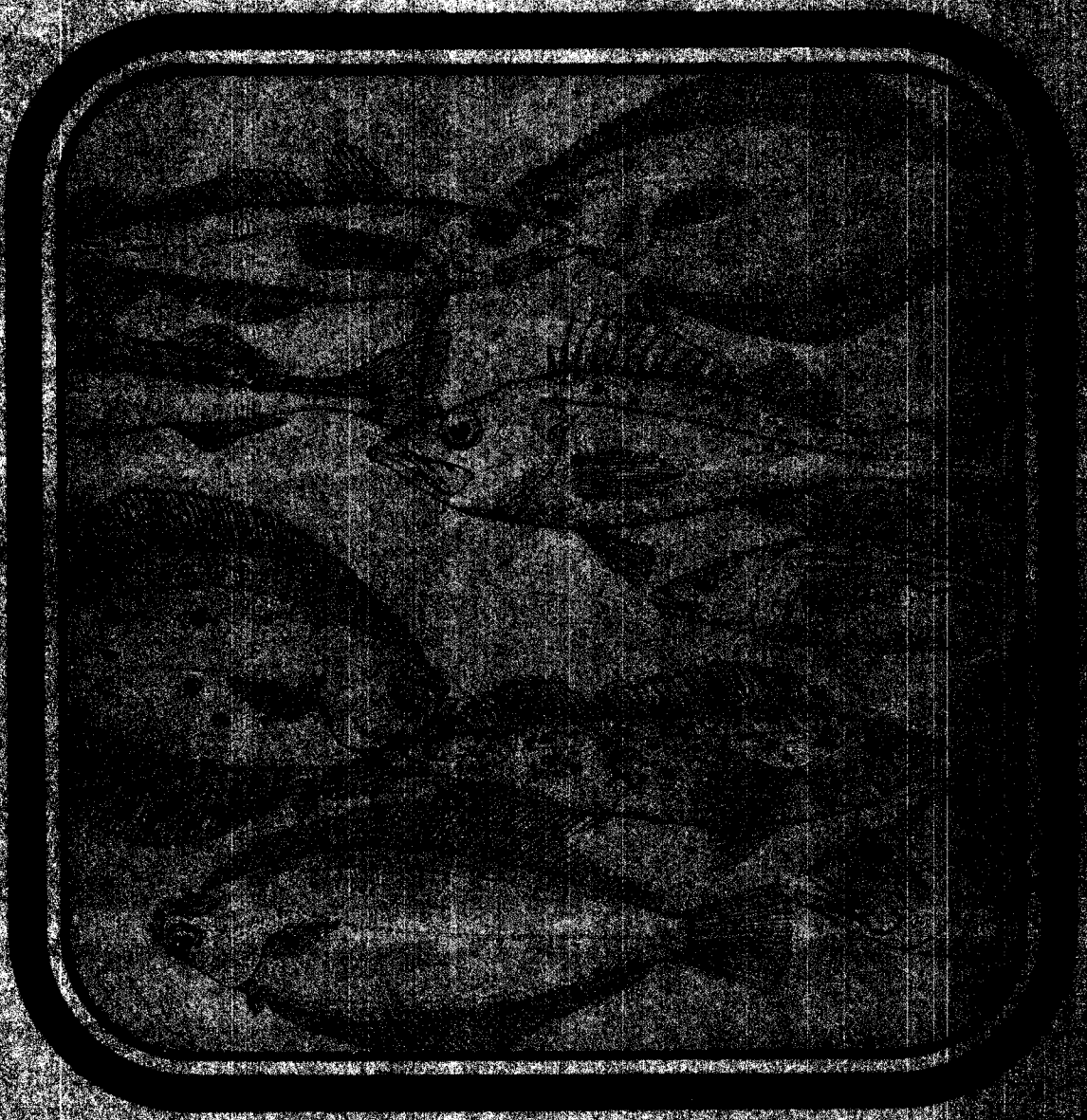
PACIFIC COAST GROUNDFISH PLAN

FISHERY MANAGEMENT PLAN AND ENVIRONMENTAL IMPACT STATEMENT
FOR THE CALIFORNIA, OREGON AND WASHINGTON GROUNDFISH FISHERY



PACIFIC FISHERY MANAGEMENT COUNCIL • 526 S.W. MILL ST. • PORTLAND, OREGON

ACKNOWLEDGMENTS

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March 6, 1981

The Honorable Malcolm Baldridge
Secretary of Commerce
Washington, D. C. 20235

Dear Mr. Secretary:

The Pacific Fishery Management Council adopted on February 19, 1981 the enclosed Final Supplemental Environmental Impact Statement/Fishery Management Plan for the Washington, Oregon and California Groundfish Fishery. We submit this document for your review and approval.

This Groundfish Plan was submitted to ten public hearings and two NEPA review periods, in addition to countless scientific and constituent reviews during its four-year development. In adopting the Plan, we have attempted in good faith to respond to all public and agency comments, including concerns of the National Marine Fisheries Service.

We believe the Plan represents the best possible means of managing this complex resource and fishery. Because of the dynamics of the fishery and the need for a coordinated regional management system, the Council urges you to expedite the review process so that the Plan can be implemented on January 1, 1982.

We respectfully request your cooperation in this endeavor.

Sincerely,

Lorry M. Nakatsu
Executive Director

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Enclosure

FINAL

FISHERY MANAGEMENT PLAN

AND

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

for the

Washington, Oregon and California Groundfish Fishery

Pacific Fishery Management Council
526 S.W. Mill Street
Portland, Oregon 97201

March 6, 1981

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PREFACE

This comprehensive and complex plan has been under development for four years. During that period the dynamics of the groundfish fisheries have been evident. Fishing effort has increased on some species and decreased on others. For one species alone (sablefish), landings increased significantly in 1979 and then declined sharply in 1980 because of market conditions. The estimates of acceptable biological catch (ABC) have been exceeded during this period for some species in some areas, as shown in the following table of ABC's and recent trawl landings.

	Vancouver Area				Columbia Area			
		Landings				Landings		
Species	ABC	1978	1979	1980 1/	ABC	1978	1979	1980 1/
Lingcod	1,000	394	839	501	4,000	679	1,086	1,145
Pacific cod	2,200	1,985	2,145	913	900	813	641	254
Pacific ocean perch	600	1,170*	935*	444	950	1,151*	1,072*	1,201*
Canary rockfish	4,000	664	649	402	1,300	1,333*	2,337*	1,147
Yellowtail rockfish	2,300	1,316	1,332	2,177	2,400	5,784*	5,945*	2,608*
Widow rockfish	None	287	277	116	None	593	3,124	9,980*
Dover sole	1,000	598	1,244*	1,020	4,000	3,840	5,827*	3,250
English sole	600	553	488	237	2,000	1,053	1,329	595
Petrale sole	600	658*	402	223	1,100	1,188*	1,231*	875

Sablefish (all areas, all gears)	ABC	1978	1979
	13,400	10,125	16,792*

1/ January-October
* Exceeded ABC

The ABC's were exceeded for Pacific ocean perch (POP), Dover sole and petrale sole in the Vancouver area and for POP, canary rockfish, yellowtail rockfish, Dover sole and petrale sole in the Columbia area. For 1979 the coastwide sablefish ABC was exceeded. If the plan had been implemented during this period the "point of concern" mechanism would have been triggered, and the management team would have evaluated the stocks in question, and if necessary, would have proposed remedial measures. Also, the specific measures in the Plan for protection of POP and sablefish would have been implemented.

Although several ABCs were exceeded, no specific conservation issues (other than POP and sablefish) have been identified. The present management measures in the Plan are adequate to protect the resource and identify any potential conservation needs. Furthermore, the ABCs and OYs in the Plan are the best current estimates available. However,

these estimates need to be reviewed, and updated if appropriate, prior to implementation of the Plan in January 1982. The Council will initiate a review of all ABC and OY values and propose appropriate changes as soon as possible. Changes, if necessary, will take place through the regulatory process prior to implementation. In some cases, extensive stock assessment analyses are necessary which cannot be completed prior to January 1982. Any necessary changes resulting from such analyses should be incorporated subsequent to Plan implementation.

The Council believes that Plan implementation should not be delayed beyond January 1982. Without the Plan there is no "point of concern" mechanism and no procedure to manage the fishery on a coordinated, coastwide basis.

1.0 RECOMMENDED MANAGEMENT REGIME

The management regime for the groundfish fishery of the California-Washington region presented below is the result of a comprehensive and deliberative process. The Groundfish Fishery Management Plan was prepared by a team of scientists selected by the Pacific Fishery Management Council (PFMC). Preliminary drafts of the Plan were reviewed extensively by an advisory panel of commercial fishermen, sport fishermen, charterboat operators, processors and consumers. The Scientific and Statistical Committee of the PFMC conducted several in-depth reviews relative to the accuracy and completeness of data and scientific concepts presented in the Plan. Several major revisions and improvements resulted from the above process.

Subsequently, the Plan also was subjected to detailed public review, which included ten public hearings in nine cities in California, Oregon and Washington. All written and verbal testimony was considered by the Council and revisions to the Plan were made wherever applicable and appropriate.

The management regime described here was chosen from many diverse alternatives presented in detail in Chapter 12 of the Plan. The description of the selected measures below is a summary of that found in Chapter 12. The reader is referred to the Plan for further information regarding the groundfish resource, fisheries, harvest levels and detailed management options considered during the selection process.

These management measures are calculated to prevent overfishing while achieving on a continuing basis the OY for the fishery.

1.1 Optimum Yield

Measure selected: Optimum yields for the Pacific Region groundfish fishery are presented in the table which follows.

Optimum yield (OY) for most groundfish species is defined as all fish which are harvested under regulations adopted by the PFMC. It is not a predetermined numerical value.

Individual numerical OYs have been set for five species. Special circumstances require that these species be managed individually. The five species selected for individual OYs are:

Pacific whiting and shortbelly rockfish - these two species are segregated because they can be caught with mid-water trawls with minimal bycatches.

Pacific ocean perch - this species is severely depleted and requires special management consideration.

Sablefish - although some of the sablefish catch is by trawl gear, much of the catch is by directed effort with stationary gear. In addition, harvests in the Monterey Bay area deserve special attention.

Widow rockfish - this species can be caught with mid-water trawls with minimal bycatch. The landings rose from 4,300 mt to over 17,000 mt in one year. A stock assessment data base is severely limited.

Optimum yields for the Pacific region groundfish fishery
(thousands of metric tons).

Species	Vancouver	Columbia	Eureka	Monterey	Conception	Total
Whiting						175.5 1/
Sablefish				2.5		13.4 2/
Pacific ocean perch	0.6 3/	0.95 3/	4/	4/	4/	1.55
Shortbelly rockfish						10.0 1/
Widow rockfish						17.5 1/
Lingcod						
Pacific cod						
Other rockfish 5/						
Dover		All that are landed under regulations				
English/Petrale		adopted by the Council.				
Other flatfish						
Other fish 6/						

1/ Total applies to the sum of catches for all areas.

2/ Total applies to the sum of catches for all areas except that, of this total, Monterey Bay (Section 12.3.1.3) catches may not exceed 2.5 thousand landed metric tons.

3/ This value represents the estimate of what will be caught under the 20-year rebuilding schedule adopted by the Council (Table 15). Actual landings of POP will be governed by trip limits (see Section 1.4.2.4).

4/ Included in "other rockfish." This species is not common nor important in the areas footnoted. Accordingly, for convenience, they are included in the "other rockfish" category for these areas only.

5/ By definition, the category "other rockfish" includes all rockfish species except Pacific ocean perch, shortbelly rockfish and widow rockfish.

6/ See Table 1, Groundfish Plan.

Rationale: This optimum yield concept is presented as OY option three in the Groundfish Plan. This OY allows for a variable amount of fish to be harvested taking into account established conservation principles. Gear restrictions

will provide protection for juveniles and tend to maximize yield per recruit. The close spatial relationship of certain species in any given area results in large by-catches of non-target species and mandates the multi-species nature of the fishery. The grouping of most species in a non-numerical OY allows the flexibility to manage for the maximum yield from the group as a whole rather than the maximum yield from each species. Option 3 basically continues the historical management practices of the states of managing the groundfish fishery without the use of quotas, but increases the monitoring and assessment of stock conditions and establishes a mechanism for timely action when required. It provides for continuation of the existing fishery while allowing for increased harvest of underutilized species (objectives C and D of the Plan). It has the least impact on fishermen's freedom since quotas are not established for most species. Adequate conservation measures are established through a "Points of Concern" mechanism (see discussion below). The objective of preventing overfishing of stocks which can be managed as a unit and rebuilding of depleted stocks is met by setting numerical OYs for whiting, sablefish, shortbelly rockfish, Pacific ocean perch and widow rockfish. Overfishing of the multispecies complex will be prevented by the selection of management measures which follow in this regime and the "Points of Concern" mechanism which will resolve conservation problems in-season as they arise. The Groundfish Advisory Subpanel and the Scientific and Statistical Committee both recommended this OY concept and the preponderance of public testimony supported it.

OY options 1 and 2 provided for numerical OY values which would result in less management flexibility and equal or greater management and enforcement costs. The proposed measure is the easiest to enforce because it places the fewest restrictions on fishermen. Data collection costs would be similar under any of the three options. All require improved data collection and reporting systems. These additional data costs are approximately $200,000-300,000 per year.

Option 1, calling for 40 separate numerical OYs, was considered by the PFMC to be impracticable in the multispecies fishery and would likely result in underharvest of certain valuable species.

Option 2, with 18 numerical OYs was less restrictive than Option 1. The PFMC determined however, that numerical OYs were unnecessary for most species and that they increased fishing, management and enforcement costs while failing to provide significant increased protection to the resource, especially since the "Points of Concern" mechanism will provide the needed protection.

1.2 Points of Concern

Measure selected: To prevent avoidable and undesirably high catches of individual species or species complexes, each species/species complex will be subject to continuing assessment and monitored throughout the calendar year for signs of biological stress. A Council-appointed Management Plan Team will conduct this continuing review of the status of each species/species complex utilizing the most current catch and effort data from the fishery.

In the course of the Team's continuing review, a Point of Concern occurs when any one or more of the following is found:

1. Exploitable biomass or spawning biomass is below a level expected to produce MSY for the species/species complex under consideration;

2. Recruitment is substantially below replacement level;

3. Fishing mortality rate exceeds that required to take ABC for the calendar year;

4. Catch for the calendar year is projected to exceed the best current estimate of ABC; or

5. Any other abnormality in the biological characteristics of the species/species complex is discovered, such as changes in age composition, size composition, and age at maturity.

Once a Point of Concern is identified:

1. The Team will evaluate current data to determine if the concerned stock shows legitimate signs of biological stress or is merely demonstrating aberrant tendencies which do not indicate biological stress;

2. If the Team concludes that there is evidence of stress, it will make findings regarding which one or more of the following management measures will relieve the condition of stress while at the same time achieve the prioritized objectives of this FMP:

   - Cessation of foreign fishing on the species/species complex;
   - Cessation of both foreign and domestic fishing on the species/species complex;
   - Cessation of directed fishing (foreign, domestic or both) on the species/species complex with appropriate allowances for incidental harvest of the species/species complex;
   - Area or subarea closures;
   - Time closures;
   - Gear limitations;
   - Quotas;
   - Other necessary measures.

3. The Team will prepare a report containing the rationale in support of the determination that the stock is stressed and a recommendation and supporting rationale indicating which management measure(s) should be employed to alleviate the stress consistent with the prioritized objectives of this FMP. The report will also contain reasons why other measures were not recommended. The report will be presented at the first regularly scheduled Council meeting following report preparation.

4. At the time and place of the meeting when the Council considers the Team's report, a public hearing will be held to afford an opportunity for public comment.

5. The Council, following review of the Team's report, supporting data, public comment and other relevant information, will recommend management measures to the Northwest Regional Director of the National Marine Fisheries Service (RD) accompanied by relevant background data, information and public comment. The recommendation will explain the urgency in implementation of the measure(s), if any, and reasons therefore.

6. The RD will review the Council's recommendation, supporting rationale, public comments and other relevant information, and, if he concurs in the recommendation, will propose regulations in accordance with the recommendations. He may also reject the recommendation, providing written reasons for rejection.

7. If the RD concurs in the Council's recommendations, he shall publish proposed regulations in the Federal Register and shall afford a reasonable period for public comment which is consistent with the urgency (if any) of the need to implement the management measure(s).

Nothing in this section shall be interpreted to derogate from the authority of the Secretary of Commerce to take emergency action under Section 305(e) of the FCMA.

Rationale: This is "Points of Concern" option 2 in the Plan (Section 9.3.1) which was determined to provide the best protection for the resource because it is based on several specific criteria related to the health of the resource. Option 1 was considered unacceptable because it would have "locked-in" the point of concern at 75% of the ABC or numerical OY. There are admitted uncertainties in estimating ABC/OY and the selection of option 1 may have precluded early detection of a developing conservation problem.

1.3 Adjustments to Harvest Guidelines (Numerical OYs and/or ABCs)

Measure selected: Under this system, increases to numerical OYs and/or ABCs not to exceed 30% annually may be made when warranted by new information about the fishery as it becomes available. Downward adjustments of any size can be accommodated for resource conservation on a case-by-case basis through the "Points of Concern" mechanism. (Note: The intent here is to allow an indefinite number of increases but which together cannot exceed 30%.)

The same procedure used to initiate the in-season adjustment (Section 9.3.2) will be used to determine whether all or a portion of the adjustment will become a permanent modification of the OY and/or ABC. The Team will use factors on page 9-16 to determine adjustments and the RD will use the Point of Concern prioritized objectives and procedures to implement these adjustments. Increases larger than 30% must be implemented through the standard plan amendment process (250-300 days).

Rationale: It is understood that the numerical OY and ABC estimates in the Plan are in many instances derived from minimal, incomplete, or preliminary data, and that there is a certain element of error in each estimate. It is further understood that environmental fluctuations will affect abundance and will therefore necessarily impart some variability to OY and ABC values. Use of fixed OY and ABC values as harvest guidelines in the absence of some mechanism for adjustment could well lead to less than optimum utilization of the resource. Therefore, within-season and between-season adjustments of OY and/or ABC will be made to allow full resource utilization. A system which allows for in-season and annual upward adjustments of OY and/or ABC values under guidelines and procedures provided in Section 9.3.2 of the Plan is desirable. An increase of 30% without plan amendment will provide flexibility to accommodate short-term unpredictable circumstances.

The choice of 30% has no single basis but was guided by the following reasons. Between 1973 and 1979 the coastwide domestic catch of groundfish by all gears increased by 96%, which on the average was 11.2% compounded annually; the rate was higher in some years, i.e. the catch increased 25% coastwide between 1978 and 1979 and more than 40% in the Columbia and Vancouver areas; these increases appeared to result in few conservation problems. While the uncontrolled growth has resulted in few conservation problems to date, the resource is not infinite and there is not a long history of increases as high as 40%. With these facts in mind, the Council chose 30% as the upper limit for controlled growth without plan amendment.

1.4 Domestic Fishery Management Measures

1.4.1 Gear Restrictions: The selection of OY option 3, in which most species have a non-numerical OY, places critical importance on the "Points of Concern" mechanism and gear restrictions to ensure that the stocks are conserved. Of particular significance are the trawl net restrictions and specifically minimum mesh size which protects immature fish and increases yield per recruit. All gears are subject to species quotas and considered for any "Points of Concern" measures enacted.

1.4.1.1. Trawl

a. Trawl Gear Definition

Trawl gear is defined as a cone or funnel-shaped net which is towed or drawn through the water by one or two vessels. Trawls are used both on bottom and off bottom. They may be fished with or without trawl doors. They may employ warps or cables to herd fish.

b. Trawl Mesh Size Definition

Mesh size is defined as the opening between knots; thus, in all sections that follow, minimum mesh size means the distance between the inside of one knot to the inside of the opposing knot regardless of twine size.

c. Minimum Trawl Mesh Size

The minimum trawl mesh size allowed regionwide is 4.5 inches. Exceptions to accommodate biological differences between species, species distribution and economic concerns are listed below.

1. Flatfish Bottom Trawls

All trawl nets used for flatfish which have continuous footrope contact with the bottom shall have a minimum mesh size of 4.5 inches or larger throughout the net. Riblines (minimum of two) must be continuous if both a 3.0-inch and 4.5-inch mesh trawl are carried on the vessel simultaneously. These requirements are regionwide.

Rationale: Mesh size studies by Best (1962) indicated that 4.5-inch mesh was suitable for Dover and English sole. A later study by Lenarz (1979) showed that for the Columbia area 4.5-inch mesh was suitable for Dover and English sole but that significant long-term increases in yield per recruit of petrale sole would result if mesh size were increased. Best also concluded that 5.0-inch double-walled codends were suitable for Dover sole.

Under this management regime, directed fishing for flatfish requires 4.5-inch or larger mesh. Economic efficiency and energy expenditure are improved if a vessel can carry both a 3.0 and 4.5-inch mesh simultaneously. To discourage covert use of 3.0-inch codends on flatfish trawls, the continuous ribline requirement should provide incentive to abide by the regulation because to do otherwise would be costly in terms of lost fishing time to make the conversion.

2. Roller or Bobbin Trawls

In the Eureka, Columbia and Vancouver areas 3.0-inch mesh is permitted provided that:

(a) the trawl footrope must have rollers or bobbins which are a minimum of 14 inches in diameter;
(b) Codends must be single walled;

Rationale: Results of work by Jow (unpublished) showed that reduction of mesh size from 4.5 inches to 3.0 inches would have adverse biological effects on bocaccio and chilipepper rockfish. Since these species are the major component of rockfish landed in the Conception and Monterey areas reduction of mesh size from 4.5 inches to 3.0 inches is not allowed for the following biological and conservation reasons:

(1) 3.0-inch mesh recruits fish to the fishery at ages of 2 and 3 years, respectively, for bocaccio and chilipepper; average age at maturity is 4-6 years for bocaccio and age 6 for chilipepper; and

(2) with 4.5-inch mesh, yield is 12% to 25% greater at fishing rates of 0.2 to 0.5 for bocaccio and 7% to 22% greater at fishing rates of 0.3 to 0.5 for chilipepper;

(3) reductions in spawning biomass range from 33% to 62% for bocaccio and 45% to 78% for chilipepper for year classes exposed to the additional years in the fishery at fishing rates of 0.2 to 0.5.

The requirement for 3.0-inch mesh codends to be single walled is necessary for two reasons: (1) unless alignment is very precise the effective mesh size opening is even further reduced, which relates to escapement, and (2) fishermen have stated that a single-walled codend can be used effectively with roller gear.

Allowing 3.0-inch mesh in the Eureka-Vancouver areas reduces gilling of some rockfish species and provides for efficient prosecution of fishing for whiting with on-bottom trawls. Bocaccio and chilipepper are not commercially important in the Vancouver and Columbia areas and trawl effort is not as great in the northern areas. Therefore 3.0-inch mesh can be allowed.

The appropriateness of the use of 3.0-inch mesh roller trawl nets in the Eureka area is unknown due to the uncertainties in the distribution and patterns of recruitment of juvenile rockfish. The use of 3.0-inch mesh roller trawls in the Eureka area must be closely monitored to determine impacts on the stocks.

3. Pelagic Trawls

Pelagic trawls must conform with the following requirements:

(a) minimum mesh size is 3.0-inch regionwide (shortbelly rockfish will require smaller mesh and will be handled under special permit, see Section 13.6);
(b) codends must be single walled;
(c) bottom line at trawl mouth must be without protection (rollers, bobbins or discs) and may not exceed 1.75 inches in diameter, which includes twine necessary for seizing material;
(d) sweeplines, including bottom leg of bridle, must be bare;
(e) an incidental catch of bocaccio, chilipepper, splitnose and yellowtail rockfishes (in the agregate) is limited to 500 lbs. or 5% of the trip weight in the Conception and Monterey areas when fishing for whiting, widow rockfish and shortbelly rockfish with pelagic trawls of mesh size less than 4.5 inches.

Rationale: A 3.0-inch mesh will allow efficient prosecution of fishing for whiting and widow rockfish while allowing for escapement of juvenile whiting. These and other gear provisions parallel physical makeup of pelagic trawls currently in use and have been shown to be effective. These provisions will discourage fishing on the bottom with pelagic trawls.

The Council has encouraged directed fishing for whiting, widow rockfish and shortbelly rockfish. Allowing for an incidental catch of 500 lbs. or 5% of the trip weight of fish other than whiting, widow rockfish and shortbelly rockfish will provide for directed fishing in the Conception and Monterey areas without undue harm to bocaccio and chilipepper rockfish. The choice of 500 lbs. or 5% of the trip weight complies with established convention and provides for a safeguard until better data are acquired.

4. Double Walled Codends

Double-walled codends are limited to 4.5-inch mesh trawls only. The double-walled portion may not be longer than 25 meshes or 12 feet whichever is greater. Meshes must coincide knot-for-knot throughout the double-walled portion. Manufactured double-ply mesh is not considered to be double-walled.

Rationale: Mesh selection studies of 4.5-inch mesh have shown that 4.5-inch double walled codends do allow escapement of juvenile flatfish provided proper alignment is achieved. The length limit conforms to current practices because of the way mesh is constructed and marketed. The double walled portion also provides a measure of strength when the codend is pulled aboard.

5. Codend Chafing Gear

(a) On 4.5-inch bottom trawls encircling chafing gear may not be less than 15 inches minimum mesh. If mesh size is less than 15 inches only the bottom one-half of the codend may be covered.

(b) On 3-inch roller or pelagic trawls encircling chafing gear is permitted but the upper one-half may not be less than 6-inch minimum mesh.

(c) No chafing gear or chafing gear sections on any trawl may be connected directly to the terminal end of the codend.

Rationale: Chafing gear is used to provide protection to the codend while the trawl is towed across the seabed or being hauled aboard the vessel. Mesh sizes were chosen by an industry working group and should provide a biological safeguard although experimental evidence is lacking.

Under current state regulations, chafing gear can only be used on the bottom one-half of the codend.

6. Mesh Measurement

Mesh measurements will be made in the following manner:

(a) mesh measurements will be made on wet webbing;
(b) mesh measurements will be made in the codend;
(c) mesh measurements will be made using a stainless steel wedge;
(d) a minimum of 20 measurements will be made and the wedge must pass through at least 80% of the meshes measured;
(e) meshes will be measured, without undue force, two at a time (meshes are to be doubled over).

Rationale: Mesh measurement, at present, is accomplished in various ways and is not consistent between states. Provisions prescribed will assure uniform mesh measurement in an economical manner. The wedge measuring devise is currently used by the State of California.

7. Enforcement and Other Costs

Enforcement costs associated with mesh size regulation will be mostly borne by the federal government since adequate enforcement can only take place at sea.

Costs to fishermen are impossible to quantify. Fishermen who choose to use roller trawls but who do not now have roller trawls will have to invest in this gear. Fishermen not now fishing flatfish would have to purchase 4.5-inch trawls to do so. In reality, nearly all costs to fishermen would be voluntary and not mandatory because of regulations

imposed by mesh size restriction. Also most trawl fishermen already have multi-trawl capability. Increased standardization of mesh size reduces costs to fishermen.

8. Other Mesh Size Alternatives Considered

The status quo, option 1, would have been discriminatory because the State of California requires 4.5-inch mesh while the states of Oregon and Washington have less restrictive but inconsistent measures (see Table 11). Status quo would have mandated a degree of economic inefficiency relative to whiting in waters off northern and central California. Status quo would not have achieved a goal of the trawl industry for regionwide uniform mesh size requirements.

Option 2 (regionwide 4.5-inch mesh) was rejected by the Council because in the Columbia and Vancouver areas this mesh size would have caused a gilling problem with Pacific ocean perch and subsequent hardship on trawl fishermen fishing for this species. This alternative would have achieved regionwide uniformity, but the ability of domestic fishermen to effectively harvest whiting would have been greatly compromised because efficient harvesting of whiting requires smaller mesh.

Option 3 (allowing 3.0-inch mesh only in the Columbia-Vancouver areas) was an attempt to alleviate the gilling problem with Pacific ocean perch and also accommodate the need to protect undersized bocaccio and chilipepper in the Monterey and Conception areas with a 4.5-inch mesh requirement. However, bocaccio and chilipepper are relatively minor in the Eureka area; 4.5-inch mesh results in gilling problems when fishing for widow rockfish, which are important in the Eureka area; and 4.5-inch mesh would hinder fishing for whiting in the Eureka area.

