price deflator, where 1986=1.00.
All prices are weighted averages.

Table 5 - Landings and Value of Individual Groundfish Species Landed in Washington, Oregon, and California in 1984 and 1986.[1]

Species	1986		1985		% Change	
	mt.	$	mt.	$	mt.	$
Lingcod	1,881	1,394,000	3,882	2,396,800	-51.5	-41.8
Pacific Cod	336	203,500	427	230,800	-21.3	-11.8
Pacific Whiting	3,463	448,500	3,894	582,800	-11.1	-23.6
Sablefish	13,152	12,358,900	14,272	12,544,600	-7.8	-1.5
Pacific Ocean Perch	1,346	827,500	1,406	781,100	-4.3	+5.9
Widow Rockfish	9,555	5,833,600	9,087	5,015,100	+5.1	+16.3
Other Rockfish	26,258	18,821,700	27,369	17,606,600	-4.1	+6.9
Dover Sole	17,280	9,818,900	20,564	10,876,300	-16.0	-9.7
English Sole	2,030	1,610,400	1,929	1,417,400	+5.2	+13.6
Petrale Sole	1,735	2,970,500	1,839	2,983,300	-5.6	-0.43
Other Flatfish	4,969	3,011,600	6,136	3,428,300	-19.0	-12.1
TOTAL	82,005	57,299,100	90,805	56,863,100	-9.7	+0.77

Source: PacFIN, Groundfish Report Series

[1] Includes domestic landings from U.S. coastal waters off WOC, but not Puget Sound; A small amount of landings of miscellaneous groundfish species are not included in the totals.

Table 6 - West Coast Commercial Groundfish Shoreside Landings, Exvessel Values (Thousands of Dollars) and Average Ves: Gross Revenues for Selected Gear Groups, 1980-1986. (Numbers of vessels using gear types other than the th: listed below are unknown).

Year	Otter Trawl[1]			Pot/Trap			Longline		
	mt	$	$ per Vessel	mt	$	$ per Vessel	mt	$	$ per Vessel
1981	91,300	38,200	93.6	3,955	2,038	30.9	2,600	2,150	11.3
1982	103,300	47,227	106.4	6,530	4,882	59.5	2,500	2,750	13.2
1983	81,700	40,752	93.5	5,440	3,635	59.6	1,300	1,322	7.2
1984	72,500	36,940	92.6	3,854	2,354	69.2	1,346	1,601	N/A
1985	75,352	41,365	115.5	3,703	3,596	108.9	3,155	4,928	N/A
1986	61,252	36,133	117.3	2,208	2,490	99.6	3,541	5,380	N/A

[1] Includes bottom, roller and midwater trawls.

Source: PacFIN, Groundfish Report Series

Table 7 - Landings and Participation in Pacific Whiting Joint-Venture Fisheries off of Washington, Oregon, and California, 1979-1986.

Year	Landings (mt)	Estimated Dollar Value ($)	Number of Trawl Vessels	Average Revenue Per Vessel ($)
1979	9,054	1,162,000	11	105,600
1980	26,793	3,275,000	15	218,300
1981	43,758	6,345,000	21	302,100
1982	68,420	10,367,000	17	609,800
1983	72,140	10,217,000	19	537,700
1984	79,047	11,841,000	21	563,800
1985	31,567	3,751,000	17	220,700
1986	81,855	8,760,000	25	350,400

Source: PacFIN, Groundfish Report Series
NMFS, Northwest Regional Office

Table 8 - Number of Vessels in Washington, Oregon, and California Commercial Groundfish Fleets, 1981-1986.

Year	Otter Trawl	Pot/Trap[1]	Longline[1]
1981	408	66	191
1982	444	82	208
1983	436	59	185
1984	397	34	96[2]
1985	358	32	129[2]
1986	308	25	190[2]

Source: State Fishery Agencies

[1] Vessels landing fish caught with this gear-type in two or more states are counted in each state for years 1982-83. These numbers therefore are an upper bound for the true number of vessels using this gear-type.