Option 4 (3.0-inch mesh plus incidental catch limits) was an attempt to achieve status quo without resorting to state boundaries. The Council rejected this alternative because opportunities to harvest whiting in the Eureka area would have been much reduced. Also the Council decided there was not sufficient biological reason to prohibit the use of 3.0-inch mesh in the Eureka area at this time.

1.4.1.2. Set Nets (Trammel Nets and Gill Nets)

Measure selected:

Set netting in the FCZ for groundfish is permitted south of 38°N latitude (Pt. Reyes, CA). The use of set nets is prohibited in all areas north of 38°N latitude.

Rationale: A set net fishery has operated for many years south of 38°N but was prohibited north of 38°N by the State of California to prevent harvest of salmon. Gear conflicts occur in the southern area, and a compromise agreement among users has resulted in an allocation of resources. Set net gear has not been used for groundfish in areas north of Pt. Reyes for many years. State regulations prohibit the use of set net gear in California north of Pt. Reyes, in Oregon and in Washington (except certain areas of Puget Sound where it is permissible for dogfish and Pacific cod only).

The prohibition of set nets is primarily intended to prevent the use of set gill nets in areas of salmon abundance. On the Pacific Coast of America, gill nets are used principally to harvest salmon and account for about one-third of all salmon landings wherever they are fished (Browning 1974). Although they may be effectvely used for groundfish, little is known of the incidental catch of salmon. Further, any misuse, whether intentional or not, could yield unacceptably high catches of salmon.

Canadian fisheries authorities also prohibit the use of set nets for groundfish (including dogfish) in all waters to prevent undesirable by-catch problems and generally consider set nets to be an undesirable gear to harvest groundfish.

All legal groundfish gears have a small incidental catch of salmon but do not have the potential to effectively target on salmon.

Conversely, gill nets are primarily a salmon fishing gear and if, while fishing for groundfish, they are ineptly or surreptitiously used, have the potential to consistently catch large numbers of salmon. Several other issues contributed to the decision to prohibit set nets north of 38°N latitude.

(1) High cost of enforcement and management

(a) All set nets are prohibited in areas of salmon abundance to prevent directed or incidental catches of salmon. Enforcement of regulations to allow set nets for groundfish, while prohibiting salmon harvest, would be extremely costly and time consuming. Effective enforcement would require monitoring at sea, boardings to check gear and catches, and intensive monitoring of catches at the port of landing.

(b) There are no catch data available for groundfish set netting in the FCZ north of 38°N. No legal set-netting has occurred in the FCZ since 1978.

(2) Gear conflicts

Conflicts between fixed and mobile gear are common wherever the two types of gear coincide. The Council has received testimony relative to conflicts between fixed gear for sablefish and trawls and also between rockfish gill nets and hook-and-line gear in Southern California. Similar conflicts between mobile fishing gear (principally trawls) and set nets would be virtually unavoidable if set nets were to be permitted in the northern areas.

(3) Resource issues

(a) Set nets may be lost due to rough terrain, bad weather or other reasons. Lost gear will continue to catch and kill fish for an unknown period of time.

(b) There have been many cases in Puget Sound where set net gear was not picked for three or more days, and a large portion of the

catch was unsalable because of decomposition and predation. This problem could be more severe in coastal waters if bad weather and long distances prevent timely attendance of the net.

(4) Allocation (See Plan Section 8.6)

The Council has instructed the Groundfish Management Team to investigate the advisability of resource or area allocation among commercial gear types and between commercial and recreational fishermen. The Council concluded that adding an additional gear type at this time to an already complex fishery issue could be counter-productive.

(5) International Considerations

In 1957 the United States and Canada effectively curtailed a developing ocean net fishery for salmon by an agreement which prohibits net fishing for salmon west of a line from Bonilla Point, Vancouver Island to Tatoosh Island, Washington[1/]. This agreement remains in effect. Due to the potential of set nets to be misused and the uncertainty of incidental salmon catches in nets targeting on groundfish, it was considered imprudent to approve an ocean set net fishery which could violate the intent of the agreement.

1.4.1.3. Commercial Hook and Line

Measure selected: No restrictions are proposed on the use of hook-and-line gear to harvest groundfish commercially.

1.4.1.4. Trap

Measure selected: Traps harvest sablefish almost exclusively but are legal gear for all species listed in this Plan. See the sablefish restrictions discussed below.

1.4.1.5. Recreational

Measure selected: Legal recreational gear are hook-and-line and spear.

Rationale: The use of this gear in taking groundfish in conformity with bag limits where applicable is biologically acceptable. These gears have been historically used by recreational fishermen and are also socially acceptable. The regulation imposes no new restrictions on the recreational fishery.

1/ Conference on Coordination of Fishery Regulations between Canada and the United States. Summary of Proceedings. Seattle, WA, February 27-18, 1957.

1.4.2 Species Restrictions

1.4.2.1. Lingcod

Measure selected: Commercial harvest of lingcod is managed by legal gear regulations adopted by the Council. There is no numerical OY or quota for lingcod.

Recreational fishermen are permitted a daily bag limit of three lingcod.

California allows up to three daily bag and possession limits of saltwater finfish for recreational fishermen during a multi-day trip in offshore waters ten or more miles distant from the mainland shore provided a declaration of such a trip is filed in advance with the California Department of Fish and Game. This provision is consistent with any bag limit option as no more than one bag limit may be taken on each day of the multi-day trip.

Rationale: Lingcod stocks are in satisfactory condition in all areas. Lingcod will be monitored and protected under the "Points of Concern" mechanism. Sport bag limits imposed on recreational users of lingcod have both biological and social reasons. A biological reason is declining catch rates in areas of high use, but which by itself does not necessarily constitute overfishing. Social reasons are to distribute the catch over a greater number of recreational users.

Most lingcod caught by the commercial fisheries, particularly the trawl fishery, are incidental to other fishing operations or from areas not utilized by recreational users. Restricting commercial users might be counterproductive unless it can be shown that the resource can be transferred from one user group to another. In the Columbia area, for example, lingcod tagged near shore and offshore have shown no interchange between tagging areas for two years of tag returns.

Prior to adoption of the Groundfish Management Plan state daily bag limits for anglers were five fish in California and three in Oregon and Washington. These bag limits were developed over many years and are biologically sound and socially acceptable. Options considered fell in a range of 3-5 fish per day. A larger bag limit could cause wastage and poor utilization of the fish. This measure is consistent with objective C of the Plan to provide a favorable climate for existing commercial and recreational fisheries.

Bag limits for groundfish have been proven enforceable by the state management agencies. This measure will likely be enforced by the states in conjunction with their ongoing enforcement activities. There will likely be no additional costs to the federal government for enforcement.

1.4.2.2. Pacific Whiting

Measure selected: Pacific whiting restrictions are presented above under "Gear Restrictions-Trawl."

1.4.2.3. Sablefish

Conservation problems have been identified in the Monterey Bay area (36°30'N - 37°00'N) and the coastwide landings in 1979 exceeded the 13,400 mt OY by 25%. The status quo may allow the OYs to be exceeded in the two areas.

Measure selected: A sablefish trip limit (percentage of the landing by weight) will be implemented in a management area (i.e. Monterey Bay or the Washington-California area) whenever 95% of the OY is reached in that management area. When area OYs are reached all landings in that area will be prohibited.

The trip limit will be established as the percentage of sablefish in all trawl landings which contain sablefish landed in that management area up to the time 95% of the OY was reached. Sablefish trip limits so set will not in any case exceed 30% of the landing weight.

The RD will follow the above criteria and implement the trip limit by field order.

Rationale: Fixed gear (trap and longline) fishermen landed 74% of the sablefish in the Washington to California area in 1979 and they landed 90% of the sablefish in the Monterey Bay area in recent years. The 95% catch provides nearly equal shares to all user groups. This option allows sablefish caught incidentally with any gear to be landed until the OYs are reached. It provides a slight catch advantage to trawlers but the trip limit percentage would inhibit targetted fishing for sablefish. Discards of sablefish will be reduced in normal fishing operations but some discard might result in cases where high sablefish catches are encountered.

Enforcement of this measure is possible; the cost of enforcement would be variable and would depend on when trip limits are implemented. Trip limits have been enforced effectively in the states of Washington and Oregon for Pacific ocean perch.

This measure affords greater flexibility than the measure which closes the fishery when 100% of either OY is reached. It will also more nearly achieve OY because unavoidable incidental catches would continue in the trawl fishery even after closure.

The other major option considered was the addition of a minimum size limit for sablefish. This measure was rejected because it would increase discards and mortality of undersized fish and because a specialty fillet market based on small sablefish would be eliminated.

Other sablefish measures selected

a. Fixed gear shall not be left unattended for more than seven days.

Rationale: Placing fixed gear on the bottom preempts other fixed gear fishermen and mobile gear fishermen from using that area. Most fixed gear fishermen attend their gear every day or so absent bad weather or mechanical difficulties. Occasionally a fisherman will leave gear unattended for long periods to participate in another fishery. This measure is designed to

prohibit this occasional violator from usurping the grounds. The seven day period was chosen to allow for uncertainties in the weather and vessel breakdowns. A longer period is considered preemptive of other fishermen. Without this measure there would be no mechanism to remove abandoned fixed gear. The intent is not to require constant monitoring. Most fixed gear fishermen do not leave their gear unattended.

While this measure may pose some enforcement problems, it is enforceable. It will require periodic on-site monitoring, and the cost of enforcement may increase but should not be prohibitive, since the intent is not to require constant monitoring.

Other measures considered by the Council would have placed a limit on the number of traps or amount of groundline which could be fished per vessel. The Council felt that these alternatives would have created unnecessary inefficiencies and would have been difficult to enforce. Each vessel would have a specific gear capacity that would have to be tested and documented. At-sea monitoring would be costly. The measure selected will solve the problem of ground preemption without unnecessary restriction.

b. Fixed gear shall be marked with poles, flags, lights, and radar reflectors attached to each end of the set. A buoy showing identification of the owner shall be included. Gear shall be marked at the surface every one mile of groundline with any of the above markers.

Rationale: The landings of sablefish by gears other than trawl increased from 6,332 mt in 1978 to 12,342 mt in 1979 (data are preliminary). Most of this "other gear" catch is taken by fixed gear, i.e. traps and longlines. The increased use of fixed gear creates real and potential gear conflict problems. Fishermen have reported gear entanglements with other fixed gear fishermen (trap vs. longline), with mobile gear (foreign and domestic trawl) and with non-fishing vessels. Requiring that fixed gear fishermen mark their gear will increase the probability that other vessels will avoid it. Fishermen support this measure and state that many already mark their gear in some fisheries. This measure will ensure that all fixed gear fishermen mark their gear and in a fashion which will maximize detection by others. Gear marking measures will result in a small capital cost to fishermen and will have high social acceptance.

This measure is easily enforceable by spot-checking at sea or examining the gear in port before it is taken to the grounds. Costs of enforcement should be minimal since the gear can be checked quickly and in conjunction with other at-sea or dockside enforcement acitivities.

The requirement that gear be marked every mile is necessary so that other user groups will know the extent of long groundlines. Fishermen have testified that some groundlines are up to nine miles in length and that encounters by trawl vessels particularly can be costly and dangerous.

c. Traps must have a biodegradable escape device located on a side panel; an escape device must be constructed with #21 or smaller untreated cotton twine so that an opening of at least eight inches in diameter results when deterioration of the twine occurs.

Rationale: This measure would minimize mortality of sablefish caught in lost or unattended traps by providing for escapement. This is an established practice in many trap fisheries and escape panels currently are required by the States of Washington, Oregon and California. The specification above is consistent with state definitions for escape devices and therefore the additional cost to fishermen is zero, and the additional cost of enforcement to the federal government is minimal or zero.

Reporting of Gear Locations

Reporting of fixed gear location is not required but fixed gear fishermen are encouraged to do so with the United States Coast Guard. Reporting of fixed gear will facilitate compensation claims by fishermen who have lost fixed gear.

1.4.2.4. Pacific Ocean Perch

Measure selected: A trip limit of 10,000 lbs. or 10% of the total trip weight is allowed for Pacific ocean perch (*Sebastes alutus*).

Rationale: The intent of this measure is to provide for incidental catches of Pacific ocean perch but to discourage directed fishing. It is expected that this trip limit will keep catches of Pacific ocean perch within the 20-year rebuilding option chosen by the Council for the Columbia and Vancouver areas. Also, the chosen trip limit allows for a more equitable division of catch between the larger vessels operating in the Vancouver area and the smaller vessels operating in the Columbia area.

The analysis by Taggart et al. (1980) showed that a 10,000 lb., 10% trip limit is within the 20-year rebuilding schedule in the Vancouver area. Fishermen stated that a change from the more liberal current state limit of 10,000 lbs. or 25% in the Vancouver area to a more restrictive limit would result in catches which will fall within the 20-year rebuilding schedule (600 mt) because fishing patterns will be altered particularly for the longer high volume trips common to the Vancouver area.

In the event that the landings under the 10,000 - 10% limit exceed the 20-year rebuilding schedule in either the Vancouver area (600 mt) or Columbia area (950 mt) in calendar year 1981, the trip limit will be 5,000 lbs. or 10% in both areas on January 1, 1982. If it is determined that the overall fishing mortality cannot be reduced then a more restrictive limit will not serve a useful purpose. Other measures considered are addressed in section 12.3.1.4 of the FMP. These measures were rejected because the measure selected was superior in terms of conservation (rebuilding) and minimizes social and economic impacts. The alternative measure of 5,000 lbs. and 10% would be used only in the event that the 10,000 lb., 10% trip limit does not meet the rebuilding objective. Although economic considerations were addressed, the final decision was based primarily on social and resource conservation considerations. Trip limits under consideration in this Plan are not significantly different in their long-term economic impact.

If the 5,000 lb., 10% limit is implemented, the Management Team will present an analysis of this limit and other alternative limits to the Council prior to April 1, 1982. This analysis will consider present stock conditions, utilize

current data and address the difference in rebuilding schedules between the Vancouver and Columbia areas.

1.4.2.5. Other Rockfish

Measure selected: Commercial harvest of rockfish is managed by legal gear regulations adopted by the Council. There is no numerical OY or quota for rockfish (except POP and shortbelly rockfish).

Recreational fishermen are permitted a daily bag limit of 15 rockfish.

California allows up to three daily bag and possession limits of saltwater finfish for recreational fishermen during a multi-day trip in offshore waters ten or more miles distant from the mainland shore provided a declaration of such a trip is filed in advance with the California Department of Fish and Game. This provision is consistent with any bag limit option as no more than one bag limit may be taken on each day of the multi-day trip.

Rationale: "Other Rockfish" stocks are in satisfactory condition in all areas. Rockfish will be monitored and protected under the "Points of Concern" mechanism.

Prior to adoption of the Groundfish Management Plan state daily bag limits were 15 fish in California, Oregon and Washington. These bag limits were developed over many years and are consistent with biological principles and socially acceptable. Options considered fell in a range of 5-15 fish per day. The PFMC concluded that in view of the status of stocks, that recreational anglers should be allowed an opportunity to harvest up to 15 rockfish per day. A larger bag limit could cause wastage and poor utilization of the fish. This measure is consistent with objective C of the Plan to provide a favorable climate for existing commercial and recreational fisheries.

As discussed under lingcod above, the measure is enforceable and will require no or little additional enforcement costs.

1.4.2.6 Shortbelly Rockfish

Measure selected: Shortbelly rockfish will be managed by experimental gear permit in cases where the gear proposed is not legal.

Rationale: While available evidence indicates that the stock of shortbelly rockfish is capable of supporting a 10,000 mt fishery, there is little information available on possible effects of a large fishery such as poor yield per recruit because of catches of smaller than optimum size shortbelly rockfish or other desirable species, or the proper gear for an efficient fishery. Until this necessary information is obtained, the fishery will be considered experimental and managed on an experimental basis. (See Sections 1.4.5 and 13.6).

1.4.2.7. Dover, English, and Petrale Soles

Measure selected: Given the selection of OY Option 3, these species of flatfish will have a non-numerical OY and therefore will not have a quota.

They will be managed using the "Points of Concern" mechanism and legal gear regulations adopted by the Council.

Rationale: Gear regulations alone are calculated to prevent conservation problems. Analyses by Lenarz (1978 a,b) indicate that the production curves for Dover and English are relatively flat-topped and therefore this group can be fished at, near or slightly above MSY levels without significant problems.

1.4.3 Restrictions on Other Fisheries

1.4.3.1. Troll Salmon

Measure selected: There are no restrictions on the catch of groundfish in the ocean troll salmon fishery consistent with the "no restriction" measure selected for hook-and-line fisheries above.

Rationale: In the ocean salmon fishery some groundfish are also caught. The major species caught are rockfish and lingcod. In the Columbia and Vancouver areas the incidental landings of groundfish were 2.3% and 1.1% of total groundfish landings in 1978 and 1979, respectively. Because of the small magnitude of the catches, there is no problem and restrictions are not recommended.

1.4.3.2. Pink Shrimp

Measures selected: The incidental landings of groundfish in the pink shrimp fishery are limited to 1,500 lbs. daily accumulated over the trip. Whiting, shortbelly rockfish and arrowtooth flounder are excluded from the incidental landing restriction.

Rationale: Groundfish are caught incidentally and sometimes deliberately by shrimp trawlers. Non-targeted catches of groundfish by shrimp fishermen have resulted in few problems while returning some economic benefits to the shrimp fishermen. Other harvesters of groundfish have expressed concern only when shrimp fishermen target on groundfish. The targeted catches are of concern for two reasons:

a. There is a potential for directed fishing on groundfish with shrimp gear (small mesh trawls), which would defeat the purpose of gear regulations set for other groundfish fisheries. Catches of substantial quantities of small groundfish in the small-mesh shrimp fishery could reduce recruitment to directed fisheries for larger fish.

b. Landings of targeted catches of groundfish by shrimp trawlers have caused some social problems in Oregon and Washington, where no landing restrictions exist.

   Prior to the beginning of the 1980 shrimp season, processors in some areas offered incentives to shrimp fishermen. These incentives were somewhat reduced by mid-season. Incentives of no restrictions on groundfish landings when coupled with the same processors limiting landings of rockfish by groundfish trawlers pose social and economic problems because landings of rockfish by shrimp fishermen impact groundfish trawlers when some portion of the trawler's market is usurped by groundfish landings

from shrimp vessels. If the trawler is placed on landing limits by the processor, then the potential discard from the trawl fishery could be greater than the groundfish landing from the shrimp fishery. Social aspects of landing limits, or lack of, are difficult to evaluate since a limit acceptable to one individual or group may not be acceptable to others.

This limit would reduce incentive to target on groundfish with small mesh shrimp trawls but would allow most fish caught incidentally to shrimp fishing to be marketed. Some waste would still occur in the shrimp fishery if exceptionally large catches of groundfish are made.

An alternative considered by the Council and suggested by the Groundfish Advisory Subpanel was 2,000 lbs. or 10% of the shrimp catch per trip. This alternative was not chosen because the potential discard was considered too high. In 1979, this allowance would have resulted in a discard of 316 mt or 25% of the incidentally landed groundfish.

A second alternative considered by the Council was 3,000 lb. or 15% of the shrimp catch per trip. This alternative was rejected by the Council after being presented with documentation and testimony from shrimp fishermen that claimed unfair treatment under a trip limit. Larger shrimp vessels make longer trips, up to five days, and a 3,000 lb. trip limit (or 2,000) would have restricted the larger vessel more than the vessel which makes one or two day trips. In 1979, a 3,000 lb. or 15% limit would have resulted in a discard of 178 mt or 14% of the incidentally landed groundfish.

The impact of the 1,500 lb. daily limit is unknown but shrimp fishermen testified that most of their incidental catches would fall under this limit. The measure should allow shrimp fishermen to land their incidental catches, minimize waste and discourage targetting on groundfish with a small mesh net.

Status quo was not considered a viable alternative because it would have been discriminatory. Shrimp fishermen landing shrimp into California's ports are restricted to 500 lbs. of groundfish per delivery while shrimp fishermen landing shrimp into Oregon and Washington ports are not restricted by incidental catch limits.

1.4.3.3 Spot and Ridgeback Prawns

Measure selected: The incidental landings of groundfish in the spot and ridgeback prawn fishery are limited to 1,000 lbs. per trip.

Rationale: Fish are an unavoidable by-catch in the spot prawn and ridgeback prawn fishery. An allowable fish catch of 1,000 lbs. would permit the landing of marketable fish caught coincidentally in the prawn fishery; it would prevent the waste of marketable fish. The 1,000 lb. fish limit is low enough that together with the high price of prawns compared to groundfish there would be little incentive to target on groundfish with small mesh trawls. Prawn fishermen employ 1.5-inch mesh trawls, and the use of trawls with meshes less than 4.5 inches for groundfish in the Conception area is biologically unsound, as yields per recruit of the major species are below their maxima.

Three other incidental fish catch measures considered by the Council involved a minimum prawn catch and/or fish catches that were 3-times the prawn catch. Such measures present difficulties to fishermen when they are attempting to locate prawn concentrations. Additional labor, fishing inefficiency, and wastage of fish occurs when fish are sorted and retained and subsequently discarded because of a prawn minimum or fish/prawn ratio. Estimation inaccuracies of prawn catch and percentages also burden fishermen. Enforcement costs are also increased when weights of prawns and fish and percentages have to be determined.

1.4.4 Reporting Requirements

Catch, effort, biological and other data necessary for implementaton of this Plan will continue to be collected by the states of Washington, Oregon and California under existing state data collection provisions. No additional reporting is required of fishermen and processors by this Plan. See Section 13.2.1 for detailed domestic reporting requirements.

1.4.5 Experimental Fisheries

Measure selected: In order to promote increased harvest of underutilized species, limited experimental fisheries for groundfish species will be allowed on a permit basis (see Section 13.6 for detailed restrictions). The permits will authorize fishing which would otherwise be prohibited by regulations.

Rationale: The purpose of an experimental fishery is to provide a mechanism to obtain data from which conclusions can be drawn, i.e. an experiment. A relevant example of a species requiring an experimental fishery is shortbelly rockfish. This is a species with an apparently large biomass and which could sustain a directed midwater trawl fishery. It is small-sized at maturity and, to be effectively harvested requires a mesh size smaller than the FMP provides. The optimum mesh is unknown, however. Another important unknown is the incidental catch that would occur during directed fishing for shortbelly rockfish, particularly in terms of seasonality.

The alternative to experimental fisheries would be a research project conducted by a fishery agency. Based on the data obtained, a regulation would be drafted and implemented. Fishery experience under this scheme might prove the regulation effective. Fishery experience also might prove the regulation to be ineffective, in which case the regulation would have to be amended. This may result in substantial financial problems for those fishermen with gear investments plus administrative costs for meetings, drafting sessions, hearings, etc., required to change the regulations or amend the FMP.

The most logical course of action is to obtain the necessary data under actual fishery conditions, but only so long as it is necessary to obtain a usable data base. In the case of shortbelly rockfish, an experimental fishery would provide the mechanism by which data on mesh size could be obtained along with estimates of the kinds and amounts of allowable incidental catch under production fishing methods. Incidental catch particularly would be difficult to determine adequately by pure research methodology because fisherman experience is not a factor in experimental design.

1.4.6 Vessel Identification

Measure selected: Each vessel over 25 ft. shall display its Official Number on the port and starboard sides of the deckhouse or hull, and on an appropriate weatherdeck so as to be visible from above. The Official Number is the documentation number issued by the Coast Guard or the certificate issued by a state or by the Coast Guard for undocumented vessels. Numerals shall be at least 18 inches high on vessels over 65 ft. and at least 10 inches high on vessels over 25 Ft.

Rationale: Vessel identification is now required either by federal or state law. This requirement will standardize vessel identity. Some small cost will accrue to fishermen to comply with this requirement but the amount is unknown.

1.5 Foreign Fishery Management Measures

1.5.1 Species

Pacific whiting only in 1982.

1.5.2. Season

Measure selected: June 1 - October 31

Rationale: During the first years of the foreign whiting fishery, fishing occurred primarily in the Vancouver and Columbia areas during May - October. In subsequent years fishing occurred as early as March off central California, where catches contained large proportions of immature whiting. Through bilateral agreement, a June 1 - October 31 season was established east of 125°40'W. Historical data demonstrate that TALFF can be harvested with usual levels of effort during that period, and the catch is comprised mainly of mature whiting.

1.5.3. Gear

Measure selected: Pelagic trawls with a minimum mesh size of 100 mm (3.94 inches) must be used. Codend liners or other devices which have the effect of reducing mesh size or improving ability to fish on the bottom are prohibited.

Chafing gear may be used but must be of a mesh size greater than or equal to two meshes of the codend, i.e., a minimum of 200 mm. The chafing gear must be connected to the codend knot-to-knot. Thread size of the chafing gear shall be not more than four times the diameter of that used in the codend.

Rationale: Pacific whiting has been identified as a species which should be assigned a TALFF, because it is not fully utilized by the domestic industry and because it can be managed as a single species fishery. The ability to keep the catch of other species which are fully utilized to an acceptable level is dependent on requiring fishing for whiting to be conducted by pelagic trawling only. A minimum mesh size of 100 mm (3.94 inches) is proposed because it has been effectively used by the Soviet whiting fleet and will allow for the escapement of most immature whiting encountered in the fishing area. Previously 110 mm was required. This was reduced to 100 mm at foreign

request because the larger size was inefficient. The use of codend liners and chafing gear, which effectively reduce mesh size, are to be controlled so that the trawl cannot be effectively employed as a means of taking smaller species (i.e., herring) or large amounts of immature whiting.

Foreign fishermen are required to fish whiting with a mesh 24mm larger than domestic fishermen for several reasons. First, domestic fishermen will be allowed to fish south of 39°N where foreign fisheries are prohibited. The whiting in this area are smaller and current domestic catches are well below potential foreign and joint venture catches and would not harm the juvenile resource in this area. Secondly, the 100mm mesh size was requested by foreign fishermen, and in the area where foreign fishing is allowed, 100mm is adequate to harvest the whiting TALFF. At the same time, 100mm mesh assists in minimizing the catches of incidental species important to the U.S. Finally, domestic fishermen will be using the 3.0-inch or 76mm mesh for directed midwater rockfish fishing (100mm is too large) as well as for whiting. Requiring domestic midwater trawl fishermen to have two nets is a disincentive and inconsistent with objective D of the Plan and contrary to the intent of the Act to encourage development of U.S. fisheries.

1.5.4. Incidental Catch

Measure selected: It is recognized that catches of species which have a numerical OY and which are fully utilized, e.g., POP and sablefish, will occur and are unavoidable in foreign and joint venture fisheries for whiting. DAP=DAH=OY for these species, and there technically can be no foreign allocation (TALFF) or JVP for them. The Council further recognizes that if these incidental catches were made a part of the OY, then the foreign or joint venture fisheries may be prevented from catching their allocation of whiting when domestic fishermen reach the OY, even though incidental catches may be minimal. Therefore, the Council has adopted the policy originally established by the Trawl PMP to allow minimal incidental catches, above and beyond the OY, which are consistent with the status of the stocks and the efficiency of the foreign and joint venture whiting fisheries. These incidental catch allowances are not to be considered as surpluses to domestic harvest, i.e. TALFFs. Foreign fishermen are to make every effort to catch only their target species.

Each foreign country given an allocation of a target groundfish species will be subject to limits on its incidental catches of other groundfish species. These limits will be expressed as percentages of the allocation of the target species, and the foreign fishery will be terminated when either the allocation of the target species or any of the incidental catch limits has been reached.

The permitted incidental catch percentages will be based on observed rates in previous foreign operations and current estimates of the relative abundance of species caught incidentally. The percentages should minimize incidental catches of species fully utilized by domestic fishermen, while allowing foreign fishermen a reasonable opportunity to harvest their allocations. These percentages can be adjusted at any time, in-season or between-seasons.

The setting and revision of permitted incidental catch rates will be the responsibility of the Regional Director, who will publish proposed levels and consider public and Council comments before adopting them.

The incidental catch levels for the first plan year, 1982, are:

Rockfish (excluding POP)	0.738% of the whiting allocation
POP	0.062% of the whiting allocation
Sablefish	0.173% of the whiting allocation
Flatfish	0.1% of the whiting allocation
Jack mackerel	3.0% of the whiting allocation
Other species	0.5% of the whiting allocation

For purposes of foreign regulations, shortbelly rockfish are included in the rockfish incidental catch category.

Rationale: The other alternative considered was to set incidental catch levels as fixed percentages of the whiting TALFF. A disadvantage of such a procedure is that frequently unpredicted changes in abundance or availability of incidental species increases such that the set value becomes unrealistically low, resulting in unnecessary interference with and occasional closure of the foreign whiting fishery.

The approach proposed herein will be the use of a variety of current information to periodically adjust incidental catch levels based on year-to-year variability in abundance and availability of incidental species. The procedure is intended to prevent targetting on non-whiting species for which there is no surplus, while preventing unnecessary hindering of the progress of the whiting fishery.

1.5.5. Area Closures

Measures selected: (1) 47°30'N to U.S./Canada boundary; (2) 39°N to U.S./Mexico boundary; (3) Columbia River Pot and Recreational Sanctuary; (4) Klamath River Pot Sanctuary; (5) 0-12 mile area.

Rationale: The area between 47°30'N and the U.S./Canada boundary is closed because a domestically important Pacific ocean perch ground is found there, the stock size is depressed, and incidental catches by a large foreign fleet may be of such a magnitude to prevent rebuilding of that stock. The area between 39°N and the U.S./Mexico boundary is closed because this is the primary area of residence of immature whiting, and fishing there would result in unacceptably large catches of juveniles. The Columbia and Klamath River Sanctuaries are designated as closed areas, because they are used intensively by domestic recreational and fixed gear fishermen, and permitting of foreign trawling in those areas would substantially increase the potential for gear conflicts. The area from 0-12 miles shall be closed to prevent conflict with U.S. commercial and recreational fishermen, prevent catch of inshore species of importance to U.S. recreational and commercial fishermen, minimize congestion due to the large size of the vessels, and to minimize social problems which developed from the high visibility of foreign fleets when fished near shore during the 1960's. This concern became law with the implementation of the Act of October 14, 1966 which established the 9-mile contiguous zone.

1.5.6. Number of Vessels

Measure selected: No restrictions are placed on the number of foreign vessels permitted in the FCZ in the area open to foreign fishing.

Rationale: Prior to the FCMA the foreign fisheries were either factory/trawlers or catcher vessels delivering to motherships. For example, in 1966 over 100 USSR catcher vessels (SRTs and SRTMs) delivered whiting to motherships which processed the catch. In subsequent years the catcher/mothership fleet was replaced by factory trawlers. The Council considered a limit of 40 vessels. Because the number of foreign trawlers has not exceeded 40 for the past several years (even before FCMA), there was no point in limiting the number of trawlers.

1.5.7. Observer Coverage

Measure selected: Observers shall be placed on each foreign fishing vessel while it is engaged in fishing in the FCZ as provided by Title II of S.2163. The law provides for the following exceptions to this requirement:

1. if an observer is aboard the mothership(s) of a mothership/catcher vessel fleet;
2. if the vessel is in the FCZ for such a short time that an observer would be impractical;
3. if facilities for quartering an observer are inadequate or unsafe;
4. for reasons beyond the control of the Secretary an observer is not available.

Rationale: Observers on all foreign fishing vessels would enhance our ability to monitor the performance and conformance of the fishery and to collect biological data from the catch.

The Advisory Subpanel unanimously recommended 100% observer coverage because of fears that vessels with observers aboard act differently than vessels without observers. The Council, Advisors and the public have noted that serious violations have occurred elsewhere when foreign vessels did not have observers aboard. By instituting 100% observer coverage, it is hoped that these violations will cease. Also, more observer coverage would give more accurate incidental and total catch information for all species, including prohibited species such as salmon which are highly valued and in a depressed condition.

1.5.8. Dumping

Measure selected: Foreign vessels are prohibited from dumping pollutants and fishing gear which would degrade the environment or interfere with domestic fishing operations.

1.5.9. Fishery Termination

Measure selected: The whiting fishery conducted by another country shall cease in each year when (1) the open season ends; or (2) the country's allocation of whiting has been taken; or (3) the country's incidental catch quota of any other species has been taken.

1.5.10. Reporting Requirements

Measures selected: Foreign nations that fish whiting are required to submit detailed reports of fishing effort and catch by species and small statistical area on a weekly and annual basis. In addition, each country must report the arrival and departure of each of its vessels, and must report its catches daily when 90% of its allocation of any species has been taken. See Section 13.2.2 of the Plan for detailed requirements.

Rationale: All of this information is necessary to enable U.S. authorities to enforce the regulations and allocations set for the current season, and to enable the Council to monitor the stocks involved and determine appropriate management measures for the following seasons.

Enforcement Costs of Foreign Measures: Season, area, gear, and incidental catch restrictions have been imposed by the NMFS under the Preliminary Management Plan for 1977 through 1980 and will continue to be enforced by established procedures. The limit placed on the number of foreign fishing vessels by this FMP will limit some enforcement costs. Complete observer coverage, paid for by other countries, could actually reduce costs to the United States by reducing the number of boardings and inspections needed. The Council recognizes the budgetary problem faced by NMFS in financing the observer program when it does not automatically receive the fees paid by other countries, but the Council does not believe that partial coverage is the proper solution to the problem.

1.6 Joint Venture Fishery Management Measures (foreign processors)

These measures apply to foreign processors which accept U.S.-caught fish at sea. Domestic fishermen participating in such ventures will be managed in the same manner as other domestic fishermen (see domestic measures above).

Measures selected:

1.6.1. Target Species: To be determined by annual surveys of domestic annual harvest, domestic annual processing and joint venture processing capabilities. Only those species which can be harvested with minimal bycatches of fully utilized species will be considered

1.6.2. Season: To be determined on a species-by-species basis, except no restriction for Pacific whiting.

1.6.3. Gear: Not applicable to joint venture foreign processors.

1.6.4 Fish other than the target species: Retention of fish by foreign processors covered by the Plan other than the target species shall be limited to expressed percentages of the target species catch which will be determined annually based on observer data and continuing stock assessment. Limits will be based on the amount of fish retained by the foreign vessel.

1.6.5 Area clossures: (a) 39°N to U.S./Mexico boundary
(b) 0-6 mile area

1.6.6 Number of foreign processing vessels: No limit.

1.6.7 Observer coverage: Same as foreign (see Section 1.5.7).

1.6.8. Fishery termination: The joint venture fishery shall cease each year when (a) the quota of the target species has been received; or (b) foreign processors have exceeded the retention allowance of any other species.

1.6.9 Reporting requirements: All fish received must be reported in the same manner as prescribed for foreign fisheries (see Section 1.5.10).

Rationale: There were concerns received during the development of this plan that accommodation of joint venture processors would (1) lead to an unfair advantage when shore processors must compete against joint ventures, if not in the domestic market, in the world market, because of safety laws, unemployment compensation, Social Security, environmental laws, and various taxes; (2) increase gear conflicts, crowding, and preemption of traditional inshore fishing grounds, and (3) encourage additional fishing effort in inshore areas where the catch of incidental species would be increased. While the severity of potential impacts associated with the first two concerns cannot be evaluated at this time, U.S. observer data reveals that 1980 incidental catches expressed as a percentage of the whiting catch were slightly less for most species or species groups in the Polish fishery than in the U.S.-USSR joint venture fishery. Polish incidental catches of important groundfish were Pacific ocean perch .07%, sablefish .21%, and flounders .01% while joint venture incidental catches (including discards) were .11%, .80%, and .17%, respectively. The Polish incidental catch of rockfish, excluding POP, (2.18%) was greater than that of the joint venture (1.68%).

Domestic fishermen have participated in the joint venture fishery because it offers them certain advantages. U.S. fishermen fishing for Pacific whiting and delivering to shore based processors incur costs associated with holding the catch aboard the vessel and delivery to the processor. Because whiting does not hold well for long periods, frequent delivery trips are required and fuel costs become a major factor relative to the viability of such a fishery. Ostensibly, fuel costs associated with delivery in the joint venture whiting fishery are reduced because the processor is mobile and can be available on the fishing grounds. For this and other reasons, such as the ability to range coastwide as whiting availability changes among areas and a guaranteed market, the joint venture fishery has grown while the shore based fishery has continued at relatively low levels of effort.

The advantage of having processing capability on the fishing grounds has been modified by regulations which required processing vessels to remain outside the 0-12 mile zone in 1978, the 0-9 mile zone in 1979, and the 0-6 mile zone in 1980. U.S. fishing vessels have focused their efforts in waters over the continental shelf where their catch rates tend to be higher than they are farther offshore where foreign vessels with greater horsepower and larger trawls can effectively find midwater whiting schools in deep water. When fishing near-bottom schools on the shelf, U.S. vessels are often fishing well shoreward of the 12 mile limit. In 1980 for example, about 55% of all codend deliveries to processing vessels were shoreward of 12 miles.[1/] Thus U.S. fishermen have been confronted with towing their catches in codends for

1/ Personal communication, Margaret Dawson, graduate student, Univ. of Alaska.

several miles for delivery. The effects were reduction of available fishing and scouting time, increased fuel costs, and deterioration of the condition of the catch.

Pacific whiting are noted for their soft flesh even when fresh, and the towing process causes further softening rapidly. U.S. observers aboard processing vessels report that the quality of U.S. catches made within short distances of the processor are comparable to the quality of catches made by the processing vessel when it is fishing for itself. Conversely, the quality of U.S. catches which have been towed for several miles is such that often all or a major part of the catch is not suitable for utilization as a food product (i.e. fillets or headed/gutted) and must be reduced to meal, a less desirable and secondary product. The differential in demand for food and meal products is reflected in prices paid to the fishermen. U.S. vessels have received 6 - 6-1/2¢ per pound for high quality whiting and 1 - 1-1/2¢ per pound for whiting which can only be used for meal production. Because it is not cost effective to fish at 1 - 1-1/2¢ per pound catches must be made in areas accessible to the processor to maintain quality.

It is difficult to assess the affects of reducing the size of the closed zone. It has been noted by U.S. observers, however, that in 1978 when the 0-12 mile zone was closed to joint venture processing vessels, about 25% of the fish delivered had to be utilized as meal, while in 1979 when the closed zone was reduced to 0-9 miles, 13% of fish delivered went into meal production. This reduction is attributed to the ability of processing vessels to be available at more sites where fishing was good for U.S. catcher vessels and to improved codend transferring and fish handling techniques. In 1980 when the closed zone was still further reduced to 0-6 miles, U.S. observers reported that nearly all tows were made in the vicinity of the processor and towing was minimal.

The area south of 39°N latitude remains closed to joint venture processing vessels for whiting because the present fishery is a volume fishery and there is concern for juvenile whiting that reside in this area. A shore-based fishery south of 39°N will have little impact on juvenile stocks because growth of juveniles outweighs fishery removals. As a shoreside fishery develops, regulations will have to be imposed to protect juveniles. A major reason for terminating foreign fisheries south of 39°N was because of the high incidence of juvenile whiting.

Seasonal restrictions on joint venture fisheries have little practical utility. The adult stock of whiting is highly migratory with northward migrations from the southern spawning area beginning in late winter and early spring and fish disappearing from northern waters in late fall. The fishery would begin whenever sufficient quantities of fish arrived at 39°N latitude to make fishing profitable. Arrival of fish at 39°N latitude will change annually depending on environmental conditions. A further consideration is that domestic fishermen participating in joint ventures should not be constrained by a season when other domestic fishermen are not, absent conservation reasons for a season.

The number of processing vessels is self-limiting because of vessel processing capacity and quota size as well as other economic considerations of the joint venture company. It is not conceivable that more vessels would receive fish than is absolutely necessary.

The proposed action bases incidental catch allowances on the amount of fish retained by joint venture processors, not the amount received (as in earlier drafts). It is recognized that once the allowance is approached or reached, processors will discard that species in order to continue operating, because if the amount retained exceeds the allowance then the fishery is terminated. While discarding may occur, the Council believes this policy is superior to a receipt policy since catcher vessels would likely dump their entire catch prior to delivery if processors had received amounts of incidental species close to the allowed level and the catcher vessel felt that that particular codend contained significant quantities of incidental species. In this case, there would be no accounting of the catch of either directed or incidental species. Moreover, it is important to recognize that discarding is not unique to joint venture fisheries. Market limits imposed by shoreside operators result in discards and these fish are rarely counted.

1.7 Adjustments

Near the end of the fishing year (calendar year) an announcement will be made in the Federal Register stating ABC, OY, DAH, DAP, JVP and TALFF estimates for the coming year (OY, DAH, DAP, JVP and TALFF are estimated for numerical OY species only). Estimates of DAH, DAP and JVP will be assessed by a survey of domestic capacity and intent as outlined in Section 10.2.1.4. Between-season estimates of ABC and OY will be determined using the harvest guideline adjustment procedure and Point of Concern mechanism outlined in Chapter 9. TALFF will be determined using estimates of OY and DAH, with the formula TALFF = OY - DAH - reserve. For any adjustment of OY during the season, as outlined in Section 9.3.2.1, the Council will decide at the end of the year whether to permanently adopt all, part or none of the increase. All of the above changes will be made by the regulatory change process.

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Summary

The introduction establishes the scope of, and the basis and authority for, this Fishery Management Plan. It is intended that the FMP be effective for two or more years without amendment assuming new information substantiates the management decisions. The objectives are listed and are important as references in specifying the optimum yield and understanding the management measures. The objectives are:

(A) Promote the availability of quality seafood to the consumer.

(B) Promote rational and optimal use, in the biological, social and economic senses, of the region's fishery resources as a whole;

(C) Provide a favorable climate for existing domestic commercial and recreational groundfish fisheries within the limitations of other objectives and guidelines. When change is necessary, institute the regulation which accomplishes the change while minimizing disruption of current domestic fishing practices, marketing procedures and environment;

(D) Provide for the orderly development of domestic groundfish fisheries, including new fisheries, consistent with (B) and (C) above, at the expense of foreign participation;

(E) Provide for foreign participation in the fishery consistent with (B), (C) and (D) above, to take that portion of the optimum yield not utilized by domestic fisheries.

(F) Prevent overfishing of stocks which can be managed as a unit, including rebuilding those stocks which are now depleted.

(G) Minimize gear conflicts among users.

(H) Recognizing the multispecies nature of the fishery, establish a concept of managing by species and by gear, or by groups of interrelated species.

(I) Attain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.

Definitions are provided for key biological and management terms which are used subsequently in the FMP. Finally, a description of the Fishery Management Unit and subunits are given. The unit is comprised of all species listed in Table 1 (page 2-8). The possible subunits are specified in Tables 29, 30, and 31 (pages 9-7, 9-8, and 9-10).

FISHERY MANAGEMENT PLAN FOR THE GROUNDFISH FISHERY OFF WASHINGTON, OREGON, AND CALIFORNIA

2.0 INTRODUCTION

This Fishery Management Plan (FMP) has been developed by the Pacific Fishery Management Council (PFMC) to achieve more effective management of the groundfish fishery of the California, Oregon, Washington region, including sablefish. This FMP is considered timely and essential to the maintenance of an orderly fishery and the productivity of the resource. The fishery has known relative stability for a number of years, but recently, a series of events have occurred which are creating dramatic changes and are threatening the efficacy of the existing management regime. Regulatory and economic displacement of vessels from other fisheries and new vessels entering the fishery during the past years have resulted in substantial increases in fishing effort in the Washington, Oregon, and California groundfish fishery. A recent survey by NMFS also indicates that substantial numbers of new vessels are being constructed for the West Coast groundfish fishery. New technology, improved electronic navigation and fish finding equipment have tended to increase harvesting ability. Landings in 1978 increased 19 and 57 percent over 1977 in the Vancouver and Columbia areas, respectively. In 1979, there were still further increases in these areas of 42 and 49 percent over 1978. Presently, the landings of many groundfish species or species groups are near or have exceeded the optimum yields presented in the FMP. All of this is occurring at a time when the states' authority to manage fisheries outside of 3 miles through the use of landing laws is being legally challenged. Given the uncertainty of state authority, excessive harvest of groundfish resources could very soon become a reality in the absence of an FMP. Furthermore, many groundfish stocks are transboundary in nature and are fished by a highly mobile fleet with the ability to fish extensively from Mexico to Canada. This fleet mobility allows citizens of one state to fish off several states often under different management regimes. Management of out-of-state fishermen by states is currently impossible in the FCZ.

The incremental costs of implementing this plan will be minimal compared to the benefits achieved. Much of the cost of management and enforcement is already being borne by the states with regard to domestic fisheries and by the federal government for foreign fisheries. The FMP will require some additional costs of plan development, improved data collection and possibly for domestic enforcement in the neighborhood of $500,000 per year. Additional expenditures may have been required even without an FMP given the rapid increase in number of vessels and harvests of groundfish. In any case, the benefits of conserving stocks and improving long-term yields through control of all citizens in the FCZ outweigh these incremental costs.

This plan replaces the current Preliminary Management Plan (PMP) for the foreign trawl fishery of the California-Washington region and state management in the 3-200 mile zone. The trawl PMP was developed by the

National Marine Fisheries Service (NMFS) and implemented by the Secretary of Commerce (Secretary) in early 1977 and will be modified annually until this plan is implemented by the Secretary. Although it is not intended to regulate fishing for groundfish in the territorial sea off Washington, Oregon, and California, unless otherwise stated, this FMP includes groundfish taken in that area as well as the FCZ for purposes of computing MSY, ABC, OY, incidental catch limitations, trip limits, daily catch limits, and any other specified amount of any species included in Table 1 pursuant to any management measure which is based on a particular amount of fish. To the extent that a state regulation quantifies an amount of fish which can or cannot be taken in ocean waters, unless otherwise stated, the quantification includes fish taken in both the territorial sea and the FCZ. It is expected that the states will implement consistent regulations in the territorial sea for these species. It is intended that this FMP will be effective for two or more years without amendment, if information becoming available substantiates the decisions made herein. Major changes will be accomplished by plan amendments. An Environmental Impact Statement (Appendix C) is included with this plan.

2.1 Objectives of the FMP

This fishery management plan is designed to manage the groundfish fishery in accordance with the findings, purposes, and policies of the FCMA. Its major purpose is to provide a management regime which will attain the optimum yield from the entire fishery while assuring the conservation of the stocks involved. In so doing the FMP will specify optimum yields and management measures which are intended to achieve harvests approximating the optimum yield. At the outset it is noted that complexities of fisheries management make exact attainment of the optimum yield improbable in a given year. Therefore, the success or lack of success of management schemes should not be judged if variations from the OY occur in the short term.

The FCMA prescribes seven national standards with which conservation and management measures must be consistent. The objectives specified below are desired for the groundfish fishery within the framework of the purposes and policies of the FCMA and the national standards.

(A) Promote the availability of quality seafood to the consumer.

(B) Promote rational and optimal use, in the biological, social and economic senses, of the region's fishery resources as a whole;

(C) Provide a favorable climate for existing domestic commercial and recreational groundfish fisheries within the limitations of other objectives and guidelines. When change is necessary, institute the regulation which accomplishes the change while minimizing disruption of current domestic fishing practices, marketing procedures and environment.

(D) Provide for the orderly development of domestic groundfish fisheries, including new fisheries, consistent with (B) and (C) above, at the expense of foreign participation;

(E) Provide for foreign participation in the fishery consistent with (B), (C) and (D) above, to take that portion of the optimum yield not utilized by domestic fisheries.

(F) Prevent overfishing of stocks which can be managed as a unit, including rebuilding those stocks which are now depleted.

(G) Minimize gear conflicts among users.

(H) Recognizing the multispecies nature of the fishery, establish a concept of managing by species and by gear, or by groups of interrelated species.

(I) Attain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.

2.2 Operational Definitions of Terms

1. Determinants of catch levels.

   a. Maximum sustainable yield (MSY) is an average over a reasonable length of time of the largest catch which can be taken continuously from a stock. It should normally be presented with a range of values around its point estimate. Where sufficient scientific data as to the biological characteristics of the stock do not exist or the period of exploitation or investigation has not been long enough for adequate understanding of stock dynamics, the MSY will be estimated from the best information available. These estimates of MSY are based on current fishery practices. Changes in mesh size and/or the season/area distributions of fishing effort would change estimates of MSY for most species.

   b. Acceptable biological catch (ABC) is a seasonally determined catch that may differ from MSY for biological reasons. It may be lower or higher than MSY in some years, because of fluctuating recruitment. ABC may or may not be set at equilibrium yield (EY) which is the harvest that would maintain a stock at its current level, apart from the effects of environmental conditions. It may be set lower than MSY in order to rebuild depleted stocks.

   c. Optimum yield (OY) may be obtained by a plus or minus deviation from ABC for purposes of promoting economic, social, or ecological objectives as established by law and public participation processes. Ecological objectives, where they primarily relate to biological purposes and factors are included in the determination of ABC. Where objectives relate to resolving conflicts and accommodating competing uses and values, they are included as appropriate with economic and/or social objectives. OY may be set higher than ABC in order to produce higher yields from other more desirable species in a multi-

species fishery. It might be set lower than ABC in order to provide larger-sized individuals or a higher average catch per unit of effort.

2. Determination of domestic annual fishing capacity and expected harvest.

   a. Domestic annual fishing capacity (DAC) is the total potential physical capacity of the fleets, modified by logistic factors. The components of the concept are:

      (1) An inventory of total potential physical capacity, defined in terms of appropriate vessel and gear characteristics (e.g., size, horsepower, hold capacity, gear design, etc.).

      (2) Logistic factors determining total annual fishing capacity, (e.g., variations in vessel and gear performance, trip length between fishing locations and landing points, weather constraints, etc.)

   b. Expected domestic annual fisheries harvest (DAH) is the domestic annual fishing capacity modified by other factors which will determine estimates of what the fleets will harvest (e.g., how fishermen will respond to price changes in the subject species and other species, etc.).

      These concepts should be placed in a dynamic context of past trends and future projections. For example, physical fleet capacity should not simply be last season's inventory of vessels and hold measurements (although this is appropriate for present interim planning), but also next year's projected movement into and out of the fishery. Vessels under construction should be included and attrition should be estimated.

   c. Domestic annual processing capacity (DAP) is the amount that will be domestically processed based not only on physical capacity but on a demonstrated intent and the effects of domestic harvesting, markets and other fisheries. Factors used to establish domestic processing capacity include, but are not restricted to:

      (1) Past performance by U.S. fish processors (i.e., actual quantities processed of the species covered by the fishery management plan).

      (2) Geographical location of the processing facilities.

      (3) The existence of contracts to purchase the species covered by the fishery management plan from domestic fishermen.

      (4) Physical and biological characteristics of the species covered by the plan (e.g., seasonal fluctuations, the migratory habits of the species, and the handling and storage characteristics of the species).

d. Joint venture processing capacity (JVP) is that amount of DAH which will not be utilized by domestic processors (JVP = DAH - DAP).

3. Determination of total allowable level of foreign fishing (TALFF). The foreign allowable catch is determined by deducting the expected domestic annual harvest and the reserve from the optimum yield [TALFF=OY-(DAH + reserve)].

4. A recreational fisherman is one who uses authorized recreational fishing gear to capture fish for personal use only and does not sell or barter catch.

5. A commercial fisherman is one who possesses a commercial fishing license issued by one of the states.

6. Unless otherwise specified, "Regional Director" in this Plan means the Director or Acting Director, Northwest Region, National Marine Fisheries Service.

2.3 Fishery Management Unit

The management unit of this FMP consists of those species of fish listed in Table 1 and includes such fish whether they are taken in the FCZ or the territorial sea off the coasts of Washington, Oregon and California.

2.4 Fishing Year

Historically, there has been no set fishing season for the groundfish fisheries of the Washington-California region. The groundfish fishery normally declines during the winter months due to bad weather. It is recognized that some fisheries occur seasonally due to weather or availability of fish and that different gear types predominate specific fisheries during different periods of the year.

Catch records have always been reported by calendar year and a long data series exists. There are no compelling reasons to adjust the fishing year. It would be imprudent to disrupt or discontinue the current data series; therefore, the fishing year shall continue to be from January 1-December 31.

Table 1. Common and scientific names of fish comprising the groundfish management unit.

*SHARKS	
Leopard shark	*Triakis semifasciata*
Soupfin shark	*Galeorhinus zyopterus*
Spiny dogfish	*Squalus acanthias*
*SKATES	
Big skate	*Raja binoculata*
California skate	*R. inornata*
Longnose skate	*R. rhina*
*RATFISH	
Ratfish	*Hydrolagus colliei*
*MORIDS	
Finescale codling	*Antimora microlepis*
*GRENADIERS	
Pacific rattail	*Coryphaenoides acrolepis*
ROUNDFISH	
Lingcod	*Ophiodon elongatus*
Pacific cod	*Gadus macrocephalus*
Pacific whiting (hake)	*Merluccius productus*
Sablefish	*Anoplopoma fimbria*
*Jack mackerel	*Trachurus symmetricus*
ROCKFISH	
Pacific ocean perch (POP)	*Sebastes alutus*
Shortbelly rockfish	*S. jordani*
Widow rockfish	*S. entomelas*
OTHER ROCKFISH[1]	
Black rockfish	*Sebastes melanops*
Blue rockfish	*S. mystinus*
Bocaccio	*S. paucispinis*
Canary rockfish	*S. pinniger*
Chilipepper	*S. goodei*
Copper rockfish	*S. caurinus*
Cowcod	*S. levis*
Darkblotched rockfish	*S. crameri*
Greenspotted rockfish	*S. chlorostictus*
Longspine thornyhead	*Sebastolobus altivelis*

[1] By definition, the category "other rockfish" includes all rockfish except Pacific ocean perch, shortbelly and widow rockfish.

Table 1. (continued)

Olive rockfish	Sebastes serranoides
Redstripe rockfish	S. proriger
Rougheye rockfish	S. aleutianus
Sharpchin rockfish	S. zacentrus
Shortspine thornyhead	Sebastolobus alascanus
Silvergray rockfish	Sebastes brevispinis
Splitnose rockfish	S. diploproa
Stripetail rockfish	S. saxicola
Vermilion rockfish	S. miniatus
Yellowmouth rockfish	S. reedi
Yellowtail rockfish	S. flavidus
Yelloweye rockfish	S. ruberrimus
FLATFISH	
*Arrowtooth flounder (turbot)	Atheresthes stomias
Butter sole	Isopsetta isolepis
Dover sole	Microstomus pacificus
English sole	Parophrys vetulus
Flathead sole	Hippoglossoides elassodon
Pacific sanddab	Citharichthys sordidus
Petrale sole	Eopsetta jordani
Rex sole	Glyptocephalus zachirus
Sand sole	Psettichthys melanostictus
Starry flounder	Platichthys stellatus

* Fish included in "Other Fish," Section 6.14.

Chapter 3 - Description of Fishery

Page

3.1 Areas and Stocks Involved..... [illegible]
3.2 History of Exploitation..... 3-[illegible]
3.3 Interaction Between and Among User Groups..... 3-[illegible]
3.4 Present and Probable Future Condition of the Fishery..... 3-[illegible]

Summary

This chapter describes the areas and stocks that have historical [illegible] and are now subject to a fishery, historical and present methods of fishing, the relationship of the various fisheries to one another, and a discussion of the present and probable future condition of the fishery.

The chapter points out:

Areas and Stocks

- The continental shelf where most of the fishery occurs is relatively narrow (1 to 87 miles, 30,000 square miles).
- Productivity on the shelf and slope is high and there is a diversity of major importance for groundfish.
- The nature of the trawl fishery results in large bycatches of nontarget species, requiring a multispecies approach to management.
- General descriptions of the location of stocks are provided.

History of Exploitation

- Trawling was introduced to the west coast in 1876 using sailing vessels. Steam vessels were used starting in the 1880's. The use of otter trawl gear on a regular basis commenced in 1906. The diesel engine and other technical advances became available in the 1920's.
- As a result of technical advances, fishing grounds between California and Canada became available to U.S. trawlers.
- Foreign vessels began production fishing in the area in 1966. The Japanese primarily sought rockfish while the Soviet Union [illegible] Pacific whiting and rockfish in the 1960's and [illegible]. Other foreign fleets had relatively small harvests of groundfish.
- Domestic users are described. Breakdown by gear type and [illegible] is given in Table 2 (page 3-9). They are (1) set net (trammel net and gill net), (2) midwater trawl, (3) bottom trawl (shallow and deep), (4) pot, (5) hook-and-line (commercial and recreational), and (6) other recreational.