[2] Represents number of longline vessels landing in Oregon and Washington, where doub counting has been eliminated; California data unavailable.

Table 9 - Washington, Oregon, and California Groundfish Trawl Fleet Characteristics, 1983-86.

	1983	1984	1985	1986
Total Number Landing	436	397	358	308
Frequency by Size (Length) Class				
< 30 feet	2	2	2	1
30-39	22	20	15	9
40-49	112	100	96	73
50-59	124	108	93	87
60-69	109	104	98	90
70-79	43	44	39	37
80-89	11	11	6	6
> 90	13	8	9	5
Vessel Characteristics:				
Average Length	57.25	57.41	57.6	58.2
Average Horsepower	312.4	312.4	309.7	310.8
Average Net Tonnage	45.7	45.5	45.8	47.6
Number Vessels Based in Each State				
California	195	169	157	126
Oregon	161	146	121	110
Washington	80	82	80	72
Vessels Landing in More than One State	74	61	41	34

Source: State Fishery Agencies

Table 10 - West Coast Groundfish Shoreside Landings (metric tons) by gear group, 1981-86.

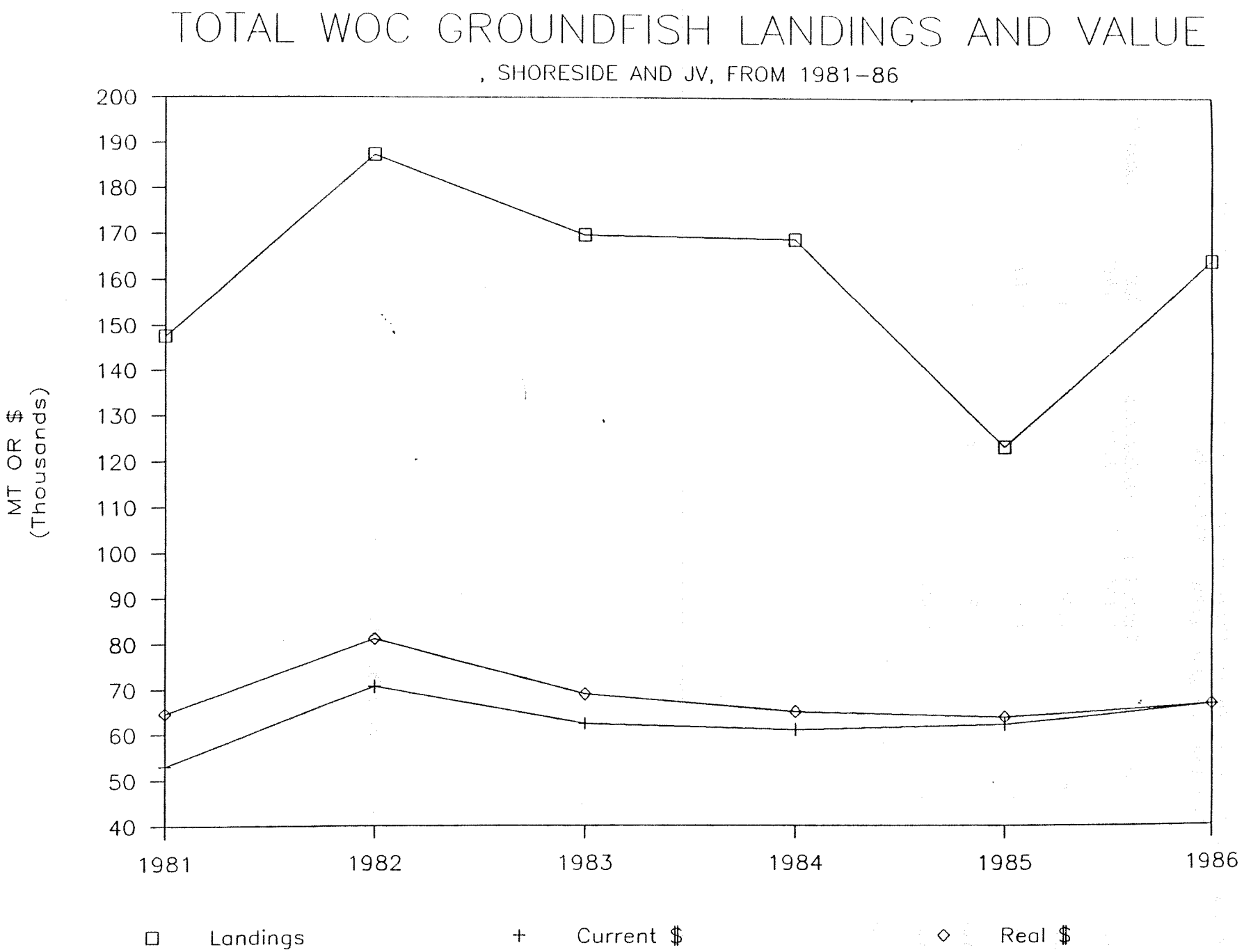
	Trawl	Trap/ Pot	Setline/ Longline	Net	Other/Misc
1981	91,328	3,956	2,599	1,738	4,173
1982	103,297	6,530	2,504	2,028	4,542
1983	81,727	5,437	1,307	2,303	6,891
1984	72,694	3,854	1,351	2,212	9,744
1985	75,352	3,703	3,155	4,058	5,318
1986	61,252	2,208	3,541	4,232	11,014

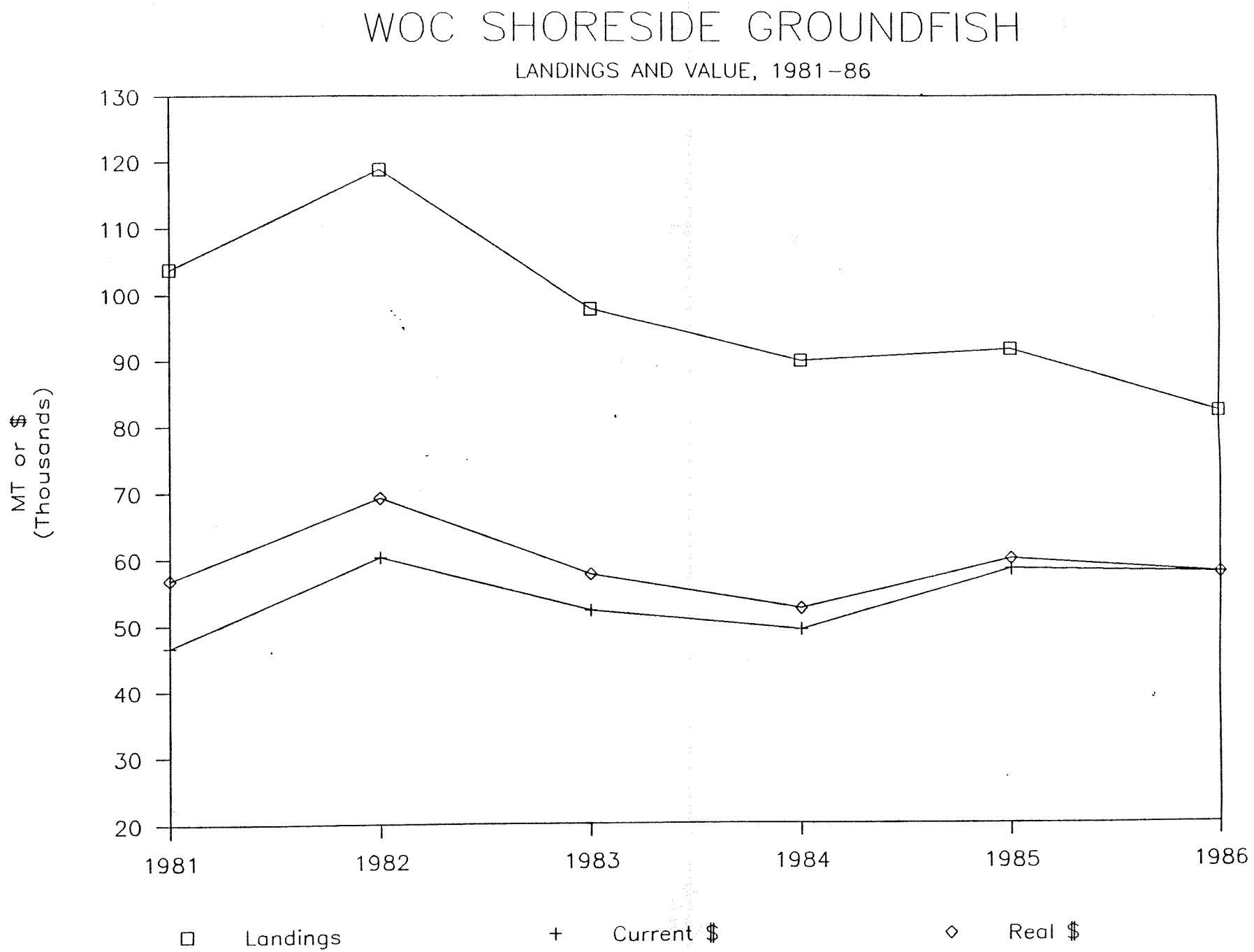
Source: PacFIN, Groundfish Report Series