- Domestic effort by trawlers in 1977 was estimated to be 136,900 hours (compared with 1973-77 mean of 126,900 hours). Efforts by other commercial gear is significant but small by comparison to trawlers. The California pot fishery utilized 32,000 pot-days in 1976.

- A coastwide total of 280 domestic trawl vessel, many over 25 years old, landed fish in 1976.

- Domestic recreational effort (hook-and-line) for 1977 is estimated at 4,760,031 angler days, taking 3,156 mt of groundfish.

- The number of private and recreational vessels participating in the fishery is unknown.

- Foreign trawl vessels are large and modern. Foreign fleets often had processing capability either on board catcher vessels or through separate factory vessels.

- Since the passage of the FCMA, foreign trawl fishing has been regulated by Department of Commerce regulations that implement a preliminary management plan (PMP). Fishing by foreign vessels has been limited to harvests of Pacific whiting by Soviet and Polish vessels with incidental catch allowances of other species.

- "Joint ventures" operated in the Pacific whiting fishery in 1978 and 1979 and 1980. Under this arrangement, U.S. trawlers harvested Pacific whiting for delivery to foreign processing vessels.

Interaction

- Gear conflicts among the various domestic groundfish gears have not been significant to date; however, the potential exists, e.g., among trawl gear, pot gear and longline.

- Bottom trawlers can harvest crabs incidentally and have been required to discard them (except for California which permits retention of 500 lbs per trip).

- Sablefish pot sanctuaries were established where foreign trawling is prohibited.

Present and Probable Future Condition of the Fishery

- Analysis of U.S. trawl landings reflects steady growth in the fishery. For example, total U.S. trawl landings in 1926-40 averaged 9,070 mt, landings in 1960 were 32,975 mt, in 1970, landings were 29,131 mt, and in 1977, landings were 49,663 mt. Landings for all domestic groundfish gear have increased from 47,658 in 1973 to 62,910 mt in 1977 and to 75,748 mt in 1978 (see Table 8, page 3-26). In 1979 landings were 93,560 mt.

- Many new multipurpose vessels are being built with the capability of entering the Pacific Coast groundfish fishery. Numerous vessels which are presently participating in other fisheries could enter this fishery at some time, e.g., Pacific shrimp or Alaska king and tanner crab.

- Fixed gear fisheries for sablefish are growing rapidly.

- Interest in recreational catches of groundfish is expanding.

- The trend of catches of groundfish by foreign vessels is shown in Table 10 (page 3-26).

3.0 DESCRIPTION OF FISHERY

3.1 Areas and Stocks Involved

The continental shelf off Washington, Oregon, and California is rather narrow, varying in width from less than a mile off the Monterey Peninsula in California to as much as 37 miles over Heceta Bank off southern Oregon. The total shelf area (0-100 fathoms) is about 30,000 square miles. By comparison, the area of the central and eastern Bering Sea shelf is an order of magnitude larger extending approximately 200 miles from shore. While the relatively limited continental shelf and upper slope habitat off Washington-California provides a much smaller harvest (about 196,000 mt versus 1,071,000 mt total catch in 1977), productivity is high, and groundfish resources of the region sustain fisheries of major importance to the U.S.

While many gear types are used in the fishery, trawling takes the major portion of the groundfish catch. The basic character of the trawl fleet and the species composition of the landings are distinctive in each INPFC area (Figure 1). Furthermore, the close spatial relationship of certain species in any given area results in large bycatches of non-target species which results in a multispecies fishery. For example, vessels targeting on Pacific ocean perch in the Vancouver area also may catch petrale sole, Dover sole, and sablefish. Several species of rockfish may be caught in any one trawl haul, and the species complex changes from north to south. Pacific ocean perch, yellowtail, canary, and silvergray rockfishes are particularly important in rockfish catches in the Vancouver and Columbia areas, while bocaccio and chilipepper rockfishes are important components in the Monterey and Conception areas.

The multispecies fishery is further complicated by seasonal availability of fish, by weather, and by market conditions (prices and limits) -- factors which cause a trawler to fish on several species assemblages in a single fishing trip. A list of fishes discussed in this plan is presented in Table 1. These species occupy a variety of depths over the continental shelf and slope. Pacific whiting is a semi-pelagic form found over a wide range of depths. It spawns in deep water beyond the continental shelf in the southern portion of its range off southern California and northern Baja California, and undertakes feeding migrations on the shelf and upper slope during spring and summer as far north as southeastern Alaska. Adult sablefish usually inhabit deeper waters of the slope, while Pacific cod and lingcod are almost always found on the shelf. The rockfishes comprise both shallow and deep water forms, with the extremes represented by *Sebastolobus altivelis*, which is associated with the bottom to depths of 850 fathoms and *Sebastes melanops* which is generally found at depths of less than 20 fms. Jack mackerel are sporadically available from northern California to Washington and occur as incidental catches in the whiting fishery.

Most flatfish species occur primarily on the continental shelf, but Dover sole, rex sole, and petrale sole frequently inhabit the continental slope. Dover sole are fished to depths of 700 fms. Individuals of certain species of bottomfish such as sablefish and

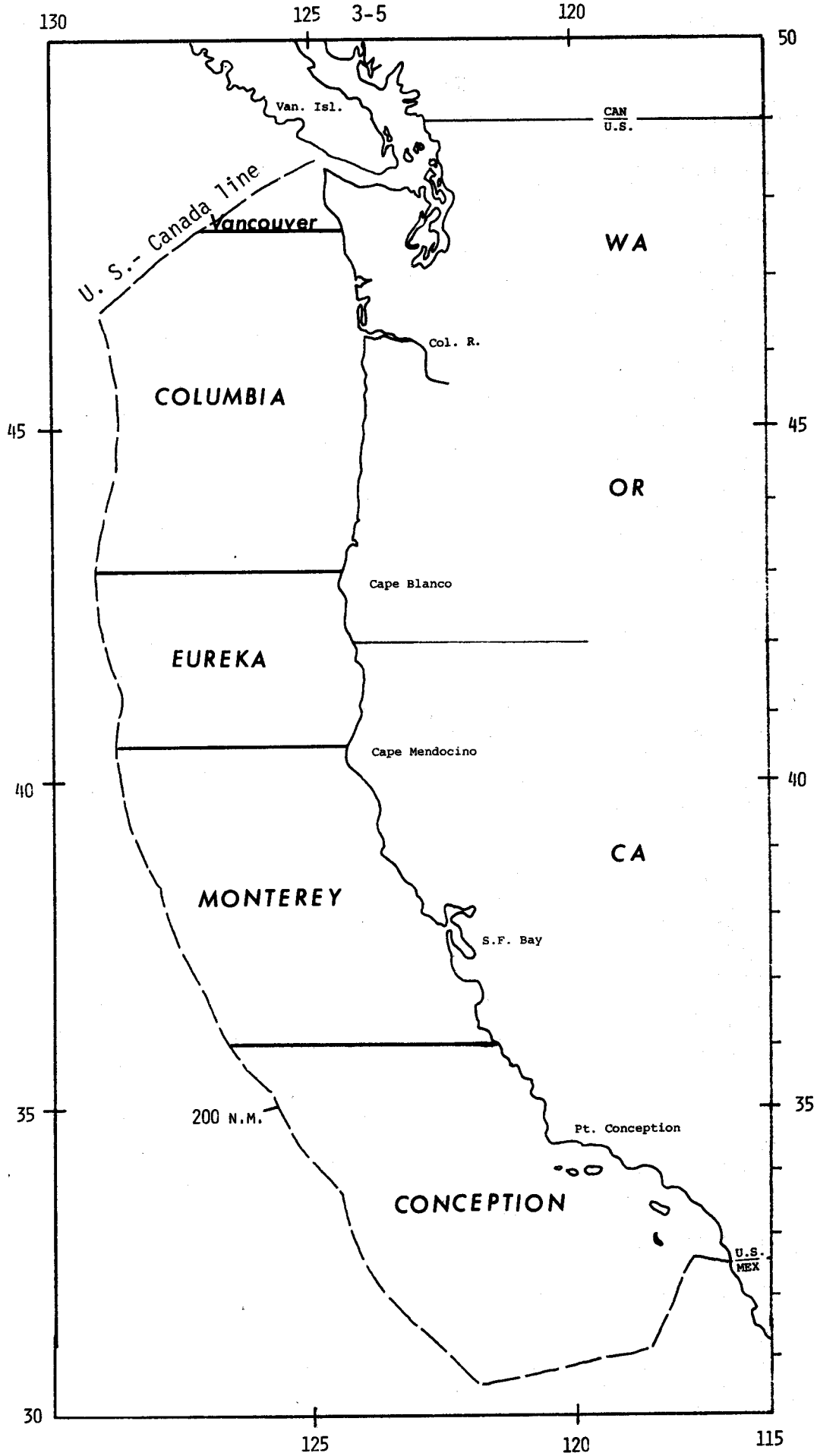

Figure 1. INPFC statistical areas in the U.S. Fishery Conservation Zone seaward of Washington, Oregon and California.

petrale sole undertake extensive coastal migrations. Sablefish tagged in Washington-Oregon waters have been recovered as far north as the Bering Sea and as far south as California; petrale sole tagged off British Columbia, Canada, were recovered off California. Most bottomfish species, however, demonstrate little coastwise movement. Some lingcod, for example, have been known to inhabit the same rocky reef throughout their lives. Tagging and morphometric studies have shown that even those species in which individuals undertake long migrations are generally relatively sedentary in behavior.

3.2 History of Exploitation

Trawling began on the Pacific Coast in 1876 (Scofield, 1948), when the paranzella net, or two-boat trawl, was introduced in San Francisco Bay and towed by lateen-rigged sailing vessels. The method successfully produced catches which were larger than those by other fishing gear of the era, and trawling within the Bay became prevalent.

During the 1880's, steam-powered vessels began replacing sailing vessels. By 1888, paranzella gear was fished exclusively by paired steam trawlers. In 1906, San Francisco Bay was closed to trawling because of decreasing fish stocks. By this time paranzella fishing had expanded to open ocean areas outside of San Francisco Bay. In 1884 a small schooner began fishing with a beam trawl (Harry and Morgan, 1963). This was the first type of trawl gear used off the Oregon-Washington coasts. The beam trawl was an effective fishing gear which could be towed by a single vessel. The otter trawl was introduced as early as 1908 but was not used on a regular basis until 1926, when two vessels began fishing the protected waters of Puget Sound. Diesel engines became available during the 1920's as did other technological advances which stimulated rapid growth and expansion of the trawl fishery. World War II created a high demand for food fish and for shark livers used in the production of vitamin A. The trawl fishery expanded to many productive offshore grounds off California, Oregon, and Washington, and by 1944 Washington trawlers were fishing as far north as Queen Charlotte Sound, Canada. In June 1978 large productive trawl grounds in British Columbia, Canada were closed to U.S. fishermen. This action forced many Washington fishermen to fish in U.S. waters (primarily off Washington). Evaluation of the impact on the fishery and stocks has not been completed, but certain stocks (for example Pacific ocean perch) have been affected. Competition among vessels for fishing grounds has increased significantly. (Note: Some grounds off British Columbia have been opened to a limited U.S. fishery for two years.)

Foreign fishing began off the coasts of Washington, Oregon, and California about 1962 when Japanese and Soviet exploratory vessels appeared as an extension of their newly developed trawl fisheries in the Gulf of Alaska. Shortly thereafter, Japanese trawlers were fishing regularly for rockfish, primarily Pacific ocean perch. The Pacific ocean perch resource off the Pacific Northwest is small relative to that originally found in more northern and westward areas; therefore, rarely did more than a dozen Japanese trawlers operate in the Washington-California area. Japanese perch catches peaked in 1968 at about 8,000 metric tons and subsequently declined precipitously to a few hundred metric tons.

A Soviet trawl fleet was attracted by the large unexploited Pacific whiting resource in 1966, which was the first major foreign fishery to occur off the west coast of the contiguous states. The 1966 catch was 136,000 mt of whiting and 24,000 mt of perch. Soviet perch catches also declined rapidly, and under the terms of a U.S.-Soviet bilateral fisheries agreement, the USSR agreed to discontinue targeting on perch or fishing in known perch areas. Soviet whiting catches peaked in 1970 when about 226,000 mt were taken. From 1967 to 1972, USSR whiting catches ranged from 103,700 to 226,000 mt. By agreement, the USSR limited its catch of Pacific whiting to approximately 150,000 mt during 1973-76. In the beginning the major portion of the catch was filleted for human consumption, and small and otherwise unsuitable whiting were reduced to meal. Recently, however, the average size of whiting has decreased markedly, forcing a reduction in the proportion filleted and an increase in the amount headed, eviscerated, and frozen.

From 1973 through 1976 fleets from the Republic of Korea, Poland, East Germany, West Germany, and Bulgaria operated in the California-Washington region but their impact on fishery resources was minor compared to Japan and USSR fishing activities prior to 1977.

Since 1977 Poland, USSR and Mexico applied for and received permits to fish within the U.S. Fisheries Conservation Zone off Washington, Oregon and California. Foreign allocations ranged from 123,200 to 161,400 mt of whiting and 4,000 mt to 3% of the whiting allocation of jack mackerel. Other species were taken only incidentally. Jack mackerel (since 1979) and other species are considered only incidental species.

Joint Ventures

Since implementation of the FCMA, there have been a number of U.S. fishing/processing companies forming business associations with foreign interests for the joint use of fishery resources within the U.S. Fishery Conservation Zone. Such arrangements are mutually beneficial in that U.S. fishermen are paid to deliver species for which there is little or no U.S. market, to foreign processing vessels. These catches are considered U.S. catches and are not counted against that foreign country's allocation.

A U.S. and USSR joint venture began a fishing venture for Pacific whiting in September 1978. Two U.S. trawlers delivered about 900 mt to two USSR trawler/processors during the six-week fishery. Jack mackerel comprised about 3.5 percent of that catch. Catch rates were low initially but one vessel averaged about 41 mt per day during the last 10 days of the fishery. Daily deliveries ranged from 9 to 73 mt. Catches were transferred from the fishing vessel to the processor vessel by means of detachable cod ends.

In 1979, the joint venture company intended to harvest 35,000 mt but actually took only 8,834 mt of Pacific whiting. As many as 7 U.S. trawlers worked during the 5-month season. These vessels were fully equipped for midwater trawling, ranging from 70-110 ft in length, and with main engines of 365 to 1,100 hp. Daily deliveries of 100-600 mt

were made to as many as 7 USSR processing vessels. Most whiting were headed, gutted and frozen; a small portion was filleted, and the remainder reduced to meal. Most of the production was exported to the Orient, eastern Europe, and the USSR.

Joint venture fishing has been regulated by the same basic regulations which guide the foreign whiting fishery. In 1980, however, the U.S./USSR joint-venture company requested two regulatory changes: that the joint venture begin on May 15 rather than June 1 and that some processing vessels be allowed to enter the 3-12 mile zone to accept codends from U.S. catcher vessels. Permission for the May 15 starting date was granted and processing vessels were allowed to within 6 miles of the coast. In 1979, five processing vessels were allowed to process within nine miles.

3.2.1 Domestic Fishery

3.2.1.1 Description of User Groups

Groundfish are harvested off the coasts of Washington, Oregon, and California within distinct gear units. These units are described by a particular capture method, by gear or depth and catch composition. Nine such units have been categorized as follows: set net (trammel net and gill net) midwater trawl; bottom trawl (shallow and deep); pot; hook-and-line (commercial and recreational); and other recreational. Species commonly captured by such gear types are shown in Table 2.

1. Set Net

   A. Trammel Net: Trammel net fishing takes place south of San Francisco, California in depths up to 80 fathoms. Vessels are fished mostly by two-person crews, and the target species generally is California halibut. However, rockfish, starry flounder, thresher shark, soupfin shark, dogfish, rays and skates are also caught. The dogfish, rays, and skates have traditionally had no or little market value, and are returned to the sea in a condition which generally precludes survival. The other species are relatively high priced because of the species and/or condition.

   B. Gill Net: A gill net fishery exists in southern and central California for rockfish. This fishery is approximately 15 years old, and has been reported to catch mainly bocaccio, chilipepper, yellowtail and olive rockfish, and to a lesser extent cowcod and vermilion rockfish. There are approximately 15 vessels which range in size from 22 to 40 feet in length. These vessels also fish sea bass during the sea bass season, and the gill net fishery is a fill-in (December-April) fishery for these fishermen. The ex-vessel prices (round weight) in 1978 were reported as follows: bocaccio, 35 to 38 cents; chilipepper, 35 cents; cowcod, 45 cents; and vermilion, 45 to 50 cents per pound. These are roughly double the values for trawl-caught rockfish.

2. Midwater Trawl: Midwater trawling by domestic fishermen, either by one vessel or two (pair trawling), is fairly uncommon off the West

Table 2. Fishing gear types utilized in groundfish harvest.

	GEAR TYPE								
							Hook & Line		1/
ROUNDFISH	Trammel	Gill Net	Trawl - Midwater	0-250 Fathoms Trawl	250-700 Fathoms Trawl	Pot	Commercial	Recreational	Other
Lingcod	x	x		x		x	x	x	x
Pacific Cod				x				x	
Pacific Whiting (Hake)			x	x				x	
Sablefish				x	x	x	x	x	
ROCKFISH									
Black Rockfish		x	x	x			x	x	x
Blue Rockfish	x	x					x	x	x
Bocaccio	x	x	x	x			x	x	x
Canary Rockfish		x	x	x			x	x	x
Chilipepper	x	x	x	x			x	x	x
Cowcod				x			x	x	x
Darkblotched Rockfish				x					
Olive Rockfish	x	x		x			x	x	
Pacific Ocean Perch (POP)			x	x			x		
Shortbelly Rockfish			x	x					
Shortspine Thornyhead					x				
Silvergray Rockfish				x				x	
Splitnose Rockfish				x					
Stripetail Rockfish				x					
Vermilion Rockfish	x	x		x			x	x	x
Widow Rockfish	x	x	x	x			x	x	
Yellowtail Rockfish	x	x	x	x			x	x	
FLATFISH									
Arrowtooth Flounder (Turbot)				x	x				
Dover Sole				x	x				
English Sole				x					
Pacific Sanddab		x		x			x	x	
Petrale Sole				x				x	
Rex Sole				x				x	
Starry Flounder	x			x			x	x	x

1/ Sport only

Coast. In 1964-67 and again in 1977-78 midwater trawling was successfully conducted for whiting. If a vessel has sufficient pulling power, and electronic equipment, an initial amount of 20 to 30 thousand dollars would be needed to convert a bottom trawler to a midwater trawler. This amount could be substantially greater given a particular vessel's size and requirements. Target species for this gear would be Pacific whiting and rockfish, especially widow and shortbelly rockfish.

3. Bottom Trawl: The California and Oregon bottom trawl fisheries can generally be categorized into shallow and deep water components. The Washington trawl fishery is distinct and cannot be separated into shallow and deep water components, although for purposes of Table 2, can be included under the 0-250 fathom trawl column.

   A. Shallow Bottom Trawl (0-250 Fathoms): The shallow bottom trawl fleet of California and Oregon fishes at depths from 0-250 fathoms, and the vessels are generally smaller and take shorter trips, generally one or two days, than the vessels which fish deeper than 250 fathoms. Some of these vessels do not fish in deep water because the winches are too slow or do not hold sufficient wire. However, other vessels with the required winches may fish shallow because of market, weather, or social considerations.

      The fish landed by these vessels are generally lingcod, Pacific cod, Pacific whiting, sablefish, rockfish (*Sebastes*) and Dover, English, petrale and rex sole, sanddabs, starry flounder and other flatfish, dogfish, skates and rays. Market conditions for some currently acceptable species (i.e., lingcod) limited their harvest in the past... Current markets for whiting, dogfish, skates, and rays do not utilize the entire harvest of these animals (see Section 1, Trammel Nets).

   B. Washington Bottom Trawl: The Washington trawl fleet fishes at depths from 0-400 fathoms. Vessels are generally larger and have a greater average capacity than those of California and Oregon (Tables 3-5). Trip duration is usually dependent upon the distance of the fishing grounds from home port. Vessels landing in Seattle and northern Washington generally make trips of 6-10 days, while boats from the southern Washington coastal ports usually make 1-3 day trips. Fish landed are comparable to those listed in A (above). Vessels often have "target" tows on several species groups in a single trip depending on availability and market conditions.

   C. Deep Bottom Trawl (250-700 Fathoms): Vessels require fast winches to raise the gear from 700 fathoms. Older winches take three to three and one-half hours to raise the gear while it can be done in 20 to 30 minutes with new hydraulic winches. Trip duration for these fisheries is generally two to five days. In depths of 400 fathoms or more, catches consist of grenadiers, sablefish, thornyheads (*Sebastolobus* spp.) and Dover sole. This is a directed Dover sole fishery with other species being caught incidentally. At present, the market does not utilize all the grenadiers which are caught.

4. Pot (Trap): The pot fishery harvests sablefish. The pricing structure for sablefish is related to size, condition, and quality. The sizes for fish in the round are large (over 7 lbs), medium (5-7 lbs) and small (less than 5 lbs). The sizes for dressed fish are large (over 5 lbs) and medium (3-5 lbs). Dressed fish in 1978 were worth 56 percent more per pound for large, and 43 percent more for medium, than round fish. However the loss of weight attributed to dressing may make these prices very similar. Also, pot-caught large and medium sablefish are often considered high quality and bring 5¢ a pound more than trawl-caught fish. Small pot-caught sablefish in southern California, however, bring less than small trawl-caught sablefish elsewhere. This fishery needs to be investigated to determine maximum economic return per recruit, recovery rates for dressed and filleted fish, and cost of fishing.

5. Hook-and-Line:

A. Commercial: Hook-and-line is the only gear unit which has both commercial and recreational aspects. Commercial hook-and-line fishing is carried out using conventional longlines, "Portugese" longlines, trolling gear, and fishing poles with 10 or more hooks employing downriggers in some cases, and jigs.

Commercial hook-and-line caught fish are mostly sablefish, rockfish and lingcod. These fish tend to bring a better ex-vessel price in California south of Fort Bragg (i.e., 1978 - 50¢ per pound compared to 18.5¢ per pound for trawl) than those caught by other gears. This is primarily due to their freshness, lack of damage, and distinct markets that want dressed rather than filleted fish.

B. Recreational: Groundfish provide vast recreational opportunities to citizens of Pacific Coast states. Recreational groundfish fisheries are highly developed in southern and central California and in localized areas in northern California, Oregon, and Washington. Groundfish are caught from commercial passenger fishing vessels (CPFV), from private or rental vessels, from piers and jetties, and from shore.

Lingcod and rockfish are the primary species/species group caught by the recreational fishery. The catch of lingcod and rockfish expressed as a percent of the total recreational 1973-77 mean catch was:

	Catch as a % of total recreational catch		
Area	Lingcod	Rockfish	Others
Conception	6.1	90.5	3.4
Monterey	19.4	78.5	2.1
Eureka	21.5	76.8	1.7
Columbia	29.9	41.3	28.8
Vancouver	45.2	40.5	14.3
Total	12.6	82.9	4.5

Thus from south to north the catch of lingcod increases and rockfish decreases.

In INPFC areas Eureka, Columbia and Vancouver the marine recreational fishery for groundfish is subordinate to the recreational ocean salmon fishery. This is not expected to change in the near future but as catch statistics show in Table 8 the recreational fishery is growing, particularly in the Eureka-Vancouver area.

In 1977, nearly half of the 29,702 reported boat days by California CPFV were spent fishing rockfish. South of Point Conception, 8,592 of 19,095 trips (45%) were rockfish trips (Robson Collins and Don Schultze, pers. comm.). In northern California, 4,761 of 10,607 trips (44%) were rockfish trips. In 1977, over 322,000 angler trips were for groundfish aboard California CPFV's (Paul Gregory, pers. comm.).

Oregon's recreational groundfish fishery operated from nine different ports; however 80% of the catch occurred at Garibaldi, Yaquina Bay, Coos Bay, and Brookings. In 1977, Oregon CPFV made 16,681 trips but the numbers of groundfish targetted trips could not be determined.

Washington CPFV that fish primarily for groundfish operate from Westport and Ilwaco. The salmon CPFV fleet also fishes at various times for groundfish or catch groundfish incidental to salmon fishing. Nearly 2,000 groundfish trips occurred in 1977 and 4,410 trips were made in 1978 for groundfish.

Non-commercial groundfish landings and effort for 1977 are given in Table 3.

Table 3. Non-commercial[1] landings of groundfish in California[2], Oregon[3], and Washington[4] in 1977.

STATE	NO. MARINE METRIC TONS OF FISH	NO. ANGLER ANGLERS	DAYS
California		2,762 mt	1,500,000 4,436,000
Oregon	214 mt	322,177[5]	322,177[5]
Washington		180 mt	N.A. 1,854[6]
Total	3,156 mt	1,822,177	4,760,031

[1] Includes any information on both private anglers, scuba divers and Commercial Passenger Fishing Vessels.
[2] Supplied by California Department of Fish and Game.
[3] Supplied by Oregon Department of Fish and Wildlife.
[4] Supplied by Washington Department of Fisheries.
[5] Includes salmon anglers who landed groundfish.
[6] Includes only directed groundfish angling.

Groundfish are caught in significant numbers by fishermen using private or rental vessels. In a typical year California skiff fishermen catch nearly 500,000 groundfish (415 mt), most of which are rockfish (Wine 1978, Miller and Gotshall, 1965). Rockfish and lingcod are the major species caught by Oregon and Washington skiff fishermen.

Catches by pier, jetty, and shore fishermen are minor compared to catches from vessels but substantial effort is expended along the coast. Over 1.3 million angler days are expended annually off California by shore fishermen (Pinkas et al, 1968, Miller and Gotshall, 1965). Information on effort and catch by Oregon and Washington shore fishermen is unavailable.

Based on mean 1973-77 catch records, the recreational fishery coastwide accounted for 6.5% of the total groundfish catch or about 3,578 mt out of a total mean catch of 54,926 mt. Catch distribution by area was:

Area	Recreational catch of total catch	Total mean catch all gear
	%	mt
Conception	33.2	6,156
Monterey	6.4	19,420
Eureka	0.5	12,112
Columbia	1.9	11,700
Vancouver	0.3	5,538
Total	6.5	54,926

Thus the recreational fishery over the 1973-77 period accounted for less than one percent in the Eureka and Vancouver areas to as much as 33 percent in the Conception area.

6. Other Recreational: Other methods consist of scuba diving and shore spearing. These fisheries are minor and have little impact on the resource.

3.2.1.2 General Description of Fishing Effort

Trawling is the major method of commercial harvesting of groundfish species. Trawl effort amounted to 136,900 hours in 1977 compared to a mean (1973-77) of 126,900 hours. Effort expended by other commercial gears is dominated by the California pot fishery (32,000 pot-days were expended in 1976). Fishing effort by set lines, hand lines and ocean gillnets is substantial in California, but small when compared to trawl effort.

In 1976 off Washington, Oregon, and California, an estimated 4,760,031 angler days were expended in hook-and-line fishing by CPFVs and private anglers.

3.2.1.3 Description of Commercial Vessels and Gear Employed

The domestic trawl fisheries in this region are conducted by vessels 12-33 meters in length under 200 gross tons. Little processing of the catch is done at sea, and fish are iced for delivery to processing facilities. Most trips are of 1-10 days duration. Many vessels are over 25 years of age and were designed as combination vessels which can and do fish a variety of gear. In 1976 there were 280 trawl vessels that landed groundfish. Characteristics of trawl vessels are shown in Tables 4-6.

Table 4. California trawl vessel characteristics.