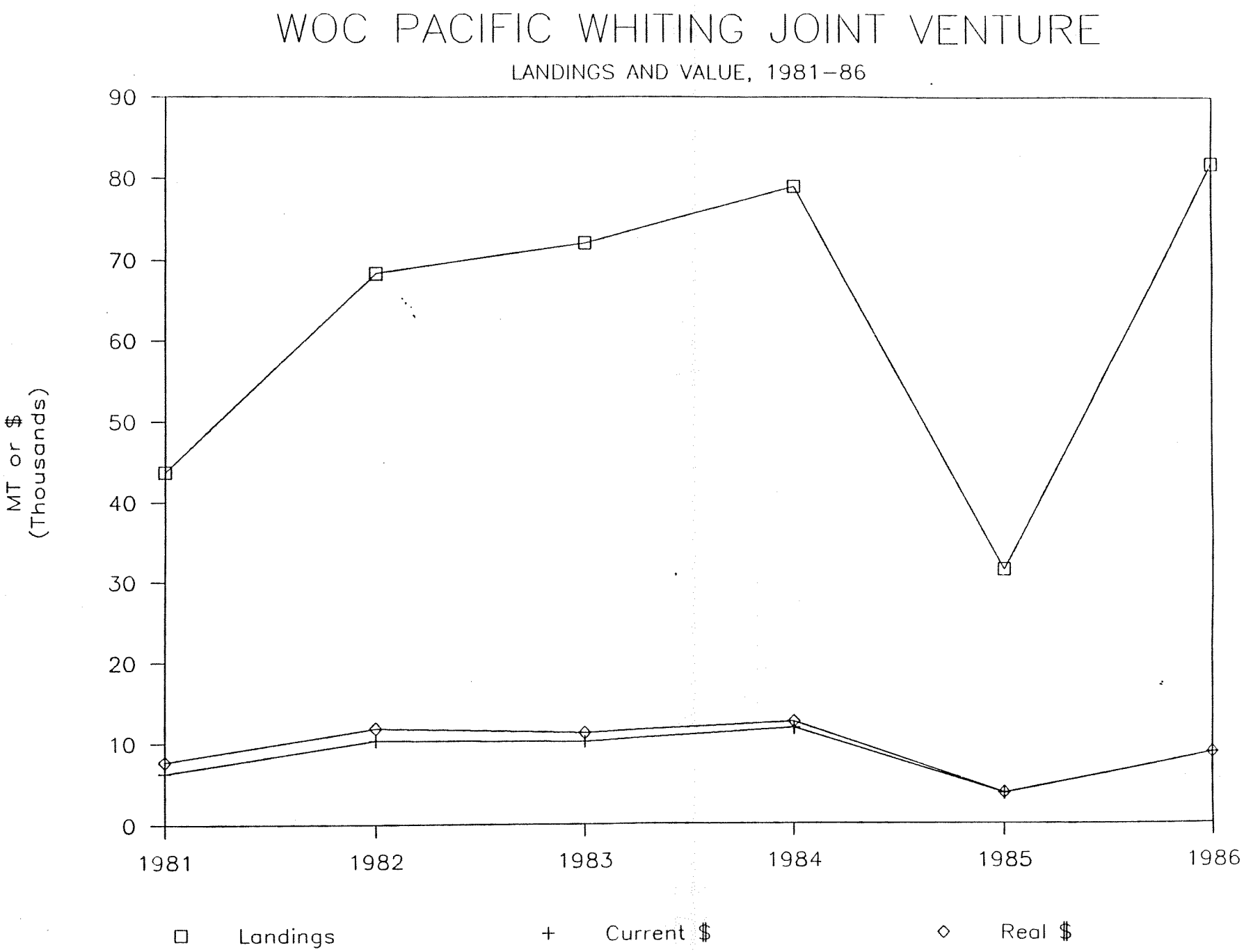
Table 11 - Exvessel Value (thousands of dollars) of West Coast Groundfish Landings by gear group, 1981-1986.

	Trawl	Trap/Pot	Set/Longline	Net	Other/Misc
1981	38,164	2,038	2,149	1,498	2,867
1982	47,227	4,882	2,749	1,769	3,712
1983	40,752	3,637	1,321	1,826	4,664
1984	36,994	2,362	1,602	1,962	6,349
1985	41,375	3,596	4,928	3,584	4,949
1986	36,133	2,212	5,380	3,743	10,434

Source: PacFIN, Groundfish Report Series


TOTAL WOC GROUNDFISH LANDINGS AND VALUE
, SHORESIDE AND JV, FROM 1981-86
MT OR $
(Thousands)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
1981
1982
1983
1984
1985
1986
Landings
Current $
Real $


WOC SHORESIDE GROUNDFISH
LANDINGS AND VALUE, 1981-86
MT or $
(Thousands)
130
120
110
100
90
80
70
60
50
40
30
20
1981
1982
1983
1984
1985
1986
Landings
Current $
Real $

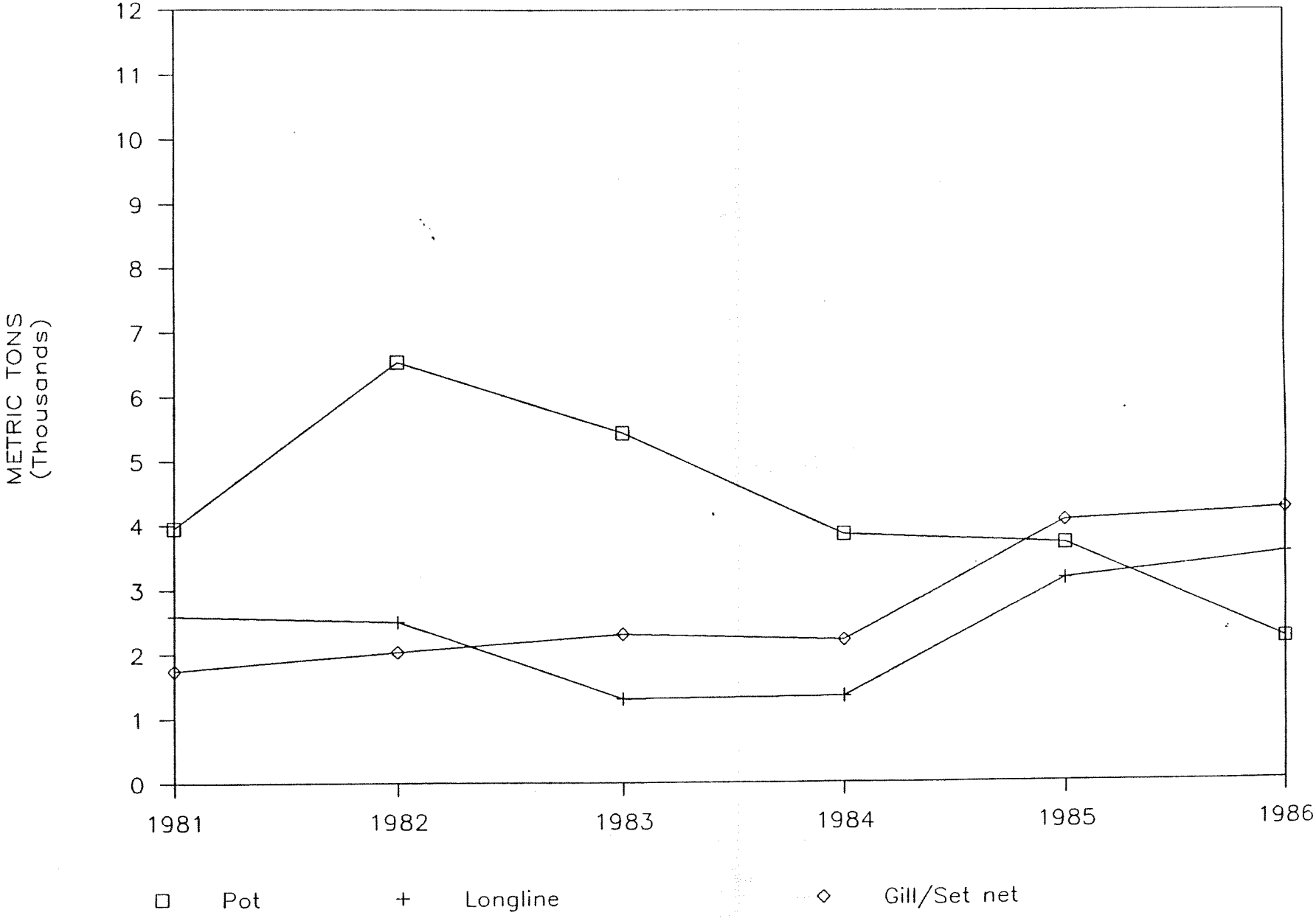

WOC PACIFIC WHITING JOINT VENTURE
LANDINGS AND VALUE, 1981–86
MT or $
(Thousands)
90
80
70
60
50
40
30
20
10
0
1981
1982
1983
1984
1985
1986
Landings
Current $
Real $