Number of Vessels	126
Average Gross Tonnage	53
Average Net Tonnage	32
Average Length	16.6m (55 ft)
Average Breadth	6m (17 ft)
Average H.P.	230
Range in L.O.A.	
<5m (15 ft)	0
5-9m (15-30 ft)	2
9-14m (31-45 ft)	26
14-18m (46-60 ft)	64
>18m (>60 ft)	34
Average Age	28 years
Average Capacity	15.9 mt (35,000 lbs)
Range in Capacity	3.0 - 74.4 mt (6,500-164,124 lbs)

Table 5. Oregon trawl vessel characteristics.

Number of vessels	79[1]
Average Gross Tonnage	42*
Average H.P.	228*
Average L.O.A.	18.6 (61 ft)
Range in L.O.A.[2]	
<5m (15 ft)	0
5-9m (15-30 ft)	0
9-14m (31-45 ft)	4
14-18m (46-60 ft)	39
>18m (>60 ft)	30
Average Capacity	15 mt (33,065 lbs)
Range in Capacity	<1-51 mt (275 lbs - 113,123 lbs)

*Averages based on 70 of 74 vessels for which data were available.
[1] 1977. Includes 29 vessels that also participated in the shrimp fishery.
[2] Includes most vessels that landed groundfish. Does not include shrimp vessels that landed incidental groundfish.

Table 6. Washington trawl vessel characteristics

Number of Vessels	75
Average Gross Tonnage	59
*Average H.P.	332
*Average L.O.A.	22m (72 ft)
*Range in L.O.A.	
<5m (15 ft)	0
5-9m (15-30 ft)	0
9-14m (31-45 ft)	0
14-18m (46-60 ft)	7
>18m (>60 ft)	27
Average Capacity	36 mt (80,000 lbs)
Range in Capacity	5-142 mt (12,000-320,000 lbs)

*Average and ranges computed using 34 vessels.

Off California, commercial line and net vessels are 7.6 and 18.3m (25 to 60 ft) in length and are operated by 1 to 3 fishermen. Open skiffs, Monterey double-enders, schooners, combination vessels, and vessels of other designs comprise the fleet. Handlines, rod and reels, longlines, gill nets and trammel nets are used. Private vessels vary from skiffs to large powered yachts.

The CPFV fleet includes vessels of 5 m to 32 m (15 to 105 ft) in length that carry 1 to 100 fishermen. Most vessels in the California fleet are 11 to 17 m (35 to 55 ft) in length and carry 20 to 50 anglers; the largest CPFV carries 100 anglers. Actual passengers carried range from 35 to 68% of vessel capacities (Young 1969). Most CPFV's participate in other fisheries, for salmon, tuna, and surface fish. Some fish rockfish during part of the year, while others fish only for rockfish. A few vessels are capable of multiday trips. Some vessels are equipped with specialized rockfish and lingcod gear (e.g., downriggers) and heavy pole and line combinations are employed. Oregon and Washington CPFV range in length from 5 to 20 m with passenger capacities of 3 to 30 fishermen.

3.2.2 Foreign Fishery

Foreign distant-water fleets are composed of modern and self-sustaining vessels. These fleets typically include a variety of support vessels such as refrigerated transports, oil tankers, patrol vessels, and research vessels. Fleet activities may be highly organized with vessels deployed in such a way as to optimize fishing and scouting operations.

Most vessels fishing in the Washington-California region are factory stern trawlers which process their own catches and provide a variety of fishery products. Such vessels have the ability to remain on the grounds for weeks, seldom ceasing fishing due to weather conditions. Since enactment of the FCMA only Soviet and Polish vessels have fished off the Washington-California region.

3.2.2.1 USSR

Declining production in the traditional fishing areas of the eastern Bering Sea led the Soviet Union to seek other grounds to the south and east off the coast of the United States and Canada. Rockfish and the virtually untapped Pacific whiting resource off the British Columbia-California coast attracted Soviet exploratory vessels in the early 1960's, and later a large production fleet in 1966 (Hitz, 1970). In 1966, the fleet was comprised mainly of side trawlers referred to as "medium fishing trawlers" (SRT's), but, in addition, there were other side trawlers designated as "fishing trawlers" (RT's), "medium fishing trawlers with freezers" (SRTM's), and "medium fishing trawlers with refrigeration" (SRTR's). Stern trawlers in the fleet included "large freezer fishing trawlers" (BMRT's) and "fishing trawlers with freezers" (RTM's). Gradually the side trawlers were replaced almost entirely by factory stern trawlers. The BMRT has been the most common factory trawler; it is 3,170 gross tons and has a crew of 22-26. The RTM is of the same general size as the BMRT but has the advantage of a larger deck area aft for handling fish and gear.

Stern trawlers use nets with a variety of configurations which undergo frequent modification. Bottom trawls with headrope lengths to 35 meters were utilized until 1973 when the USSR agreed to discontinue bottom trawling to reduce the impact on depleted Pacific ocean perch stocks. Midwater trawls are large (headrope lengths to 97 meters) nets aimed with the aid of sophisticated electronic equipment. This equipment relays information to the vessel's bridge regarding the position of the trawl relative to the seabed, sea surface, and fish concentrations.

Soviet distant-water fishing operations have been conducted under the expeditionary concept which was designed to combine and coordinate fishing and fleet support activities. Prior to the implementation of the FCMA, as many as 100 vessels were engaged in fishing or support activities at the peak of the whiting fishing season. Thirty to thirty-five BMRT's have been observed fishing in the same area on large concentrations of fish. Vessels supporting the trawl fleet have included refrigerated transports, tugs and patrol boats. An expeditionary commander has usually been responsible for coordinating the fleet activities.

Since the enactment of the FCMA, the maximum number of Soviet vessels engaged in the whiting fishery in the Washington-California region was 39 vessels in 1977, 29 in 1978, and 32 in 1979.

3.2.2.2 Poland

Poland is a rather recent participant in the whiting fishery, appearing first in 1973 with an exploratory probe, then with a fleet of eight vessels in 1974, 13 vessels in 1975, and 6 vessels in 1976. Three fishing companies send vessels to the northeastern Pacific Ocean, and it appears that most vessels operate independently, although organized fishing by 6 to 8 vessels has been observed. Trawlers are serviced by cargo vessels which resupply the fleet and accept frozen processed products for delivery to Mexican and European ports.

Most Polish fishing vessels are the relatively new (post-1970) "B-418" factory stern trawlers, built in Poland. They are 89 meters in length, 2,475 gross tons, and carry a crew of 80-98. They are equipped with mechanized filleting lines, are fully refrigerated, and have meal and oil plants. All fishing in the Washington-California area is midwater trawling. Nets are as long as 176m, with a vertical mouth opening of 24m and a horizontal opening of 75m. Fish are located hydroacoustically, and the trawls are aimed with the aid of the latest electronic equipment.

Most of the catch is filleted. Small whiting are headed, eviscerated, and frozen in trays. Heads, viscera, and whiting not suitable as fresh-frozen products are reduced to meal and oil on board. The Polish whiting catch in 1977 was 17,000 mt.

3.2.2.3 Other Nations

No Japanese trawl vessels presently fish in the California-Washington region, however Japan licenses vessels to fish in waters north of 10°N and east of 170°E (including the Bering Sea, Aleutian Islands, and south and east off the Pacific coast of the United States and Canada). These vessels operate independently, either offloading their catches to refrigerator transports or delivering processed catches to Japan themselves. Typical factory trawlers now fishing in the North Pacific trawl fishery are 3,000 to more than 5,000 gross registered tons with crews of 130 or more. They are equipped with sophisticated electronic navigational and fish-finding devices and are capable of trawling in midwater and on rough seabeds.

The German Democratic Republic (GDR) first sent a trawler to the northeastern Pacific Ocean in 1973. In subsequent years, as many as two GDR stern trawlers were sighted off the West Coast. These vessels were 82 and 86m in length, 2,917 and 2,961 gross registered tons, and carried crews of 84. Such vessels were equipped with mechanized filleting lines and meal plants. The catch was almost entirely whiting, most of which was filleted. Small whiting were headed, eviscerated, and frozen. GDR vessels appeared to come and go throughout the season, spending part of the time off Mexico. Their 1974 whiting catch was probably about 5,000 mt. The GDR did not receive a permit to fish in the FCZ after the FCMA was passed.

In 1973, the Republic of Korea started a longline/trap fishery for sablefish off the Washington-California coasts. Like Japanese longliners, the vessels were generally 30-60m in length and 400-500 gross tons. The fishery was carried out by about four vessels between 1973-75, but in 1976 expanded to 23 vessels. This fishery was eliminated when the FCMA came into effect in March 1977 since the stock appeared to be fully exploited by U.S. fishermen.

Two Federal Republic of Germany factory stern trawlers appeared occasionally during 1975 and seemed to be targeting on whiting. Little is known about the vessels or their catch. In 1976, three Bulgarian stern trawlers were observed fishing for whiting off northern California and central Oregon. These were also factory stern trawlers, but little

else is known about the vessels, their operation, or their catches. Neither Germany nor Bulgaria received allocations for 1977 pursuant to the FCMA.

3.3 Interaction Between and Among User Groups

In the latter stages of development of the Groundfish FMP, concern was expressed that conflicts between different types of gear on the fishing grounds were occurring. These conflicts have not been officially documented, and their exact nature and frequency of occurrence is unknown. What is known at this time is that conflicts have occurred between foreign trawl and domestic fixed gear, and between domestic recreational gear and domestic gill nets largely confined to southern California.

3.3.1 Domestic

The inshore segment of trawl fisheries off the Washington-California region at times competes spatially for the same grounds with the Dungeness crab fishery when the crab season is open. Two sources of controversy between crab fishermen and trawl fishermen are gear conflicts and mortality resulting from the incidental catch of crabs by trawlers. Gear conflicts between crabbers and trawlers have been largely avoided because the two groups have historically respected fishing customs or "gentlemen's agreements." At the present time, trawlers generally respect the presence of crab pots in certain areas out to depths of 50 or 60 fathoms for the first two or three months following the opening of the crab season (usually December 1).

Crab fishermen view widespread adherence to these agreements as necessary to protect themselves not only from the direct gear loss (cost of replacement and fishing opportunity subsequent to gear loss), but also because lost pots may continue for several years to entrap harvestable crabs. A high percentage of sublegal males and smaller female crabs probably exit through the escape ports. Trawlers attempt to avoid crab gear to prevent lost fishing time and damage to nets.

One major reason for the closure of the Washington coastal crab fishery during the fall is a concern for the handling mortality which would result. Widespread molting of mature male crabs usually occurs during the late summer or early fall and studies indicate that a significant loss to the resource would occur if a crab fishery were to be permitted during this period. Although at times an emotional issue between trawlers and crabbers, it is not possible to show that trawling has or has not had adverse effects on the crab resource. The impact of trawling and discarding crabs has yet to be evaluated. Crab abundance is highly cyclic, with peak years occurring about every 7-10 years. A steady increase in trawl catch and effort has occurred coastwide since 1969 and there has been a dramatic increase in effort in the Columbia-Vancouver area since 1977. Although much of this increase is not of a nature to affect crab populations, there has been increased effort in inshore areas during the summer and fall. This inshore fishery, which is primarily directed at dogfish and flatfish, employs gear to which crabs are vulnerable although trawlers normally prefer to avoid large

concentrations of crabs. California allows 500 lbs. of crab to be landed per trip and prohibits trawling within three miles.

The shrimp fishery impacts groundfish stocks. California permits a 500 pound landing of rockfish per trip in the shrimp fishery; Washington has no catch limits; Oregon imposes catch limits of 250 Dover, English and petrale sole (in the aggregate) under 11 inches when caught with mesh size less than 4.5-inches. In the Columbia-Vancouver (U.S.) area the minimum estimated incidental catch was 216 mt in 1971 and was nearly 6% of shrimp catch. The highest incidental catch occurred in 1979 when 1,891 mt was landed or about 11% of the shrimp catch. Over the 1970-79 period the incidental catch was 767 mt or about 5% of the shrimp catch. This value may underestimate the actual incidental catch because not all vessels land the incidental catch or only some species may be landed. Species composition of the incidental catch is partially known, in that when sold, major species/species groups are separated. Rockfish (all species) accounted for 72% of the incidental landings during 1971-75. Lingcod and flatfish each accounted for 12%.

The impact of the domestic trawl fishery on marine recreational fisheries is impossible to assess at this time. There is some competition for some species of rockfish and lingcod. In previous years, studies of trawl and CPFV catch in central California revealed little interfishery conflict due to differences in target species (Heimann and Miller, 1960). However, the current CPFV fishery also targets on species commonly taken by the trawl fishery and competition exists. From northern California to Washington trawl-recreational competition is limited to those areas that are adjacent to ports with trawl fleets. Most trawl production on lingcod occurs offshore during summer months, and it is difficult to evaluate the influence of this trawling on inshore local stocks that are pursued by the recreational fishery.

There is competition for stocks of rockfish and lingcod in California and Oregon between recreational and commercial fishermen. Domestic conflicts between commercial mobile gears and fixed gears have not been significant prior to 1979. However, in 1979 a large influx of sablefish traps or pots and longlines has resulted in conflicts. Also in 1979 there have been conflicts between pot fishermen and foreign trawlers.

There is potential for gear conflict among fishermen using trawls, longlines and pots to harvest sablefish. In 1977 set gear fishermen off the Pacific Coast took about 57 percent of all sablefish landed and most of the remainder was landed by trawlers. Longline gear has been employed throughout the history of the fishery, but during the early 1970's pots became popular and have taken an ever increasing share of the catch.

The ex-vessel U.S. value of a single dressed five-pound (7.1 pound round) fish was $3.50 in 1978. It would take 19 pounds of small fish to equal this value at the current ex-vessel price structure north of southern California and 41 pounds of small fish in the southern California pot fishery. However, quantity of available product to the consumer may be different. If a 27 percent recovery rate for filleted

small sablefish is the case, then the 19 pounds of small fish produce 5.1 pounds of food, and 41 pounds produce 11 pounds of food. Five pounds of dressed fish produces less than 4 pounds of food. This raises a question regarding optimum size at capture so as to take advantage of the maximum economic return, food production or available biomass. The question can be considered by relating price of fish to growth and decay of population cohorts. The analysis of population growth and decay requires an estimate of natural mortality (M), the length-weight relationship, and the length-age relationship for the species. The data used to estimate these relationships taken from Oregon and California by Phillips (1954) and Pruter (1954) are as follows:

	FEMALE				
	Fork Length		Weight		Percent
Age	cm	in	kg	lbs	Spawning
1	35	14	0.35	0.8	0
2	44	17	0.80	1.8	0
3	51	20	1.30	2.9	0
4	57	22	1.82	4.0	10
5	62	24	2.38	5.2	25
6	66	26	2.95	6.5	50
7	70	28	3.54	7.8	65
8	73	29	4.15	9.1	75
9	76	30	4.77	10.5	95
10	79	31	5.40	11.9	100
11	82	32	6.05	13.3	100
12	85	33	6.71	14.8	100
13	87	34	7.38	16.3	100
14	89	35	8.05	17.7	100
15	92	36	8.75	19.3	100
20	102	40	12.29	27.1	100
30	118	46	19.37	42.7	100

	MALE				
	Fork Length		Weight		Percent
Age	cm	in	kg	lbs	Spawning
1	35	14	0.35	0.8	0
2	43	17	0.73	1.6	0
3	49	19	1.13	2.5	10
4	54	21	1.53	3.4	40
5	58	23	1.94	4.3	60
6	62	24	2.35	5.2	75
7	65	26	2.77	6.1	85
8	68	27	3.19	7.0	100
9	70	28	3.61	8.0	100
10	73	29	4.04	8.9	100
11	75	30	4.47	9.8	100
12	77	30	4.90	10.8	100
13	79	31	5.33	11.7	100
14	81	32	5.77	12.7	100
15	83	33	6.21	13.7	100
20	91	36	8.42	18.5	100

The data and assumptions that entered the "growth and decay of population cohort" analysis are as follows:

Beginning cohort numbers	10,000 individuals
Natural mortality, M	0.22
Ratio of males to females	1:1
Length-weight relationship for males (in gm and cm units)	$W = 0.0031L^{3.28}$
Length-weight relationship for females (in gm and cm units)	$W = 0.0044L^{3.21}$
VonBertalanffy growth curve for males (in cm units)	$L = 98.32\ [1-e^{-.1001(t+3.70)}]$
VonBertalanffy growth curve for females (in cm units)	$L = 128.90\ [1-e^{-.0664(t+4.44)}]$

The analysis shows that sablefish off Washington-California probably maximize their biomass at ages 5 to 6 (24 inches average size, 5 lbs average weight). Details of the results are as follows:

Age (years)	Length (inches)	Weight (pounds)	Percent Spawning	Percent of Maximum Biomass (M=0.22)
1	14.9	1.1	0	59
2	17.2	1.7	0	75
3	19.3	2.5	5	87
4	21.3	3.4	25	95
5	23.0	4.4	45	100
6	24.6	5.5	65	100
7	26.1	6.7	75	97
8	27.5	8.0	90	93
9	28.8	9.2	100	86
10	30.0	10.5	100	79

Some important implications of the analysis are that at high fishing mortalities sablefish can be harvested as early as age 4 when more than 95% of the biomass potential is reached or at age 7 after the maximum biomass is reached but before it declines below 97%. At age 7, fish are larger (26 inches) and weigh 6.7 lbs which corresponds to the average size of set gear-caught fish. The analysis, however, does not take into consideration the spawning potential of the population. If it is assumed that recruitment is strongly dependent on the spawning population, then exploiting sablefish at lower ages will result in a greater risk of reducing the spawning potential. At age 7, about 75% of the fish will be of spawning age, whereas this percentage is reduced to 25% at age 4. The trawl fishery tends to take smaller fish incidentally in the Dover fishery. It may be biologically and economically more advantageous to harvest sablefish by set gear instead of by trawls when fishing pressure is high.

As there are maxima in biological yields, maxima also occur for economic yields when entry into the fishery is delayed until age 6. Economic advantages of delayed entry are due to the larger proportion of medium and large sablefish in catches. Yields for various entry ages and fishing mortality levels were derived from Ricker yield modeling (Ricker, 1975) and prices for the landing categories of sablefish. The data used are as follows:

Ages 1-15	
Beginning weight of age 1	1,000 lb
Weight at age of sablefish	(Low 1977) page 7
Entry ages	4, 5, 6, 7, 8
Instantaneous fishing mortality,F	0.1, 0.2, 0.3, 0.5, 0.7,1.0
Prices	$0.125 small, 0.28 medium, 0.40 large
M = 0.22	

For F values of 0.1, 0.2 and 0.3 maximum economic yields occur at entry age 6; at higher F values for the entry ages considered, maximum economic yields occur at age 8 (Table 7, Figure 2). However, the relatively small, (3%) change in economic gain between 6 and 8 year olds at these higher Fs may make little actual difference between ages.

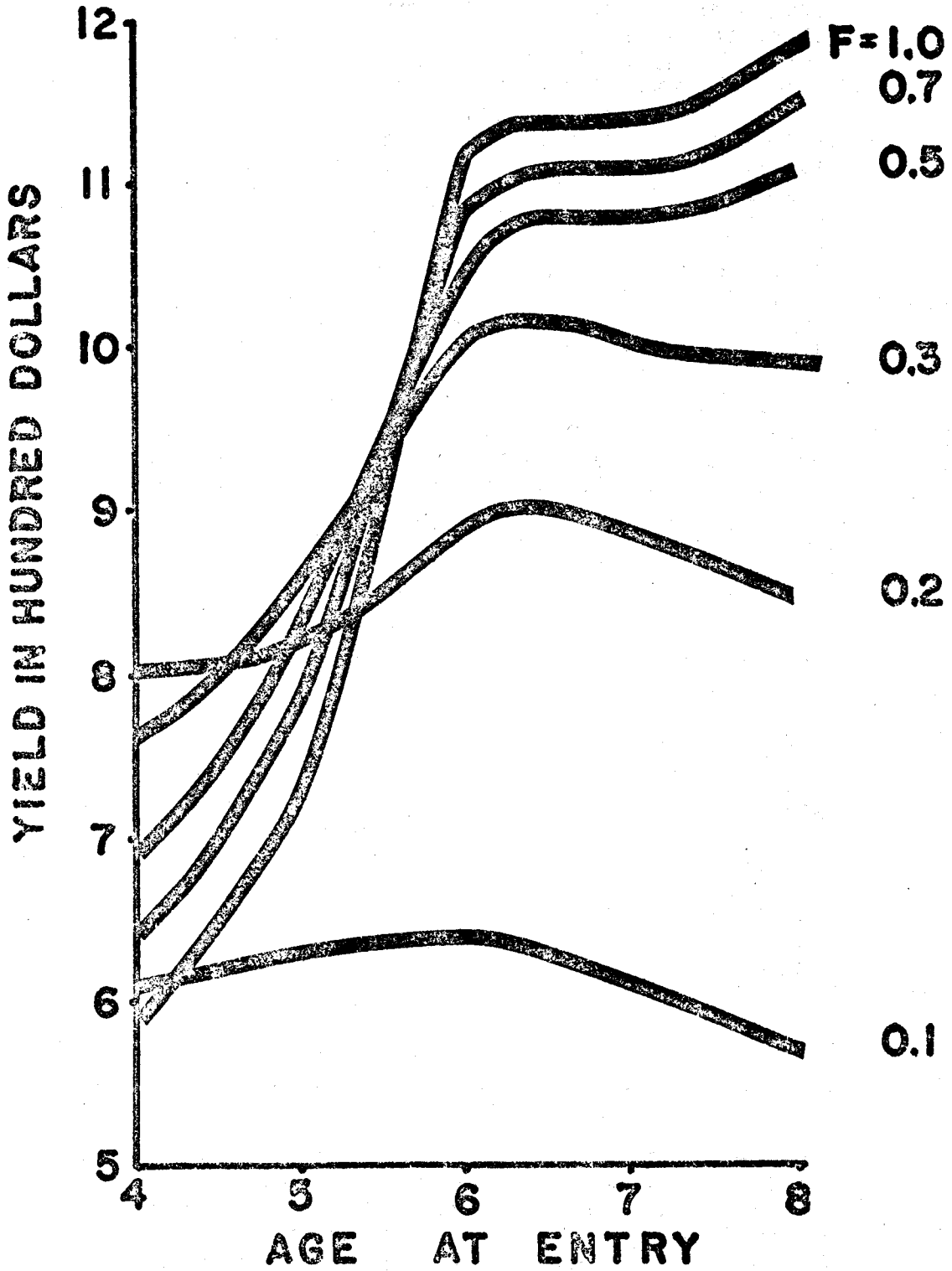

Figure 2. Yields in hundreds of dollars from 1,000 lbs of age 1 sablefish through age 15 at various fishing mortality levels and entry ages.

Table 7. Yields in dollars from 1,000 lb of age 1 sablefish (through age 15) at various fishing mortality levels and entry ages

Entry Age	F Values 0.1	0.2	0.3	0.5	0.7	1.0
4	613	805	766	696	643	596
5	631	823	863	834	791	733
6	644	900	1,007	1,059	1,094	1,126
7	614	885	1,006	1,082	1,110	1,142
8	572	854	996	1,112	1,152	1,180

3.3.2 Foreign

There have been a variety of impacts on U.S. fisheries due to the presence of the large foreign trawl fleet off Washington, Oregon, and California: preemption of fishing grounds; reduction in abundance of species of current or potential interest to the U.S. industry; and interference with or destruction of fixed gear deployed by U.S. sablefish fishermen.

The major impact on stocks of fish of past and current interest to U.S. fishermen has been confined mainly to Pacific ocean perch. U.S. perch catches from the area off Washington and Oregon averaged about 2,000 mt during 1956-60. Catches increased steadily after 1960 and reached a peak of 7,200 mt in 1965. USSR and Japanese vessels arrived in large numbers in 1966, and in two years (1966-67) caught some 60,000 mt of perch. U.S. perch catches immediately plummeted to 675 mt in 1969.

Under terms of the 1979 PMP, foreign whiting fleets are prohibited from targeting on Pacific ocean perch. Permitted incidental catches of Pacific ocean perch do not pose a serious threat to the rebuilding of perch stocks. However, targeting on perch stocks has the potential to seriously retard or prevent stock rebuilding.

Physical preemptions of fishing grounds have been regularly reported by U.S. trawlers and salmon trollers. This occurs when large numbers of large Soviet trawlers appear on grounds where concentrations of small domestic vessels had been operating. Rather than risk gear entanglement or collision, the smaller U.S. vessels often depart.

Gear conflicts have occurred between foreign trawls and U.S. sablefish traps and longlines. The problem became acute in the early 1970's when improving markets and new trap technology stimulated growth of the U.S. fishery. As fishermen began to adapt to a system whereby 10-15 traps were fished on a single groundline, their gear losses increased as foreign trawlers swept away entire strings of traps. An attempt was made to ease the problem by keeping captains of foreign vessels apprised

of fixed gear locations. This approach was only partially successful due to poor communications and navigation. It was not until sablefish trap sanctuaries were established through bilateral agreements that the situation improved. The recent reduction of on-bottom trawling by foreign vessels also seems to have eased the conflict.

3.4 Present and Probable Future Condition of the Fishery

3.4.1 Domestic

The total U.S. trawl landings averaged about 9,070 mt during the 1926-40 period, increased sharply during the war years to an average of 22,222 mt, and grew rather steadily to 67,391 mt by 1979. Species contributing most to the 1979 U.S. trawl landings were Dover sole (24 percent of the total landings), rockfish (38 percent), Pacific cod (4 percent), petrale sole (4 percent), English sole (6 percent), lingcod (4 percent), and sablefish (7 percent). U.S. trawl landings from the Washington-California region are shown in Tables 8 and 9.

The domestic groundfish fishery of the Pacific region will continue to develop in the next few years. The several factors discussed below all indicate an increase in effort and catch is inevitable.

1. New Vessels. Most Pacific Coast and Gulf of Mexico boat yards are operating at maximum capacity. Many new large multipurpose vessels with trawl and bottomfish set gear capability are being built. Although many of these vessels will enter other fisheries, an undetermined number will fish for groundfish in the Pacific region.

2. Termination of Fishing Rights in Canada. In past years Washington trawl vessels harvested up to 80 percent of their entire catch from Canadian waters, with a 1965-1974 ten-year average of 75 percent.

   As late as 1975 over 50 percent of Washington's trawl landings were from Canada. In 1979 twenty percent or less of Washington trawl vessel landings will be from Canada and the terms of the U.S.-Canada fishery agreement call for termination of U.S. trawl fishing in Canada by 1981.

   It is anticipated that most trawlers excluded from Canada will fish off Washington and Oregon. A temporary closure of Canadian waters in 1978 resulted in virtually the entire fleet shifting south to traditional grounds from northern Washington to central Oregon. The few vessels large enough to fish in Alaska have not done so because of limited markets and a preference for southern waters.

3. Entry from Other Fisheries. There is a possibility that large numbers of vessels could enter the groundfish fishery from other fisheries. For example, if the moratorium on effort is placed by Oregon on shrimp vessels or if the shrimp stocks decline significantly, shrimp trawlers could fish for groundfish effectively with minor modification. The direct effects of a shrimp fishery moratorium are impossible to evaluate until the exact details are known and until the status of other alternative fisheries are assessed.

Table 8. United States groundfish landings (metric tons) from the California-Washington region by INPFC areas, 1973-79.

1973

	Conception			Monterey			Eureka		
		Other			Other			Other	
Species	Trawl	Comm.	Rec.	Trawl	Comm.	Rec.	Trawl	Comm.	Rec.
Lingcod	289	67	130	711	110	250	488	50	14
Pacific Cod	0	0	0	0	0	0	0	0	0
Sablefish	6	13	1	1,768	599	0	1,461	89	0
Pacific Ocean Perch	0	0	0	2	0	0	59	2	0
Other Rockfish	1,349	1,029	2,412	5,151	1,098	858	1,560	156	32
Dover Sole	28	0	0	4,621	0	0	5,829	21	0
English Sole	147	0	0	689	0	0	775	3	0
Petrale Sole	193	0	0	710	0	0	454	4	0
Other Flatfish[1]	63	87	68	542	11	27	1,157	7	1
Total[2]	2,234	1,196	2,610	14,420	1,818	1,135	11,831	332	47
Trawl Effort (1000s hours)	11.7			31.5			38.2		

	Columbia			Vancouver			
		Other			Other		Total-All Gear
Species	Trawl	Comm.	Rec.	Trawl	Comm.	Rec.	All Areas
Lingcod	873	67	60	163	5	10	3,287
Pacific Cod	139	Tr.	--	416	--	--	555
Sablefish	348	367	--	19	--	--	4,671
Pacific Ocean Perch	95	10	--	252	--	--	420
Other Rockfish	1,664	468	73	401	Tr.	7	16,258
Dover Sole	1,743	52	--	323	--	--	12,617
English Sole	938	1	--	421	1	--	2,975
Petrale Sole	975	29	--	560	--	--	2,925
Other Flatfish[1]	1,013	15	--	105	--	--	3,096
Total[2]	8,081	1,031	200	2,670	33	20	47,658
Trawl Effort (1000s hours)	24.1			6.0			

[1] Excludes Pacific halibut.

[2] Includes fish for industrial use-animal food and misc. recreational species.

Table 8. (continued)

1976

	Conception			Monterey			Eureka		
		Other			Other			Other	
Species	Trawl	Comm.	Rec.	Trawl	Comm.	Rec.	Trawl	Comm.	Rec.
Lingcod	181	90	117	747	54	280	351	24	16
Pacific Cod	0	0	0	0	0	0	0	0	0
Sablefish	100	67	2	1,601	3,143	0	1,092	111	0
Pacific Ocean Perch	0	0	0	1	0	0	40	0	0
Other Rockfish	2,176	1,022	1,623	4,931	1,152	1,096	1,795	145	59
Dover Sole	84	0	0	5,022	0	0	5,474	1	0
English Sole	211	0	0	931	0	0	910	Tr.	0
Petrale Sole	212	0	0	765	0	0	389	Tr.	0
Other Flatfish[1]	52	177	70	1,048	26	24	1,143	1	1
Total[2]	3,083	1,356	1,812	15,216	4,375	1,400	11,384	281	76
Trawl Effort (1000s hours)	17.0			38.1			33.5		

	Columbia			Vancouver			Total-All Gears
		Other			Other		
Species	Trawl	Comm.	Rec.	Trawl	Comm.	Rec.	All Areas
Lingcod	658	24	61	374	39	6	3,022
Pacific Cod	484	8	--	1,671	2	--	2,165
Sablefish	403	182	--	138	189	--	7,028
Pacific Ocean Perch	709	35	--	550	1	--	1,336
Other Rockfish	3,881	525	105	1,401	134	6	20,051
Dover Sole	2,095	23	--	479	1	--	13,179
English Sole	1,717	2	--	717	--	--	4,488
Petrale Sole	927	5	--	518	--	--	2,816
Other Flatfish[1]	1,985	6	--	156	1	--	4,690
Total[2]	13,483	812	192	6,606	383	14	60,473
Trawl Effort (1000s hours)	34.9			14.6			

[1] Excludes Pacific halibut

[2] Includes fish for industrial use-animal food and misc. recreational species.

Table 8. (continued)

1977

	Conception			Monterey			Eureka		
		Other			Other			Other	
Species	Trawl	Comm.	Rec.	Trawl	Comm.	Rec.	Trawl	Comm.	Rec.
Lingcod	75	81	93	850	85	168	309	70	14
Pacific Cod	0	0	0	0	0	0	0	0	0
Sablefish	80	907	1	1,350	2,515	0	1,135	164	0
Pacific Ocean Perch	0	0	0	0	0	0	65	0	0
Other Rockfish	2,100	1,020	1,363	6,000	1,190	1,039	2,050	186	71
Dover Sole	75	0	0	4,000	0	0	6,402	0	0
English Sole	190	0	0	1,000	0	0	828	0	0
Petrale Sole	220	0	0	800	0	0	415	0	0
Other Flatfish[1]	105	135	59	1,140	25	23	1,151	2	1
Total[2]	2,861	2,143	1,516	15,310	3,815	1,230	12,689	422	86
Trawl Effort (1000s hours)	15.0			39.5			35.0		

	Columbia			Vancouver			
		Other			Other		Total-All Gear
Species	Trawl	Comm.	Rec.	Trawl	Comm.	Rec.	All Areas
Lingcod	679	99	67	539	127	8	3,264
Pacific Cod	497	33	--	1,496	3	--	2,029
Sablefish	340	552	--	345	139	--	7,528
Pacific Ocean Perch	471	8	--	817	--	--	1,361
Other Rockfish	4,452	1,076	110	3,312	153	7	24,129
Dover Sole	1,875	31	--	510	1	--	12,894
English Sole	1,030	3	--	276	--	--	3,327
Petrale Sole	916	9	--	298	--	--	2,658
Other Flatfish[1]	1,327	28	--	246	1	--	4,243
Total[2]	12,390	1,839	284	7,879	429	17	62,910
Trawl Effort (1000s hours)	29.4			18.0			

[1] Excludes Pacific halibut.

[2] Includes fish for industrial use-animal food and misc. recreational species.

Table 8. (continued)

1978[1]

Species	Conception Trawl	Conception Other Comm.	Conception Rec.	Monterey Trawl	Monterey Other Comm.	Monterey Rec.	Eureka Trawl	Eureka Other Comm.	Eureka Rec.
Lingcod	25	107	95	875	112	222	336	92	10
Pacific Cod	0	0	0	0	0	0	0	0	0
Sablefish	90	2,316	0	1,250	2,250	0	1,042	249	0
Pacific Ocean Perch	0	0	0	0	0	0	68	0	0
Other Rockfish	1,500	1,121	1,459	5,500	1,304	1,114	2,360	183	80
Dover Sole	50	0	0	4,500	0	0	6,300	0	0
English Sole	120	0	0	950	0	0	860	0	0
Petrale Sole	90	0	0	790	0	0	420	0	0
Other Flatfish[2]	95	150	60	1,128	25	25	1,157	2	1
Total[3]	1,990	3,694	1,614	15,133	3,691	1,361	12,864	526	91

Species	Columbia Trawl	Columbia Other Comm.	Columbia Rec.	Vancouver Trawl	Vancouver Other Comm.	Vancouver Rec.	Total-All Gear All Areas
Lingcod	680	78	64	278	175	19	3,168
Pacific Cod	816	32	1	2,164	14	Tr.	3,027
Sablefish	1,145	1,038	2	264	479	Tr.	10,125
Pacific Ocean Perch	1,149	11	0	829	0	0	2,057
Other Rockfish	8,671	1,331	229	3,154	313	50	28,369
Dover Sole	3,841	48	0	543	5	0	15,287
English Sole	1,053	5	0	635	1	0	3,624
Petrale Sole	1,189	10	0	189	2	Tr.	2,690
Other Flatfish[2]	2,092	30	51	-	4	0	4,820
Total[3]	21,264	2,584	417	8,775	1,029	75	75,108

[1] Preliminary data.

[2] Excludes Pacific halibut.

[3] Includes fish for industrial use-animal food and misc. recreational species.

Table 8 (continued)

1979[1]

Species	Conception Trawl	Conception Other Comm.	Conception Rec.	Monterey Trawl	Monterey Other Comm.	Monterey Rec.	Eureka Trawl	Eureka Other Comm.	Eureka Rec.
Lingcod	136	85	90	388	105	225	209	123	10
Pacific Cod	0	0	0	0	0	0	0	0	0
Sablefish	68	4,109	0	1,202	1,887	0	1,046	982	0
Pacific Ocean Perch	0	0	0	1	0	0	44	11	0
Other Rockfish	1,957	1,121	1,459	4,500	1,304	1,114	3,183	620	80
Dover Sole	95	0	0	4,000	0	0	5,764	1	0
English Sole	208	0	0	1,110	0	0	1,192	3	0
Petrale Sole	181	0	0	601	0	0	443	0	0
Other Flatfish[2]	110	150	60	1,150	30	25	1,258	3	1
Total[3]	2,905	5,465	1,609	13,102	3,326	1,364	13,884	1,744	91

Species	Columbia Trawl	Columbia Other Comm[4]	Columbia Rec[6]	Vancouver Trawl	Vancouver Other Comm.[7]	Vancouver Rec.	Total all Gear
Lingcod	901	80	85	907	-	-	3,344
Pacific Cod	497	21	0	2,184	-	-	2,702
Sablefish	1,458	5,364	0	676	-	-	16,792
Pacific Ocean Perch	912	110	0	593	-	-	1,671
Other Rockfish	12,304	1,128	382	3,889	-	-	33,041
Dover Sole	4,727	103	0	1,730	-	-	16,420
English Sole	925	7	0	490	-	-	3,935
Petrale Sole	1,053	8	0	439	-	-	2,725
Other Flatfish[2]	2,325	34	9	193	-	-	5,348
Total[3]	25,829	9,734[5]	493	11,671	2,343	N.A.	93,560

1 Preliminary data.
2 Excludes Pacific halibut.
3 Includes fish for industrial use-animal food and misc. recreational species.
4 Species composition for Oregon data only.
5 Includes State of Washington other gear catch of 2,879 mt for which species composition not available.
6 Oregon data only, Washington recreational catch not available.
7 Species composition not available.

Table 8 (continued)

1978[1] TOTAL LANDINGS - ALL AREAS, BY GEAR TYPE

Species	Trawl	Other Comm.	Rec.	Total
Lingcod	2,194	564	410	3,168
Pacific Cod	2,980	46	1	3,027
Sablefish	3,791	6,332	7	10,125
Pacific Ocean Perch	2,046	11	0	2,057
Other Rockfish	21,185	4,252	2,932	28,369
Dover Sole	15,234	53	0	15,287
English Sole	3,618	6	0	3,624
Petrale Sole	2,678	12	0	2,690
Other Flatfish	4,472	211	137	4,820
Total[2]	60,026	11,524	3,558	75,108

1979[1] TOTAL LANDINGS-ALL AREAS, BY GEAR TYPE

Species	Trawl	Other Comm.	Rec.	Total
Lingcod	2,541	393	410	3,344
Pacific Cod	2,681	21	0	2,702
Sablefish	4,450	12,342	0	16,792
Pacific Ocean Perch	1,550	121	0	1,671
Other Rockfish	25,833	4,173	3,035	33,041
Dover Sole	16,316	104	0	16,420
English Sole	3,925	10	0	3,935
Petrale Sole	2,717	8	0	2,725
Other Flatfish	5,036	217	95	5,348
Total[2]	67,391	22,612	3,557	93,560

[1] Preliminary

[2] Includes fish for industrial use-animal food and misc. recreational species.

Table 9. United States trawl landings (metric tons) for the California-Washington area, 1962-79.

SPECIES	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Lingcod	905	806	899	929	883	1,032	1,431	1,108	1,181	1,542	1,935	2,524	2,679	2,624	2,311	2,405	2,194	2,541
Pacific Cod	275	567	703	733	979	566	595	249	174	535	1,194	555	1,128	1,981	2,156	1,993	2,980	2,681
Sablefish	1,742	1,000	870	929	998	681	678	1,063	1,381	1,487	2,498	3,602	2,769	3,299	3,334	3,249	3,791	4,450
Other Rockfish	8,173	7,289	5,828	6,238	7,108	5,970	6,751	7,521	6,562	6,351	8,527	9,978	8,885	10,171	13,966	16,554	21,185	25,833
Pacific Ocean Perch	4,101	4,918	5,357	7,192	2,856	1,024	759	675	956	1,134	665	554	635	860	1,661	1,608	2,046	1,550
Dover Sole	6,370	7,474	6,901	6,650	6,460	4,965	6,149	8,643	9,743	9,381	13,061	12,543	11,544	12,781	13,303	12,836	15,234	16,316
English Sole	3,582	3,585	3,531	3,899	4,551	4,327	4,531	3,063	2,499	2,293	2,644	2,971	2,951	3,556	4,493	3,290	3,618	3,925
Petrale Sole	2,969	2,819	2,319	2,280	2,409	2,272	2,244	2,476	2,681	2,920	3,161	2,892	3,655	3,751	2,810	2,502	2,678	2,717
Other Flatfish	2,532	2,343	2,348	2,192	2,613	3,086	3,246	2,603	2,413	2,295	2,967	2,879	3,205	3,307	4,451	3,974	4,472	5,036
Other Foodfish	208	225	265	221	175	212	203	168	96	89	156	313	200	206	768	1,166	--	--
Industrial Use-Animal Food	3,882	3,141	3,642	4,003	4,292[3]	11,852[3]	2,549	2,363	1,445	2,618	523	421	352	269	58	86		
TOTAL	34,739	34,167	32,663	35,226	23,234	35,987	29,136	29,932	29,131	30,645	37,331	39,232	33,223	42,805	49,311	49,663	60,026[4]	67,391[4]

1/ Preliminary.
2/ Over estimated for years 1960-72; landings include species other than POP.
3/ Primarily Pacific whiting.
4/ Includes industrial use-animal food landings.

With modification, many of the vessels currently fishing king and tanner crab in Alaska, could fish for groundfish. If the crab fishery fails or is saturated with vessels, the groundfishery could be an attractive alternative.

The set gear fisheries for sablefish are also growing rapidly due to high ex-vessel prices and entry by smaller vessels which are leaving the troll salmon fishery.

4. Current Status of the Fishery. The groundfish fishery has grown rapidly. In 1979 landings from the Vancouver area increased 42 percent over 1978. In the Columbia area landings were up 49 percent from 24,265 mt in 1978 to 36,056 mt in 1979. The Eureka-Monterey and Conception areas (except sablefish in Conception) did not experience rapid growth since many California fisheries are already well developed and relatively stable.

   Although part of the increase was a result of effort from vessels displaced from Canada, new vessels and large replacement vessels also contributed to the increase. Catches by the existing trawl fleet can be expected to increase because of new technology, improved electronic navigation and fish finding equipment, and fishing on new and/or previously untrawlable areas.

5. Status of Stocks. Several stocks of fish currently utilized can withstand additional harvest. There are also several abundant groundfish species which are presently underexploited or are not harvested at all by domestic fishermen. It is anticipated that fisheries for these species (e.g., turbot, shortbelly rockfish, widow rockfish, whiting) will increase when harvesting, processing, and marketing technologies develop.

6. Recreational Fishing. Interest in recreational angling for groundfish is increasing and catches will likely increase more rapidly than in the recent past.

3.4.2 Foreign

Prior to 1966 there was not a major foreign fishery in the California-Washington region, although there were scouting expeditions as early as 1963. Total foreign removals, principally whiting, were greatest in 1967 when about 258,000 mt were caught. Production figures are shown in Table 10.

Table 10. Foreign groundfish catches (approximate) from the Washington-California area, 1967-79, U.S. trawl catches shown for comparison.

(1,000s m.t.)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
PACIFIC WHITING:													
USSR	195	68	109	201	147	111	139	157	155	154	100	70	97
Poland	0	0	0	0	0	0	2	44	42	24	18	27	18
Japan	0	0	0	1	1	Tr	4	8	3	3	0	0	0
Other	-	-	-	-	-	-	-	-	2	50	0	0	0
Total	195	68	109	202	148	111+	145	209+	202+	231	118	97	115
U.S.	8	Tr	Tr	Tr	Tr	Tr	Tr	Tr	Tr	Tr	Tr	1	9
SABLEFISH:													
USSR	1/	1/	1/	1	1	4	6	Tr	Tr	Tr	Tr	Tr	Tr
Poland	0	0	0	0	0	0	0	Tr	Tr	Tr	Tr	Tr	Tr
Japan	1	Tr	1	Tr	Tr	1	Tr	Tr	Tr	Tr	0	0	0
ROK	0	0	0	0	0	0	0	Tr	4	14	0	0	0
Other	-	-	-	-	-	-	-	-	Tr	Tr	-	0	0
Total	1	Tr	1	1+	1+	5	6+	Tr	4+	14+	Tr	Tr	Tr
U.S.	1	1	1	1	3	2	4	3	3	3	3	4	4
ROCKFISH: 2/													
USSR	38	16	3	3	2	2	6	3	2	2	Tr	Tr	Tr
Poland	0	0	0	0	0	0	Tr	Tr	5+	2+	Tr	Tr	Tr
Japan	6	4	Tr	Tr	Tr	2+	5	7+	1+	1+	0	0	0
Other	-	-	-	-	-	-	-	-	Tr	Tr	0	0	0
Total	44	20	3+	3+	2+	4+	11+	10+	8+	5+	Tr	Tr	1
U.S.	7	8	8	8	7	9	11	10	11	16	18	23	27
FLATFISH:													
USSR	1/	1/	1/	1/	2	3	Tr	Tr	Tr	Tr	Tr	Tr	Tr
Poland	0	0	0	0	0	0	Tr	0	Tr	Tr	Tr	Tr	Tr
Japan	Tr	Tr	Tr	1/	1	1	Tr	Tr	Tr	Tr	0	0	0
Other	-	-	-	-	-	-	-	-	Tr	Tr	0	0	0
Total	Tr	Tr	Tr	1/	3	4	Tr	Tr	Tr	Tr	Tr	Tr	Tr
U.S.	15	16	17	17	17	22	21	21	23	25	23	27	28
OTHERS:													
USSR	4	8	3	7	Tr	3	3	5	2	3	Tr	Tr	Tr
Poland	0	0	0	0	0	0	Tr	Tr	7	1	Tr	Tr	Tr
Japan	3	1	Tr	Tr	Tr	3	4	3	1	1	0	0	0
Other	-	-	-	-	-	-	-	-	Tr	Tr	0	0	0
Total	7	9	3+	7+	Tr	6	7+	8+	10+	5	Tr	1	1
U.S.	6	5	4	3	5	4	4	4	5	5	6	6	8

Defined:

1/ Reported within another fish category. Specific information not available.
2/ Includes Pacific ocean perch.
\+ Minimum value - exact figures not available.
Tr Trace - less than 1,000 tons.

Chapter 4 - History of Management

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Summary

This chapter outlines historical state, federal and international groundfish management systems and authorities. Also discussed is the effectiveness of management measures, other fishery management plans, and international federal and state laws and policies affecting or affected by this plan.

The chapter observes that:

Domestic Management Institutions, Policies and Jurisdictions

- Except for international agreements which have provided for federal implementation, regulations for the fishery have been set and enforced by the state fishery management agencies.

- Since 1947 the Pacific Marine Fisheries Commission, formed under interstate compact, has served as a focus for coordination of state regulations.

- State regulation has been limited essentially to area closures, gear restrictions such as mesh size and recreational bag limits. Little, if any quota management has been exercised by the states. State regulations are summarized in Table 11 (page 4-4).

Foreign Fisheries

- Bilateral fishing agreements have provided for some federal control over foreign fisheries in the ocean and since the passage of the FCMA, foreign fishing has been only pursuant to Governing International Fishery Agreements and Department of Commerce regulations implementing a preliminary management plan.

Other Fishery Management Plans and Federal Laws

- The Pacific Council's FMPs for pink shrimp and ocean salmon may interact with this plan as gear used in these fisheries is capable of taking groundfish and vice versa. The North Pacific Council's FMPs for Gulf of Alaska groundfish should have little or no effect on groundfish stocks managed under this FMP.

- Federal laws which may interact with this FMP include the National Environmental Policy Act, the Marine Protection, Research and Sanctuaries Act, the Coastal Zone Management Act, the Marine Mammal Protection Act, the Fisherman's Protective Act, and the Outer Continental Shelf Lands Act.

- International agreements pertaining to this FMP include the Halibut Convention, Convention for the High Seas Fisheries of the North Pacific Ocean,. Exchange of Notes with Canada re U.S. Groundfish Fishing of the Canadian West Coast, and Governing International Fisheries Agreements (GIFAs) with foreign countries fishing under this plan.

4.0 HISTORY OF MANAGEMENT

4.1 Domestic Management Institutions, Policies, Jurisdictions

State regulations have been in effect on the domestic fishery for about 70 years. Regulations were set and enforced by the states acting independently. However, many fisheries overlapped state boundaries and were participated in by citizens of two or more states. Management and uniformity of regulation became a difficult problem which stimulated the formation of the Pacific Marine Fisheries Commission in 1947. The Commission has no regulatory power but is a coordinating body with authority to submit specific recommendations to states for their adoption.

4.1.1 Regulatory Measures Employed to Regulate Fishery

Early regulations took the form of area closures (i.e., San Francisco Bay was closed to trawling in 1906) because of concerns about stock depletion. Minimum trawl mesh sizes were adopted in the early 1930's in California as the production of flatfish decreased. During 1935-40, voluntary mesh size limits were adopted by the trawl industry after markets imposed minimum size limits on certain flatfishes and gear-saving studies demonstrated that a larger mesh size (5 inches) caught fewer unmarketable fish. Shortly thereafter, mandatory minimum mesh sizes were adopted by the state. Mesh regulations have since been in effect in all coastal states. State groundfish regulations in effect off Washington, Oregon, and California as of January 1978 are summarized in Table 11. An international research-regulatory body, the International Pacific Halibut Commission, has also played a role in regulation of the domestic trawl fleet by prohibiting the taking of Pacific halibut (*Hippoglossus stenolepsis*) by trawl.

4.1.2 Purpose of Measures

The purpose of measures was to control age at entry into the fishery, protect spawning stocks, regulate fishing effort, and assist user groups. Logbook information provides fishery data to determine trends and assess stocks.

4.2 Fishing and Landing Laws

The coastal states have historically managed the groundfish fishery by means of time and/or area closures, mesh size, gear restrictions and bag limits. The states have laws requiring fishing vessels and commercial fishermen to be licensed. Landing laws have been instrumental in state enforcement. Pertinent provisions applying to the pre-FMP groundfish fishery are set out in Table 11. State fishing laws are in Revised Code of Washington Chapter 75, Oregon Revised Statutes 506 and California Department of Fish and Game Code, Division 6.

Table 11. Summary of coastal groundfish regulations (excluding inside waters and Pacific halibut regulations) in effect January 1, 1979.

Regulation	California	Oregon	Washington
Season closure	In the Calif. halibut trawl grounds, south and east of a line due west (270°T) from Point Arguello and north and west of a line due south (180°T) from Point Mugu in waters not more than 25 fm deep and not less than 1 n. mi. from shore, closed to trawling gear Mar. 15 through June 15.	None.	None.
Area closure	Use of trawl nets prohibited in waters less than 3 n. mi. from nearest point on mainland shore except as above under season closure. Trawl nets, except midwater trawls, may be used between Yankee Pt. and Pt. Sur in waters one or more miles from shore.	Trawl fishing limited to waters of the Pacific Ocean.	No closed areas for ocean trawl fishing.
Legal gear defined	Paranzella nets, beam trawls, otter trawls, shrimp trawls and midwater trawls are defined as trawl nets. Revocable permits from Department or experimental gear permits from Commission required for midwater trawls.	Trawl net means a bag-shaped net composed of wings, body, intermediate and codend sections, held open by trawl doors or fixed beam frame. The codend is the last 50 meshes; the intermediate section is the next 50 meshes forward of codend.	Otter trawl gear is defined as a tapered funnel-shaped net consisting of a forward intermediate and codend section. Otter doors or boards are used to spread the mouth of the net. Roller and bobbin gear may be used.

Table 11. (Continued - Page 2 of 4)

Regulation	California	Oregon	Washington
Minimum mesh size or other net restrictions	In California halibut trawl grounds, trawls with codends at least 29 meshes long and 47 meshes in circumference and codend mesh of 7.5" in length may be used during open season June 16 through Mar. 14. No webbing less than 4.5" (except mesh actually covering floats) may be possessed on boat. Hog ring codends not less than 6" when wet and not greater than 20 meshes long or 100 meshes in circumference. Double bags; meshes must coincide knot for knot, not less than 4.5" Chafing gear not more than last 120 meshes of net, not more than bottom one-half of circumference. Not more than eight riblines may be attached to any type codend.	Whiting may not be taken with trawl nets less than 2.5". Not more than 250 Dover, English, or petrale sole (combined) under 11" may be landed if vessel has on board a single wall intermediate or codend less than 4.5"or a hog-ring type codend of less than 6". Chafing gear may not cover more than bottom one-half of codend. Hog ring codend material not greater than 3/8" diameter. Double wall codend must have knots of each layer coincide knot for knot full length of double layer.	Double layer codends must have meshes and knots coincide the full length of double layer. Hog-ring and rope-type chafing gear not less than 7". Chafing gear of hides or canvas not greater than one-half circumference of codend. Minimum mesh is 3.0" for all species except whiting which is 2.5", measured between the knots.
Net measurement	Between knots.	Between knots, over 5 meshes with 10 lbs. of tension. Measured to nearest 1/4".	Between knots, wet, over 3 consecutive meshes with 10 lbs. of tension.

Table 11. (Continued - Page 3 of 4)

Regulation	California	Oregon	Washington
Method of measurement	Ruler or net gauge.	Ruler.	Ruler.
Logbooks	Required for trawlers, sablefish pot fishermen and CPFV.	Required.	Voluntary.
Line gear	Troll or hand lines, not more than 2 hook, except plugs. Set lines may be used in ocean waters, except not more than 5 hooks in District 15.	Set line/long line permitted in ocean waters, anchored or drifting. Troll gear not permitted April 15 through April 30.	Lines pulled behind boat are troll lines, not more than 6 may be used on any one boat. Set lines permitted, on bottom or suspended.
Set nets	Legal in parts of California. Set gill nets south of Point Reyes only. Rockfish and lingcod may not be taken between the south steamplant stack at Moss Landing and Point Sal under various depth restrictions (40-60 fm minimum, see Calif. regulations for details). After July 1978 set gill nets south of Pigeon Point must be made of No. 6 nylon twine or smaller except heavier twine may be used in bottom 15 meshes. Trammel nets 8-inch mesh Sonoma County south.	Not legal in ocean waters.	Not legal in ocean waters.

Table 11. (Continued - Page 4 of 4)

Regulation	California	Oregon	Washington
Traps	Legal with permit, ocean waters. Biodegradable panel required.	Legal, escape panel required.	Legal, escape panel constructed of biodegradable material required.
Size limits	California halibut 4 lb., 22 inches.		
Bag limits Recreational	California halibut 5 except 3 in Bodega and Tomales Bay. 20 finfish in combination, not more than 15 rockfish or 5 lingcod.	Ocean foodfish: 25/day, not more than 3 lingcod; not more than 15 rockfish, cabezon or greenling in the aggregate.	An aggregate of 15 rockfish, Pacific cod, pollack and greenling; lingcod 3.
Trip limits		20,000 lbs Pacific ocean perch.	Only 10,000 lbs or 25% of total aggregate trip weight may be Pacific ocean perch.

4.3 Foreign

4.3.1 Regulatory Measures Employed to Regulate Fishery

During the development of foreign trawl fisheries in the Washington-California region a number of restrictions were agreed to during bilateral fishery negotiations with several nations. These agreements also provided for cooperative research, exchange of fishery statistics, control of discharge of pollutants at sea, and loading zones within the U.S. contiguous fishery zone. Since 1977 foreign fisheries have been regulated under the terms of the PMPs.

4.3.1.1 Pre-FCMA Bilateral Agreements

(1) USSR

The first bilateral fishery agreement affecting trawl fisheries off Washington, Oregon, and California was signed in February 1967 by the United States and USSR. In return for privileges to fish and/or load in specified localities within the U.S. 3-12 mile contiguous fishery zone (CFZ), the USSR agreed to certain restrictions on their fishing operations so as to provide U.S. fishermen the opportunity to fish grounds of traditional interest and to reduce gear conflicts between the two countries. This agreement was renegotiated every one or two years prior to the enactment of the FCMA.

In renegotiating the agreement in 1971, the United States for the first time granted limited port call privileges to Soviet fishing and support vessels on the Pacific Coast. In return, out of continued U.S. concern for the status of Pacific ocean perch stocks, additional areas were closed to Soviet trawling and the USSR agreed not to conduct a specialized fishery for rockfish south of Cape Flattery, Washington.

In 1973, the USSR agreed to restrict its rockfish harvest and to limit its catch of Pacific whiting to the 1971 level of 150,000 mt. They also agreed not to conduct a specialized fishery for flatfish south of 48 degrees 10'N latitude.

The last bilateral agreement was in July 1975. Principal modifications were designed to provide further protection to Pacific ocean perch and other rockfish and to reduce gear conflicts between USSR trawlers and U.S. fishermen using sablefish traps.