WOC GROUNDFISH LANDINGS AND VALUE

FOR GROUNDFISH TRAWL, 1981-86

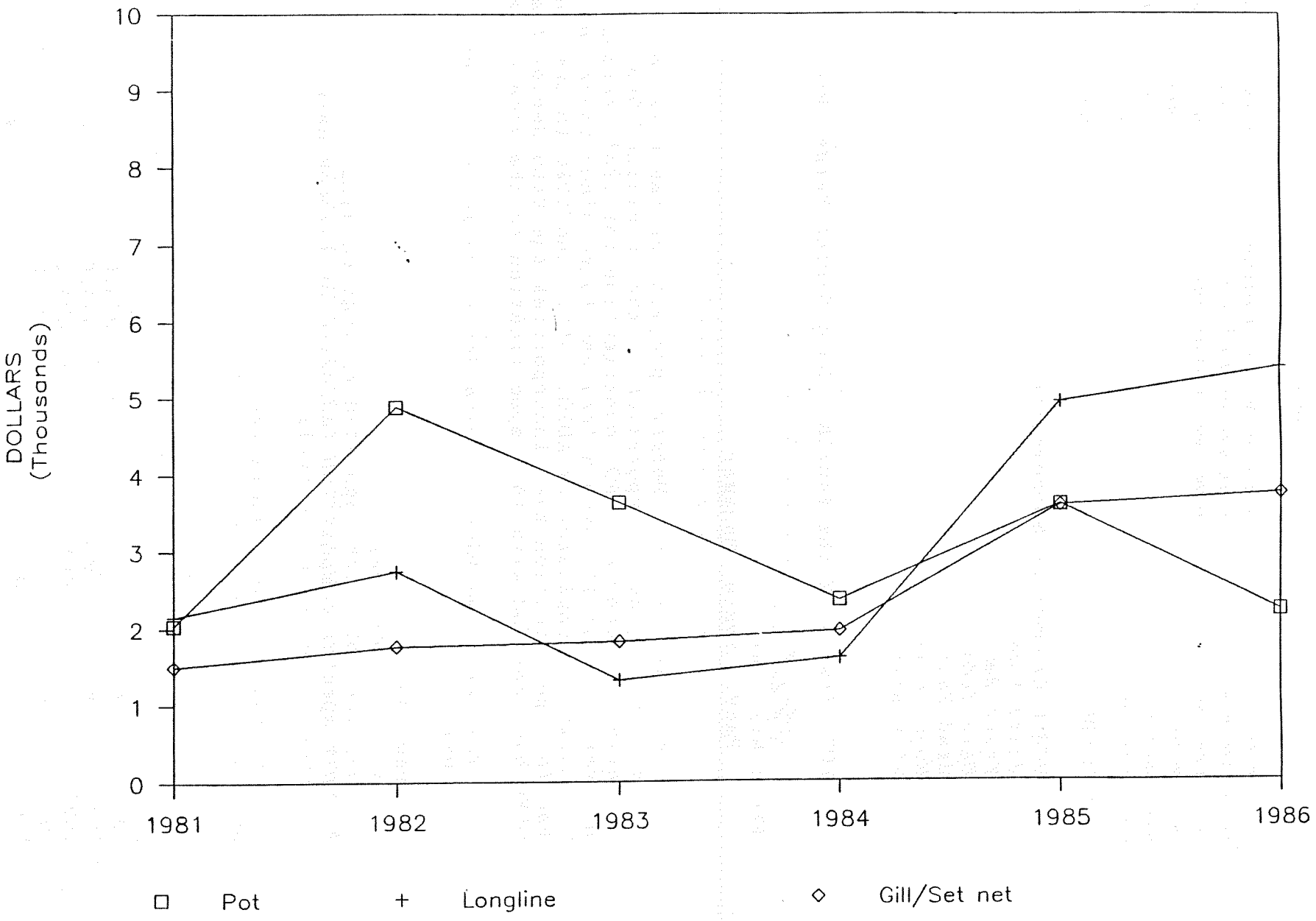
WOC GROUNDFISH LANDINGS

FOR FIXED GEAR, 1981–86



WOC GROUNDFISH LANDED VALUE (CURRENT $)

FOR FIXED GEAR, 1981–86



APPENDIX G

PACIFIC COAST FISHERIES DATA COMMITTEE

MEMBERSHIP

ALASKA DEPT. FISH & GAME
CALIFORNIA DEPT. FISH & GAME
IDAHO DEPT. FISH & GAME
OREGON DEPT. FISH & WILDLIFE
WASHINGTON DEPT. FISHERIES
WASHINGTON DEPT. GAME

NORTH PACIFIC FISHERY MANAGEMENT COUNCIL
PACIFIC FISHERY MANAGEMENT COUNCIL
PACIFIC MARINE FISHERIES COMMISSION

NATIONAL MARINE FISHERIES SERVICE
ALASKA REGION
NORTHWEST & ALASKA FISHERIES CENTER
NORTHWEST REGION
SOUTHWEST FISHERIES CENTER
SOUTHWEST REGION

MEMORANDUM

May 20, 1987

TO: PCFDC Groundfish Subcommittee:
Fritz Funk
Frank Henry
Dave Judkins
Brad Pattie
Russ Porter
Rick Stanley

SUBJECT: Status of the PacFIN - Data Series Merger Project

FROM: Will Daspit
PacFIN System Manager

The Data Series Merger project has taken a major step forward with the incorporation of the Canadian Department of Fisheries & Oceans (DFO) contribution for 1981 through 1984. However, we still have a long way to go since there has been virtually no compliance by ADFG, WDF, and CDFG to the enhanced PacFIN specification that incorporates the Data Series features. ODFW has complied with this specification to the greatest extent.