(2) Japan

The first U.S.-Japan bilateral fisheries agreement was signed in May 1967. This agreement related primarily to the conduct of Japanese fishing operations in the Bering Sea and Kodiak Island regions. Subsequent extensions, modifications, and renewals of the agreement included more and more restrictions in the Washington-California region. In 1970, in exchange for a loading area off Washington, the Japanese agreed not to trawl or longline in a zone off the south Washington coast. This area was also closed to Soviet trawling. The latest agreement in 1974 reduced Japanese

effort in the Washington-California area and limited the catch of rockfish and sablefish as well as the aggregate catch of all other species.

(3) Poland

Poland, which began fishing off the West Coast in 1973, entered into a bilateral fishery agreement with the United States in May 1975; the agreement was renegotiated in early 1976. The agreement was designed to protect the whiting resource, reduce the impact on rockfish and other important domestically harvested species, and minimize gear conflicts. The agreement also dealt with protection of the living resources of the U.S. continental shelf, control of dumping pollutants at sea, cooperative research, and exchange of research and commercial fisheries data.

(4) Other Nations

The United States did not negotiate bilateral agreements with the German Democratic Republic, the Federal Republic of Germany, and Bulgaria to regulate their trawling operations. They were late entrants in the trawl fisheries off the West Coast and their effort was limited.

4.3.1.2 Preliminary Management Plans Under FCMA

Since the implementation of the FCMA in 1977, foreign trawl fisheries within the FCZ off Washington, Oregon and California have been regulated under the terms of the Preliminary Fishery Management Plan (PMP) for the trawl fishery of the Washington, Oregon and California region. The PMP established the total allowable catch (TAC), permissible incidental catch levels, species not to be subjected to a directed fishing effort, time-area closures (to protect certain stocks and to reduce gear conflicts), and effort limitations. In addition, the PMP outlined the procedures the foreign nations should follow when submitting statistical reports and fleet disposition reports.

The initial 1979 TALFF was 109,120 mt. Specific time-area closures for the 1979 foreign trawl fishery are presented in Figure 3. Directed fishing effort with midwater trawls was permitted for Pacific whiting north of 39°N latitude. A 100 mm (4.0 in) minimum mesh size was established. Salmon, Pacific halibut and/or creatures of the continental shelf (shrimp, crab, etc.) taken incidentally during trawling operations could not be retained. The 1979 foreign incidental catch allowances for jack mackerel, rockfishes, Pacific ocean perch, flounders, sablefish and other fishes were as follows:

Species	Incidental Catches Only Totals Not to Exceed:
Jack Mackerel	.03 x allocation of whiting
Rockfishes (including POP)	.008 x allocation of whiting
Pacific Ocean Perch	.00062 x allocation of whiting
Flounders	.001 x allocation of whiting
Sablefish	.001 x allocation of whiting
Others	.005 x allocation of whiting

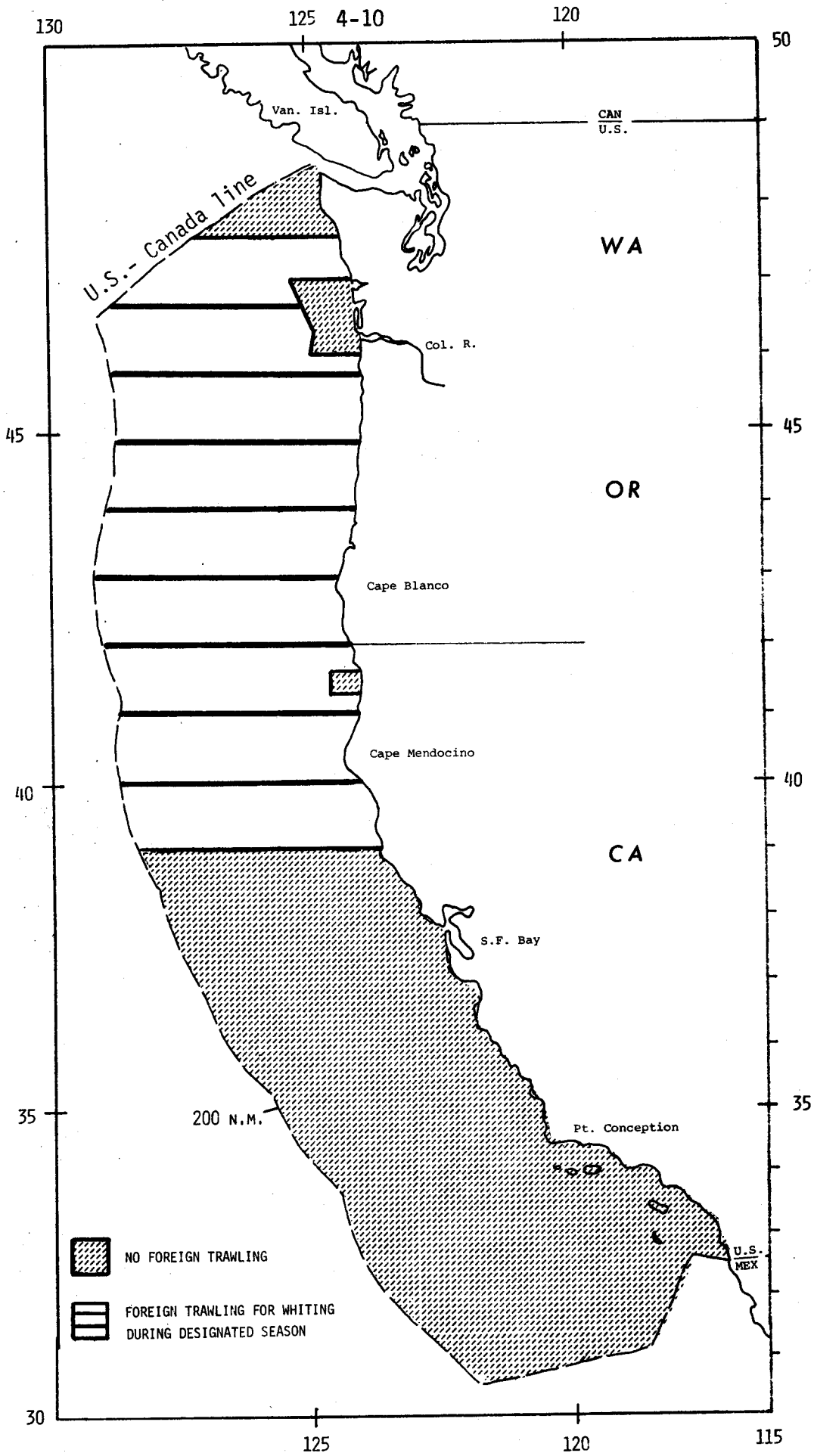

Figure 3. Time/area closures pertaining to foreign trawl fishing in the Washington-Caligornia region in 1979. In addition to the closed areas shown, foreign trawling is prohibited within 12 miles of shore.

4.3.2 Purpose of Measures

Regulatory measures imposed on foreign fishermen were designed to: (1) protect species generally under full or optimum utilization or of special interest to U.S. fisheries, (2) prevent the catch of large numbers of juveniles, and (3) reduce the opportunity for conflict between foreign trawling and U.S. recreational and commercial fishermen.

4.4 Effectiveness of Management Measures (Foreign and Domestic)

Minimum mesh size restrictions have controlled the age at first capture which has tended to maximize the yield per recruit for key groundfish species (bocaccio, chilipepper, Dover sole and English sole) and reduce the catch of immature fish of most species.

The effectiveness of spawning ground closures is difficult to evaluate. A relationship between closures and recruitment has not been demonstrated to exist.

Regulatory measures designed to reduce conflicts between domestic user groups have met with moderate success, although in some cases conflicts still occur.

Violations by foreign vessels fishing under bilateral fishery agreements and regulations imposed by PMPs (such as directed fishing for rockfish, fishing inside the FCZ and use of small mesh nets) were frequently reported by U.S. fishermen. Few of these reports were verified and apprehensions were rare. Conflicts over right-of-way, the use of fixed and mobile gear, and preemption of fishing grounds occurred prior to the FCMA and are still a matter of concern to U.S. fishermen.

Enforcement has been the responsibility of the U.S. Coast Guard and the NMFS Enforcement Division. Area and time closures have been the easiest type of restriction to monitor with regular air and surface patrols continuously assessing the distribution and activities of foreign vessels. Such surveillance is only occasionally hampered by the unavailability of aircraft and vessels or long periods of adverse weather.

It is much more difficult to adequately monitor foreign adherence to agreed catch levels and avoidance of non-target species. Until recently, U.S. observers were not aboard foreign vessels, so all monitoring was accomplished through air and surface patrols and occasional boardings. Such observations only provided estimates of the size of the annual catch, but did allow a limited assessment of species composition. For example, during a two-year period (1974-76), 25 Soviet vessels were observed taking substantial rockfish catches, contrary to the U.S.-USSR bilateral agreement. U.S. observers are now being deployed on some Soviet and Polish trawlers to more accurately determine catch size and composition.

4.5 Other Fishery Management Plans

This FMP, when implemented, will supercede the Preliminary Management Plan for the trawl fisheries off Washington, Oregon and California which has governed foreign and joint venture fishing in 1977, 1978, 1979 and 1980.

The Pacific Council has had a fishery management plan for ocean salmon fisheries in effect in 1977, 1978, 1979 and 1980. The plan takes notice of incidental catches of salmon by trawl gear. It prohibits directed salmon fisheries by use of nets. This FMP addresses the incidental catch of salmon in Section 12.3.3.

The Pacific Council has four FMPs under development which interact with the groundfish fishery. They are for herring, pink shrimp, ocean salmon and squid. Each recognizes existing gear conflict and incidental catch issues involving the groundfish fishery. Section 3.3.1, of the FMP discusses these issues.

4.6 Federal Laws and Policies

National Environmental Policy Act

This law requires an environmental awareness for major federal actions significantly affecting the human environment. An environmental impact statement has been prepared assessing the impacts of this FMP. Although the EIS incorporates much of the analysis made in the document, conclusions regarding environmental impact are made in that document.

Marine Sanctuaries

Under the Marine Protection, Research and Sanctuaries Act of 1972 the National Oceanic and Atmospheric Administration has authority to designate ocean areas, including portions of the FCZ, as marine sanctuaries for the purpose of preserving or restoring conservation, recreational, ecological, or esthetic values.

NOAA's Office of Coastal Zone Management, based on public workshops, selected three sites off California as active candidates for marine sanctuaries:

- the waters around the northern Channel Islands and Santa Barbara Channel;
- the Point Reyes/Farallon Islands area;
- the Monterey Bay area.

All of these areas occur at least partially within the FCZ addressed by this Plan.

As of March 1981, the status of the three proposed sanctuaries was as follows:

Channel Islands - This area was officially designated as a marine sanctuary. The boundary is six miles around San Miguel, Santa Rosa, Santa Cruz, Anacapa and Santa Barbara Islands (totaling 1,253 sq. miles).

The following activities are restricted:

- oil and gas operations;
- discharging or depositing any substance;
- alteration of or construction on the seabed;
- navigation (except within designated areas) and operation of vessels (other than fishing or kelp harvesting vessels) and aircraft overflights below 1,000 feet;
- removing or otherwise deliberately harming cultural or historical artifacts.

Fishing, kelp harvesting, recreational, research, military and enforcement vessels are exempted from the vessel traffic restrictions and therefore will be allowed in nearshore waters. Fishing is not subject to sanctuary regulations, except with respect to discharges. Discharges allowed are indigenous fish wastes and chumming materials, effluents from marine sanitation devices, non-polluted cooling waters, and effluents incidental to allowed hydrocarbon operations.

The Final EIS states that "by contributing to the preservation of the natural resources of the area, the proposed action should benefit those activities such as fishing, tourism and recreation which depend on these resources."

Point Reyes - Farallon Islands - Official sanctuary designation occured on January 16, 1981. The final regulations were published on January 26 and expected to become effective after 60 calendar days of continuous session of Congress.

The FEIS proposes the creation of a marine sanctuary in the waters off the Point Reyes National Seashore. Between Bodega Head and Point Reyes Headlands the sanctuary extends seaward to three miles beyond territorial waters. It includes the waters within 12 miles of Noonday Rock and the mean high tide line on the Farallon Islands, and the waters between the islands and the mainland from Point Reyes Headlands to Rocky Point. The proposed sanctuary includes Bolinas Bay and Lagoon, most of Tomales Bay, Estero Americano, Estero de San Antonio, and Bodega Bay, but not Bodega Harbor (totaling 948 sq. miles).

The purpose of the sanctuary is to protect marine birds, mammals, their habitats and other natural resources. Restrictions are similar to those in the Channel Islands Sanctuary. Vessels used for fishing and recreation are allowed throughout the proposed sanctuary. Discharges of any substance would be prohibited except for fish wastes and chumming materials (bait), effluents from marine sanitation devices, exhaust, vessel cooling waters, and certain biodegradable wastes. The regulation of fishing will

remain the responsibility of California Department of Fish and Game, Pacific Fishery Management Council and the National Marine Fisheries Service.

Monterey Bay - The Monterey site is still at the early proposal stage. A draft EIS should be available in January 1981. A NOAA Issue Paper developed in January 1979 stated that the proposed boundary is from Pt. Sur north to Pt. Ano Nuevo and from the mean high tide line seaward to three miles beyond the territorial sea.

Coastal Zone Management

California, Oregon and Washington all have approved coastal zone management programs under the federal Coastal Zone Management Act of 1972 (CZMA). The activity proposed by this FMP is federal management and conservation of the groundfish fishery resource, primarily through establishment and implementation of acceptable harvest levels. The states' programs establish general land and water use policies and goals which are implemented on the local level. Each state has a coastal zone management lead agency which coordinates coastal zone planning and use.

The CZMA requires that federal activities directly affecting the coastal zone of the state be consistent to the maximum extent practicable with approved coastal zone programs. The FCMA requires that fishery resources in the FCZ be managed in accordance with its mandates, including compliance with the national standards.

It should be noted that in every state the Coastal Zone and the Fisheries Conservation Zone do not overlap but are adjacent. Activities in one zone, however, can affect the other.

California - The California Coastal Zone Program[1] is based upon the California Public Resources Code §30000 et. seq. The Act establishes a structure for state approval of a local coastal program. The California Coastal Commission is the state's coastal zone agency. The coastal zone boundaries are generally the seaward limit of state jurisdiction and inland, to 1,000 yards from the mean high tide line. The California Program does not undertake to regulate fishing, leaving all fisheries management authority with the Department of Fish and Game. However, the Coastal Zone Act does encourage the protection of existing coastal facilities serving commercial fishing and recreational boating. Expanded shoreline facilities would be subject to land use planning requirements.

Oregon - The 1973 Oregon Land Use Act, ORS 197, requires the state to develop statewide land and water planning goals and guidelines. These form the basis of Oregon's Coastal Management Program. The Land Conservation and Development Commission is the state coastal zone agency. The boundaries are generally defined to extend to the state's

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[1] The Coastal Zone Management Program for San Francisco Bay is an independent and separate document.

seaward limit and inland to the crest of the coastal mountain range. Under the Act, cities and counties are required to develop coordinated comprehensive plans which are in conformance with the goals and guidelines.

Goal 19 - Ocean Resources is the most pertinent aspect of the Oregon Coastal Zone Program relating to this FMP.

> "To conserve the long-term value, benefits and natural resources of the nearshore ocean and the continental shelf. All local, state, and federal plans, projects and activities which affect the territorial sea shall be developed, managed and conducted to maintain, and where appropriate, enhance and restore, long-term benefits derived from the nearshore oceanic resources of Oregon. Since renewable ocean resources and uses, such as food production, water purity, navigation, recreation and aesthetic enjoyment, will provide greater long-term benefits than will nonrenewable resources, such plans and activities shall give clear priority to the proper management and protection of renewable resources."

Goal 19 appears to be compatible with the goals and objectives of the FCMA and FMP. The information contained in this FMP provides the analyses specified in Goal 19's implementation requirements. Oregon Laws which may be affected by the FMP are

Submersible and Submerged land	ORS 274.005-274.940
Ports Planning	ORS 777.835
Water Quality	ORS 468.700-468.775

Other Oregon goals for coastal use are less directly affected by the FMP. Should development of domestic groundfish fisheries occur, impact on coastal communities through port development or shorebased processing siting, could be an issue. In such cases, Goal 17 - Coastal Shorelands could be pertinent. However, no evidence of immediate or large-scale development has surfaced.

Washington - The Washington Coastal Zone Program incorporates the Shoreline Management Act, RCW 90.58 (SMA). The Department of Ecology is the state coastal zone management agency. The boundary of the coastal zone is the seaward limit of the state and inland to 200 feet of the ordinary high water mark. The planning and administrative boundary is comprised of the 15 coastal communities. The Shoreline Management Act provides for state approval of a local Shoreline Master Program according to guidelines established by DOE. None of the guidelines make any direct reference to fishing. However, one guideline gives priority use of water frontage to ports and water-related industry such as commercial fishing. Another guideline gives recreational use of the shoreline a priority. Development of domestic fisheries could impact coastal zone use by increasing demand for port and processing sites.

Consistency Determination: The activities proposed in this plan are consistent to the maximum extent practicable with the states whose coastal zone programs were approved by the Secretary of Commerce on the following dates:
California -- November 7, 1977 and amended September 21, 1979;
Oregon -- May 6, 1977; and Washington -- June 1, 1976. Copies of the consistency determinations are appended to the EIS (yellow pages).

Marine Mammal Protection Act

A few fishermen participating in the groundfish fishery off Washington, Oregon and California may experience an incidental involvement with marine mammals. Consequently, these operations are subject to the U.S. marine mammal regulations (50 CFR 216.24) which require a current certificate of inclusion for each commercial fishing vessel (foreign or domestic) which might take marine mammals incidental to fishing operations in the FCZ.

The Foreign Fishing Regulations (Section 611.3(h), Subpart A published in the Federal Register, Vol. 43, No. 244) stipulate that killing, capturing, or harrassing marine mammals is not authorized by a foreign fishing permit. The application procedures for the certificate of inclusion and the requirements, restrictions and prohibitions concerning marine mammals are contained in 50 CFR 216.24.

A discussion of marine mammal/fishery interaction is present in "A Report Based on the Workshop on Stock Assessment and Incidental Take of Marine Mammals Involved in Commercial Fishing Operations" (NMFS, 1980).

Endangered Species Act (ESA)

A purpose of the ESA is to insure that federal actions do not jeopardize the continued existence of threatened or endangered species or result in the destruction or modification of their critical habitat. Since a Council-developed FMP will result in federal regulations, a determination needs to be made whether or not the FMP will affect such species or their habitats.

There are 12 marine animals which are listed as endangered or threatened and which are found in the area covered by this FMP: four species of sea turtles, seven whale species and the California population of the sea otter.

The breeding populations of the green sea turtle and the Pacific ridley sea turtle off the Pacific coast of Mexico and all populations of the leatherback sea turtle are endangered. The loggerhead sea turtle is listed as threatened over its entire range. According to a NMFS evaluation [1/] the turtles occurring off California are transient

1/ Threshold examination of the effect of proposed OCS Lease/Sale No. 48 on endangered species, Dec. 1978.

portions of the populations at the northern limits of their ranges, and no known nesting occurs there. Furthermore there are no known or documented interactions between fishing vessels and sea turtles in this area.

The seven species of endangered whales occurring in the area are the blue, fin, sei, humpback, sperm, Pacific right and gray whales. The species most commonly found in the area and therefore most likely to be impacted by fishing is the gray whale, since it migrates twice yearly between its northern feeding grounds and the Baja California calving grounds, normally within a few kilometers of shore. According to personnel from the NMFS Marine Mammal Laboratory, there are only two known incidences of gray whales being entrapped by fishing gear and these incidences occurred in estuarine waters, probably by other than groundfish gear. While there is a possibility that gray whale/groundfish gear interactions might occur, it is reasonable to assume that they would be minimal at the most. The Bering Sea/Aleutians Groundfish Plan approved in 1979 contains no documentation of interactions with endangered marine mammals. The Council believes that there is no likelihood of any jeopardy to the continued existence of the endangered gray whale as a result of this FMP, or that there will be any destruction or modification of its critical habitat. Furthermore, fishing has taken place for many years and would continue without this FMP.

The final species to consider is the sea otter. The California population of this species has been listed as threatened. Groundfish vessels do not pose a threat to the sea otter because of its inshore habitat.

However, in the event of an encounter with a listed endangered species it is important to note that the ESA prohibits any "taking" of an endangered species. "Take" is broadly defined to include among other things the unintentional capture or harming of an endangered species or collection of dead parts of same. The "taking" of an endangered species can be authorized by permit only for purposes of scientific research.

Other Federal Laws

The Outer Continental Shelf Lands Act is federal legislation dealing with the use of the seabed and subsoil of the outer continental shelf. It is under this authority that the Bureau of Land Management establishes oil and gas leases.

The Fishermen's Protective Act, 1978 amendments create a Fishing Vessel and Gear Damage Compensation Fund from which U.S. vessels are eligible for compensation if damage to vessels attributable to non-U.S. vessels and to gear attributable to any other vessel or acts of God.

Other federal laws which may have some relation to the FMP are listed in Appendix A.

4.7 Indian Treaty Rights

Treaties with a number of Pacific Northwest Indian tribes secure to certain treaty tribes certain rights to take fish at their usual and accustomed fishing grounds.

The tribes which presently have been found to have such fishing grounds in areas which are embraced by this plan are:

Makah Tribe: Marine waters extending from the Strait of Juan de Fuca "out into the ocean to an area known as Swiftsure and then south along the Pacific Coast to an area intermediate to Ozette Village and the Quileute Reservation."
[384 F. Supp. 312, 364 (W.D. Wash., 1974)].

Quileute and Hoh Tribes; Tidewater and saltwater areas adjacent to the coastal area that includes the Hoh, Quillayute, Queets, and Quinault Rivers and Lake Ozette.
[384 F. Supp. at 359, 372].

Quinault Tribe: "Ocean fisheries ... in the waters adjacent to their territory" which for fishing purposes includes the area from the Clearwater-Queets River system to Grays Harbor.
[384 F. Supp. at 374].

The Council knows of no presently active tribal fisheries for species covered by the Groundfish Plan. Should such a fishery develop in the future, the Groundfish Plan may have to be reconsidered regarding its impact on such fishery and modifications, if any, which may be appropriate to account for such a fishery.

4.8 International Agreements

Existing international agreements affecting the FMP are

1. The Convention for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea (1953) - This treaty with Canada establishes the International Pacific Halibut Commission (IPHC). The IPHC establishes regulations for harvesting halibut by U.S. and Canadian vessels off the coasts of the two countries to achieve maximum sustained yield from the fishery and to maintain the stocks at those levels. The Convention has implementing domestic legislation, the Northern Pacific Halibut Act of 1937, 16 U.S.C. 772 et. seq.

2. The International Convention for the High Seas Fisheries of the North Pacific Ocean (1952) - This Convention establishes the International North Pacific Fisheries Commission made up of the parties to the Convention, the United States, Canada and Japan. The Convention was amended by protocol in 1978. While the major thrust of the Convention as amended is to restrict the high seas salmon fisheries, it also establishes a mechanism for international scientific research for other North Pacific stocks, including groundfish.

3. Reciprocal Fishing with Canada - Traditional reciprocal fishing by groundfish vessels of the U.S. and Canada was permitted by executive agreement prior to the FCMA and by amendment to the FCMA in 1977. In 1978, the U.S. and Canada withdrew reciprocal fishing privileges. By exchange of notes Canada agreed to permit, for two years, U.S. fishermen to harvest groundfish in the Canadian fisheries zone off its west coast under the following general restrictions:

   - Catches are limited to 3,250 metric tons for each of two years

   - The fishery shall be directed for rockfish with limited incidental catches

   - The period for which fishing is allowed is April 1, 1979 to March 31, 1981

   The agreement provides more specific restrictions in an annex.

4. Governing International Fisheries Agreements (GIFA) - The FCMA requires that a GIFA be negotiated and approved by the Congress before any permit to foreign fishing vessels may be issued. Countries having GIFAs may apply for fishing privileges for its vessels for any TALFF allocated by this FMP. Traditional foreign groundfish fishing is described in Section 3.2.2 of this FMP.

5. International Regulations for Preventing Collisions at Sea, 1972.

Chapter 5 - Description of Stocks

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Summary

This chapter provides a general discussion of the history of research, the biological characteristics and population dynamics of the stocks involved in the fishery, an analysis of the catch and effort data, and research data regarding these stocks that is available to the Council. Comment is made regarding the quality of data that are available. They include:

History of Research

- At sea surveys include flatfish tagging studies since the 1950's, sablefish tagging in the 1970's, resource surveys of flatfish by California and Oregon, of Pacific whiting by NMFS in the early 1970's and a NMFS-coordinated survey of whiting and rockfish in 1977.

- Foreign research cruises have been carried out by Canada on P.O.P. and other rockfish (1963-69), by the USSR on Pacific whiting and rockfish (since 1965). Poland participated in the 1977 rockfish survey.

Life History Features

- The life history characteristics are provided for most major stocks in Table 12 (page 5-5).

- While a large number of species are included in the groundfish complex, latitudinal and bathymetric differences in distribution aid in management. Species also differ in longevity, fecundity, age at maturity and migration patterns.

Catch and Effort Data, Sampling

- Catch and effort data have been used as a source of information in determining the status of the stocks. Data on the domestic trawl fishery is collected by the states by area, vessel trip, gear type and species. Compilation is done by the Pacific Marine Fisheries Commission in the form of trawl fleet hours per month per statistical area. Effort data are not available for commercial non-trawl fisheries except California sablefish pot fisheries. Limited recreational catch data are available. Foreign fishery catch data historically have been available but are substantially improved under the MFCMA.

- All three states carry out sampling programs of commercial and recreational catches.

Quality of Data

- Historical data do not meet the needs of today. Present west coast information is sufficiently detailed but shortcomings exist. Agencies have not systematically monitored discarded fish and did not report U.S. whiting catches until 1978. In addition, certain rockfish catches have been reported in aggregated form as "other rockfish." Pre-MFCMA data on some foreign catches are marginal.

5.0 DESCRIPTION OF STOCKS

5.1 History of Research

5.1.1 United States

Research efforts on groundfish occurred prior to 1900, but in many cases were of local nature and largely descriptive. The great majority were life history studies. Extensive at-sea surveys did not begin until 1951 when the R/V John N. Cobb (NMFS) began a series of exploratory surveys of the Washington-California region.

A series of extensive flatfish tagging studies by the States of California, Washington, and Oregon were also initiated in the 1950's and extended through the 1970's. These studies, as well as mesh-selection studies conducted by the coastal states were coordinated through the Pacific Marine Fisheries Commission. A similar tagging study in 1971-76 on sablefish was initiated by NMFS and various agencies.

Beginning in the late 1960's and early 1970's, resource surveys conducted by various state and federal agencies were broadened significantly. The first attempts to estimate biomass and age composition from trawl/hydroacoustic surveys occurred at this time. Flatfish surveys were carried out by the States of California (1969) and Oregon (1971-76). Whiting surveys were carried out by NMFS during 1969-75. In 1977, NMFS coordinated a survey of whiting and rockfish from Pt. Hueneme, California, to Cape Flattery, Washington.

A series of comprehensive ichthyoplankton (egg and larval) surveys of the California-southern Oregon region have been carried out by NMFS during the 1950's-1970's, with occasional cooperative ventures with the USSR. These surveys have produced information on the early life history of whiting and rockfish in the CALCOFI region.

Aside from at-sea fisheries surveys, a significant body of additional fisheries research has been done by U.S. universities, state agencies and federal agencies. This work has been summarized by Day and Forrester (1971).

5.1.2 Foreign

The most extensive and well-documented series of research surveys undertaken off the U.S. coast were those of the Canadian R/V G.B. Reed (1963-69). The life history and relative abundance of Pacific ocean perch and other rockfish off the Washington-Oregon coast was surveyed.

Research cruises by the USSR have been carried out since 1965, but were largely exploratory in nature. Hydroacoustic estimates of whiting and rockfish biomasses were developed during the cruises, but the methodology used in obtaining these estimates was poorly documented. Significant contributions on the biology of whiting (Ermikov, unpublished manuscript) and Pacific ocean perch (Snytko, 1971) have resulted from Soviet research efforts.