The enhanced PacFIN - Data Series Merger specification has five main features:

1. Trawl Hours
2. Catch by PMFC area
3. Best area of catch (adjusted by logbook data)
4. Best species composition (adjusted by logbook data)
5. Grade (or size) where available

The following table summarizes the status of this project for each agency for each year for each feature:

	ADFG	DFO	WDF	ODFW	CDFG
1986	p		g	HPACG	P g
1985	P		g	HPACG	P g
1984	P	HPAC	g	hPACG	P g
1983	P	HPAC	g	hPACG	P g
1982	P	HPAC	g	P G	P g
1981	P	HPAC	g	P G	P g

H => trawl hours have been provided
P => catch has been provided by PMFC area
A => catch by area has been adjusted with logbook data
C => species composition has been adjusted with logbook data
G => market grade (or size) where available has been provided

p => ADFG's PacFIN contribution for this year is through October only. Catch for NOV & DEC has not been provided since ADFG is no longer a PacFIN data source.

g => Grade data for sablefish only will be provided by WDF within the next month. Grade data for sablefish (and other species) has been, and continues to be, provided by CDFG, however it is known to be grossly inaccurate.

h => Although ODFW has provided trawl hours for 1984 and 1983, these statistics are considered incorrect and will be resubmitted.

A status of each agencies efforts to satisfy the requirements of this specification is:

ADFG - since ADFG has officially withdrawn from the PacFIN project, the PacFIN office has not requested anything regarding this project.

DFO - the 1985 data set should be submitted very soon; 1986 data set to be submitted in NOV87

WDF - Work is in progress

ODFW - as of this writting there is no target date for correcting the trawl hours for 83 and 84 nor for providing 81 and 82 data

CDFG - no work in progress for any aspect of this project

Over the years this office has had many inquiries regarding the "finalness" of the PacFIN database. The response has always been that no annual data set for all data sources is final. For certain agencies for certain years one could probably state that the data is final. This would probably be true for ODFW for 86 and 85 and for DFO for 84 thru 81. It is my opinion that if ALL aspects of this PacFIN - Data Series Merger specification are adhered to by all agencies for all years (currently thru 1985) starting with 1981, then the PacFIN database could be declared final. More appropriately, I would like a letter from each agency stating that the data they have contributed is in fact the "BEST AVAILABLE DATA." Ideally a letter including a statement to this effect would be written to the PacFIN System Manager as each annual data set is determined to be final.

APPENDIX H

Terms of Reference

Committee of Age Reading Experts (CARE)

PURPOSE

The primary role of CARE is the development and description of agreed on standards and age reading quality control procedures within and among agencies responsible for management of groundfish on the northeast Pacific rim. Results of these efforts shall be reported to the Technical Sub-Committee (TSC) of the Canada-United States Groundfish Committee.

MEMBERSHIP AND OFFICERS

Membership of CARE shall be limited to agencies represented on the TSC, including PMFC, with participation by appropriate educational institutions and other groups with special knowledge or interest in groundfish ageing. A chair, vice chair and recorder (secretary/reporter) shall be chosen and serve at the pleasure of CARE. Elections (selections) of officers shall be on odd numbered years for 2-year terms on a July 1 to June 30 basis. As needed, CARE may establish sub-committees to deal with specific issues such as age reading methodology and quality control. The officers and sub-committee chairpersons (if any) shall constitute an executive committee to establish meeting locations, dates, preliminary agendas, etc.

OPERATING PROCEDURES

Meetings shall be held at mutually agreed upon times and locations within the jurisdiction of the parent committee where facilities are adequate to carry out the purposes of said meetings. The member agencies shall seek the necessary financial support to convene such meetings. Where special expertise such as experimental design or biometric/statistical analyses, etc., are required, CARE may draw on the TSC or other resources as needed. Results of the meetings shall be circulated to the CARE membership and participants and reported to the TSC by the chair of CARE. PMFC shall act as the coordinating secretariat of CARE.

Revised and Adopted by TSC
6/19/86