The USSR and Republic of Korea (ROK) both participated in cooperative sablefish tagging programs with NMFS. The Polish Sea Fisheries Institute participated in the 1977 rockfish survey.

5.2 Life History Features

Life history features of the most common species in the groundfish community are summarized in Table 12. A large number of species have been considered in developing the groundfish plan for the Pacific Coast. Latitudinal and bathymetric differences in species distribution serve to reduce the difficulty of managing the species complex.

Many of the depth ranges presented in Table 12 pertain to the entire year, and the overlap in these ranges is less extensive within any given season. Further separation of species occurs as a result of the semi-pelagic behavior of species, and as a result of distinct differences in the type of substrate preferred by each species. In a recent analysis of flatfish substrate preferences off Oregon (Demory et al., 1975), Dover sole, arrowtooth flounder, and sablefish were most abundant over mud-sand, rockfish tended to be most abundant over hard, rocky bottom.

Catch rates from the 1977 rockfish survey (Gunderson and Sample, 1979) provide some perspectives on the species composition of the offshore rockfish community. The "principal species of commercial importance" (Fraidenburg et al., 1977) usually make up the bulk of the fish caught in the survey in the Vancouver and Columbia areas, particularly in the 50-200 fathom zone. In the Eureka-Conception areas the principal commercial species made up a smaller proportion of the biomass. Species such as splitnose rockfish, shortbelly rockfish, and stripetail rockfish made up a significant portion of the research vessel catches.

Many of the species that are not extensively exploited are quite slow-growing (in the sense of attaining maximum size) (Westrheim and Harling, 1975) and probably have a correspondingly low rate of natural mortality. Splitnose rockfish, sharpchin rockfish, stripetail rockfish, redstripe rockfish, and shortspine thornyhead are in this group. The productivity of these species is quite low, and their productivity per unit biomass contrasts sharply with species like canary rockfish, yellowtail rockfish, chilipepper, or bocaccio.

With the exception of shortbelly rockfish and widow rockfish, most species other than those that currently dominate commercial rockfish catches can be expected to make only minor contributions to the maximum sustainable yield of rockfish, and can be grouped in an "other rockfish" category for purposes of reporting and management.

Shortbelly rockfish seem to be the most distinctively pelagic of the rockfish group. The hydroacoustic/midwater segment of the 1977 rockfish survey encountered large quantities of this species off central California. In addition, their short life span, low fecundity and early age at sexual maturation sets them apart from all of the other rockfish. They are treated separately in this management plan.

Table 12. Life history characteristics of principal groundfish species off Washington, Oregon and California.

	ROUNDFISH				ROCKFISH	
	Lingcod	Pacific Cod	Pacific Whiting	Sablefish	Black	Blue
Bottom depths of common occurrence (fm)	1-100	10-90	20-275	80-1000	0-50	0-50
Spawning period	Oct-Nov	Jan-Mar	Jan-Apr	Nov-Apr	*	Jan-Mar
Maximum age (years)	15	8	16	20	18+	24
Average age at maturity, female	5-6	2-4	3-4	7	*	7
Average size (cm) at maturity, female	70	55	37-41	70	*	27
Annual rate of natural mortality ($1-e^{-M}$)	0.26	0.55-0.63	0.26[a]-0.45	0.20[a]	0.18[a]	*
Growth completion rate (k), female	0.16	0.30-0.70	0.30	0.14[b]	0.18	*
Fecundity at average size at maturity	98,000	860,000	85,000	400,000	*	80,000
Literature cited (Section 14.0)	3,29,75	64,65,114, 124	5,12,21 27,72,89	70	31,107	75

	ROCKFISH			
	Bocaccio	Canary	Chilipepper	Darkblotched
Bottom depths of common occurrence (fm)	40-120	50-120	60-150	50-250
Spawning period	Nov-Mar	Nov-Mar	Nov-Mar	Nov-Mar
Maximum age (years)	30	26	16	30
Average age at maturity, female	4-6	14	6	11
Average size (cm) at maturity, female	41-48	49	37	37
Annual rate of natural mortality ($1-e^{-M}$)	0.18[a]	0.18[a]	0.18[a]	0.10[a]
Growth completion rate (K), female	0.11[b]	0.15	0.18	0.09
Fecundity at average size at maturity	280,000	820,000	70,000	45,000
Literature cited	42,43,97 127	42,43,97 126	42,43,97, 127	42,97,123, 126

a Estimated from consideration of life history characteristics.
b Sexes combined.
* Unavailable.

Table 12. (Continued - Page 2 of 3)

	ROCKFISH					
	POP	Shortbelly	Shortspine Thornyhead	Silvergray	Splitnose	Stripetail
Bottom depths of common occurence (fm)	50-250	50-150	150-850	50-150	100-250	50-150
Spawning period	Feb-Mar	Jan-Apr	Mar-May	Jun	Feb-July	Nov-Mar
Maximum age (years)	30+	12	30+	29	29+	17
Average age at maturity, female	10	3	*	13	5-12	4
Average size (cm) at maturity, female	34	17	*	45	21-27	17
Annual rate of natural mortality ($1-e^{-M}$)	0.10	0.26[a]	*	0.10[a]	0.10[a]	0.15[a]
Growth completion rate (K), female	0.09	0.28	*	0.04	0.10	0.15[b]
Fecundity at average size at maturity	30,000	6,000	*	*	14,000+	15,000
Literature cited	38	42,69,97	2,90,123	42,123,126	42,97,123 126	42,97,123

	ROCKFISH			FLATFISH	
	Vermilion	Widow	Yellowtail	Arrowtooth Flounder	Dover Sole
Bottom depths of common occurrence (fm)	10-110	30-175	40-120	30-350	20-800
Spawning period	Nov-Mar	*	Nov-Mar	Dec-Mar	Nov-Mar
Maximum age (years)	22	29	23	22	25+
Average age at maturity, female	6	4	11	8	8-9
Average size (cm) at maturity, female	33	32-38	45	42	35-38
Annual rate of natural mortality ($1-e^{-M}$)	0.10[a]	0.20[a]	0.18[a]	0.15[a]	0.18
Growth completion rate (K), female	0.10[b]	0.21[b]	0.20	0.16	0.11
Fecundity at average size at maturity	63,000	55,000	490,000	1,000,000	40,000
Literature cited	97	42,97,123, 126	42,43,97, 126	24,57	24,46,68

[a] Estimated from consideration of life history characteristics.
[b] Sexes combined.
* Unavailable.

Table 12. (Continued - Page 3 of 3)

	FLATFISH				
	English Sole	Pacific Sanddab	Petrale Sole	Rex Sole	Starry Flounder
Bottom depths of common occurrence (fm)	10-150	10-60	20-250	20-250	0-90
Spawning period	Nov-Mar	July-Sept	Nov-Mar	Jan-Jun	Nov-Feb
Maximum age (years)	18	13	25	24	10+
Average age at maturity, female	5	3 6-8	4-5	3	*
Average size (cm) at maturity (female)	31	19	36-44	23-24	35
Annual rate of natural mortality ($1-e^{-M}$)	0.23	0.26[a]	0.18	0.18[a]	*
Growth completion rate (K), female	0.26	0.31	0.21	0.17	*
Fecundity at average size at maturity	300,000	50,000	98,000	6,000	*
Literature cited	30,48, 119	7,24	48,66	24,58	3,82

[a] Estimated from consideration of life history characteristics.
[b] Sexes combined.
* Unavailable.

The magnitude of the widow rockfish resource is largely unknown at present, but appears to offer significant potential for fisheries development. Like shortbelly rockfish, they are principally pelagic in their distribution.

In the Vancouver and Columbia areas, the plan is developed around the yellowtail, canary and silvergray rockfish in the 50-150 fathom depth zone, Pacific ocean perch in the 100-200 fathom zone, widow rockfish and "other species". In the Eureka area the plan addresses canary-yellowtail complex, widow rockfish and others. In the Monterey-Conception region the plan addresses bocaccio, chilipepper, shortbelly rockfish, widow rockfish and others.

The schooling behavior of rockfish must also be considered when examining the groundfish community, since the ability of commercial fisheries to target on a given species is partially dependent on this behavior. Most rockfish form dense, tightly clustered aggregations that can be sought out by echo sounding, while flatfish tend to be more uniform in their distribution. Incidental catches (bycatches) of flatfish are consequently harder to avoid when trawling on the bottom in a given area, whereas large schools of rockfish can be more readily avoided because they are acoustically detectable. The tendency for rockfish to form dense aggregations increases the possibility of overfishing at reduced stock levels, since schools that are capable of producing significant catches can still be sought out--a sitution which does not occur with most flatfish.

Most of the principal groundfish species spawn either in the winter or early spring, with a migration to deeper water (lingcod excepted) usually preceding spawning. All of the rockfish in Table 12 can be distinguished from the other species on the basis of their reproductive behavior, since they give birth to living young. Fertilization is internal, and is known to precede spawning (release of young) by 1-4 months, depending on the species in question. Catch rates of most species are high during the spawning season, but rockfish may have two periods of high catch rates--one corresponding to the mating period, and one during the spawning period.

Fecundity is directly related to the size of the female for all species in Table 12. The estimated fecundity at the age at maturity is presented so that relative levels of reproductive potential can be compared among species.

There is considerable variation among species in the number of eggs (or larvae) produced. Pacific cod, canary rockfish, and arrowtooth flounder are the most fecund species, and this characteristic makes them more resilient to depletion of the spawning stock than a species like shortbelly rockfish or Pacific ocean perch. An analysis by Cushing and Harris (1973) suggests that fishery-induced recruitment failures are far more likely in species such as shortbelly rockfish and Pacific ocean perch than they are in species such as Pacific cod.

Relative rates of growth can be examined by comparing the size and age at maturity among species. Given this index of growth, and the other

parameters furnished in Table 12 one can gauge the relative production per unit biomass that a species is capable of. This production will vary directly with growth rate and natural mortality rate, and inversely with maximum age and age at maturity.

5.3 Stock Units and Distribution

5.3.1 Lingcod

Lingcod appear to be relatively sedentary in their distribution. In an analysis of tagging experiments, Chatwin (1956) found that less than 10 percent of recovered fish had moved more than five nautical miles from the point of release. The ones that moved in excess of five miles had been at liberty for an average of three years. Reeves (1966) and Miller and Geibel (1973) also concluded that it was unusual for lingcod to migrate any great distances. Most investigators believe that lingcod migrate to shallow rocky reefs for spawning.

5.3.2 Pacific Cod

There has been only a limited amount of Pacific cod tagging and that occurred off Washington. Cod in the Washington-Oregon region can be considered a single group, although there may be some interchange with stocks off southwest Vancouver Island. There is little evidence of interchange between cod tagged at Cape Flattery and stocks in the Strait of Juan de Fuca and the Gulf of Georgia (Gosho, 1976).

5.3.3 Pacific Whiting

Pacific whiting is the only species listed in Table 12 that can be regarded as a single stock throughout the California-Washington region. Spawning occurs primarily during January-April off southern California and northern Mexico, seaward of the continental shelf. After spawning, the adults migrate to the coast of central California, reaching this area as early as March. The migration continues northward so that feeding schools may be found off Oregon by April, off Washington in May, and eventually off British Columbia by midsummer. Feeding continues until fall, when a return migration to the spawning area begins.

5.3.4 Sablefish

Sablefish tagging results (Low, 1977) indicate that although a portion of the sablefish population undertakes long migrations, the majority of the population does not. The proportion of fish recovered in the original area of release ranged from 68 percent in the Conception area to 93 percent in the Vancouver area (Figure 4). Similar results were obtained by Osada and Caillet (1975), who tagged 1,450 sablefish in the Monterey Bay area. A total of 73 tags were returned, with 72 of these coming from Monterey Bay itself. United States and Japanese tagging studies show that a limited exchange occurs between sablefish stocks in the California-Washington region and those in the Gulf of Alaska and Bering Sea.

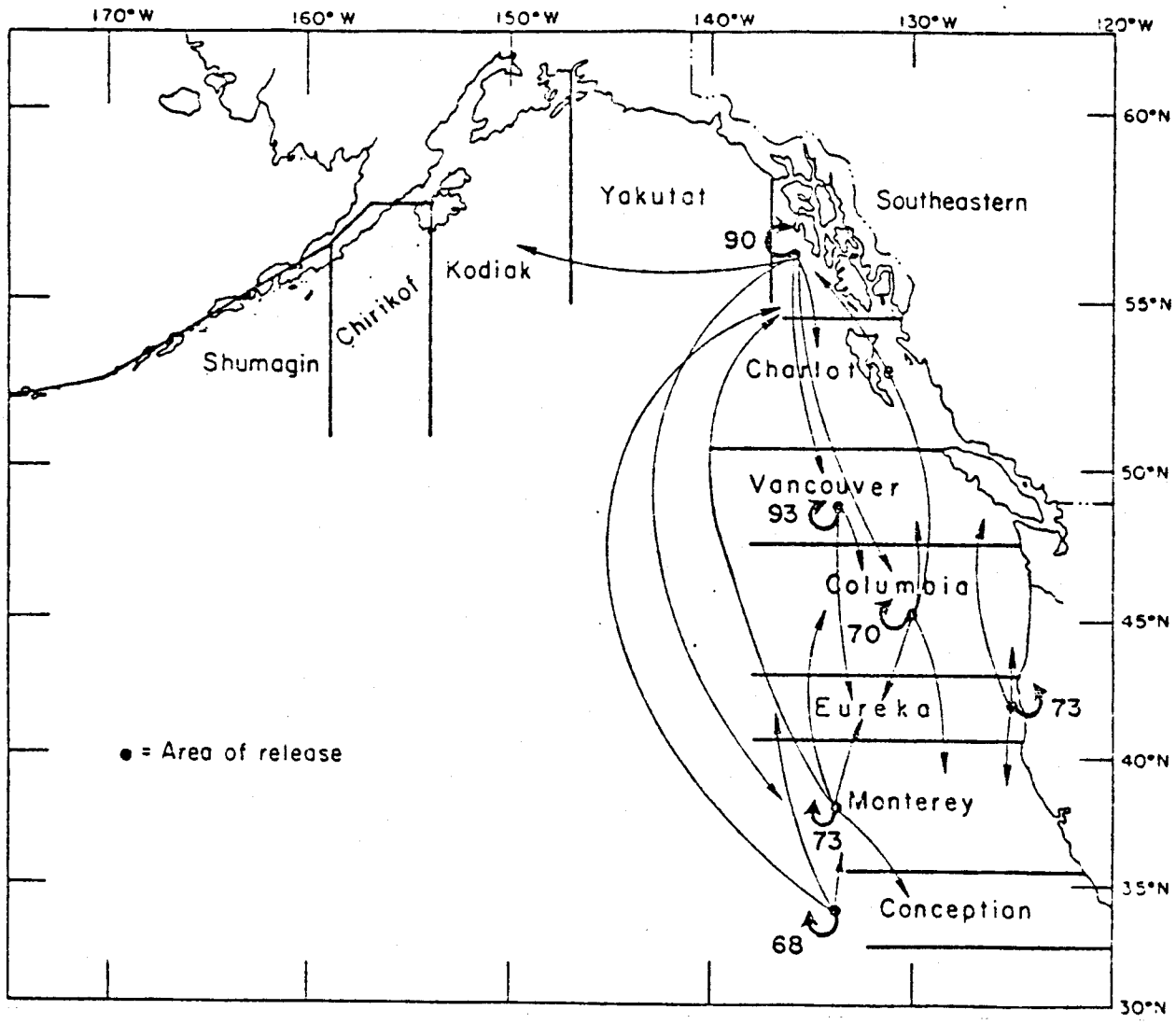

Figure 4. Sablefish tag recovery by INPFC areas. Arrows show direction but not path of migration. Numbers show percentages of tags recovered in the area of release. The tagging study was a cooperative venture of the United States, Republic of Korea, and the USSR.

5.3.5 Rockfish

Few tagging studies on rockfish have been carried out because most rockfish die from the effects of decompression when they are brought up from depths of 10 fathoms or greater. Carlson and Haight (1972) were able to tag 331 yellowtail rockfish and found that this species clearly has a homesite and homing ability. Fish returned to this homesite from as far as 22.5 km, some after displacement to other schools, and some after three months in captivity. Miller and Geibel (1973) also found that tagged blue rockfish showed limited movements.

If the behavior patterns found in these studies extend to other rockfish species, it is likely that several stocks may exist within any given INPFC area, but for the purposes of this plan, INPFC areas are assumed to contain unit stocks.

5.3.5.1 Pacific Ocean Perch

Two major stocks of Pacific ocean perch are in the Vancouver and Columbia INPFC areas. Resource surveys and commercial fisheries data indicate that only minor concentrations of Pacific ocean perch lie south of the Columbia area, and that major concentrations occur in the central portion of the Columbia area (44°00' - 47°00') and the southern portion of the Vancouver area (48°00' - 49°00'). A region of relatively low abundance separates the stocks in the Vancouver and Columbia areas.

5.3.6 Dover Sole

Tagging experiments with Dover sole indicate virtually no coastwise movement of Dover sole, with 81, 98 and 99% of the fish being recovered in the area of release (Figure 5). Recaptures of tagged fish show that Dover sole stocks are highly restricted in their distribution, and that several distinct stocks occur in some INPFC areas. For example, in the INPFC Columbia area there are three different stocks: one north of the Astoria canyon; one south of the Astoria canyon and north of Heceta Bank; and one between Heceta Bank and Cape Blanco.

5.3.7 English Sole and Petrale Sole

English sole and petrale sole appear to make seasonal migrations that cross the boundary between the Vancouver and Columbia areas, but migrations of this nature appear to be far more limited in the Eureka-Conception region. At least 94 percent of the English and petrale sole tagged in the latter region were recovered in the area of release.

Based on tagging results, Jow (1969) identified one separate English sole stock in the Conception area, two in the Monterey area, and a fourth stock that inhabits the Eureka area and extends into the northern part of the Monterey area (Figure 6). Similarly, four separate spawning groups of petrale sole are located off Cape Mendocino (Eureka area), Pt. Delgada, Pt. Montara (Monterey area) and Pt. Sal (in the Conception area).

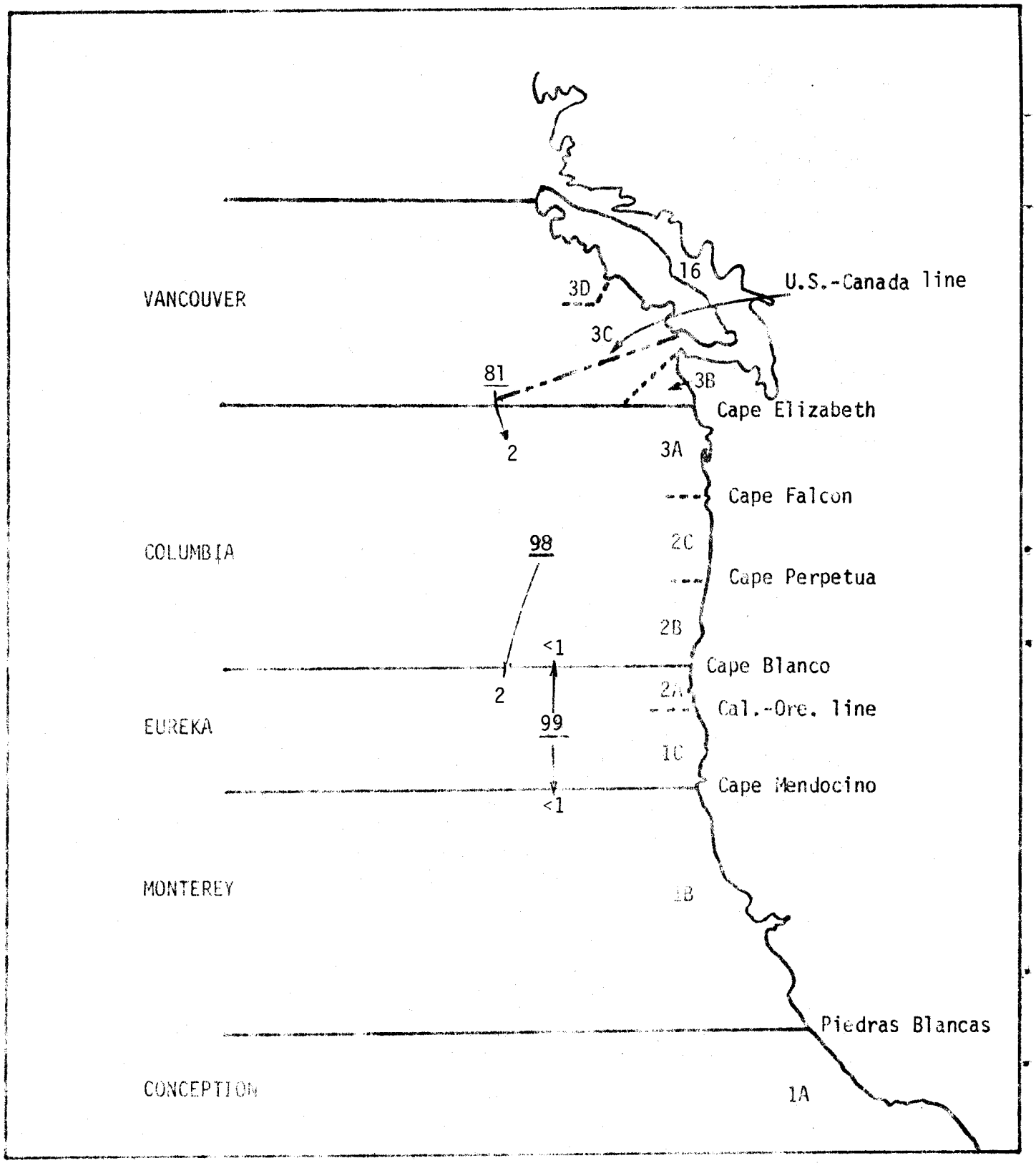

Figure 5. Dover sole tag returns by INPFC area. Arrows show direction but not path of migration. Numbers show percentages of tags recovered. Underlined number is the percentage recovered in the area of release.

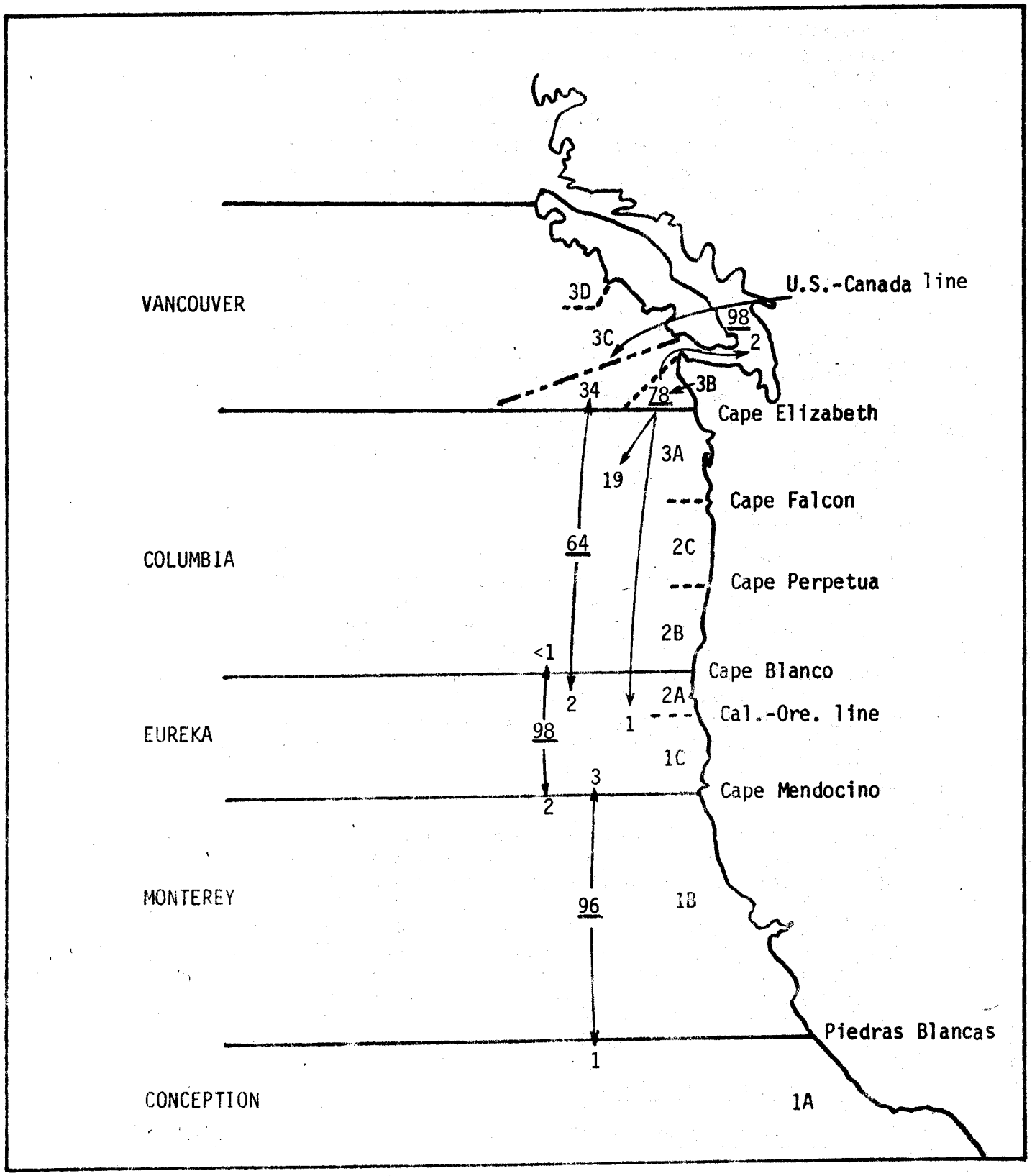

Figure 6. English sole tag returns by INPFC area. Arrows show direction but not path of migration. Numbers show percentages of tags recovered. Underlined number is the percentage recovered in the area of release.

Three stocks of petrale sole are known to inhabit the Vancouver area at different times of the year (Pedersen, 1975a), including one that moves into the Columbia area to spawn off Willapa Bay, then returns to the Vancouver area during the summer feeding period (Figure 7). Two of the stocks that spawn in the Vancouver-Columbia area migrate into Canadian waters off southwest Vancouver Island during the summer. Pattie (1969) has shown that some of the English sole tagged in the Vancouver area in the summer follow a similar southerly migration into the Columbia area during the winter, with a corresponding northward migration in the spring.

With the exception of some stocks of English and petrale sole that migrate between the Vancouver and Columbia area, most movements of Dover sole, English sole, and petrale sole are restricted to individual INPFC areas, and several stocks can inhabit a single area. In many cases the distribution and degree of seasonal intermingling of these stocks is poorly delineated, however, and INPFC areas have been taken as the basic management areas for these species. For flatfish other than Dover sole, English sole and petrale sole, patterns of stock distribution are largely unknown.

5.3.8 Jack Mackerel

Jack mackerel occur throughout the northeastern Pacific, generally east of a line drawn from the tip of Baja California to the eastern Aleutian Islands (MacCall et.al. 1980). Young fish, up to about five years old and 35 cm FL occur at the southern, inshore end of this range, especially off southern California. The remainder of the range is inhabited by old fish, over 15 years old and 50 cm FL, especially along the coast from San Francisco to Washington and offshore to the limit of the FCZ. The location of the five to 15-year-old fish (30 to 50 cm FL) is unknown. Nowhere have they been detected in the abundance they must necessarily be to produce the abundance of older fish which has been observed.

The majority of jack mackerel spawning occurs in the area inhabited by the northern-offshore large fish. This spawn is presumably the source of recruitment to the small fish in southern California.

Development of jack mackerel fisheries should distinguish between the two segments of the stock. Both intra- and inter-segment impacts of harvesting will require monitoring. However, due to its incidental occurrence in the whiting fishery, only the northern large fish segment of the jack mackerel stock will be considered in this FMP. The northern segment is defined as mackerel caught north of Pt. Arena (39°N).

5.4 Catch and Effort Data

5.4.1 Domestic Fisheries

Catch and effort data on the domestic trawl fishery are collected by the States of Washington, Oregon, and California by state statistical area, by vessel trip, by gear type, and by species. This information is then compiled with Canadian catch-effort data by the Pacific Marine Fisheries

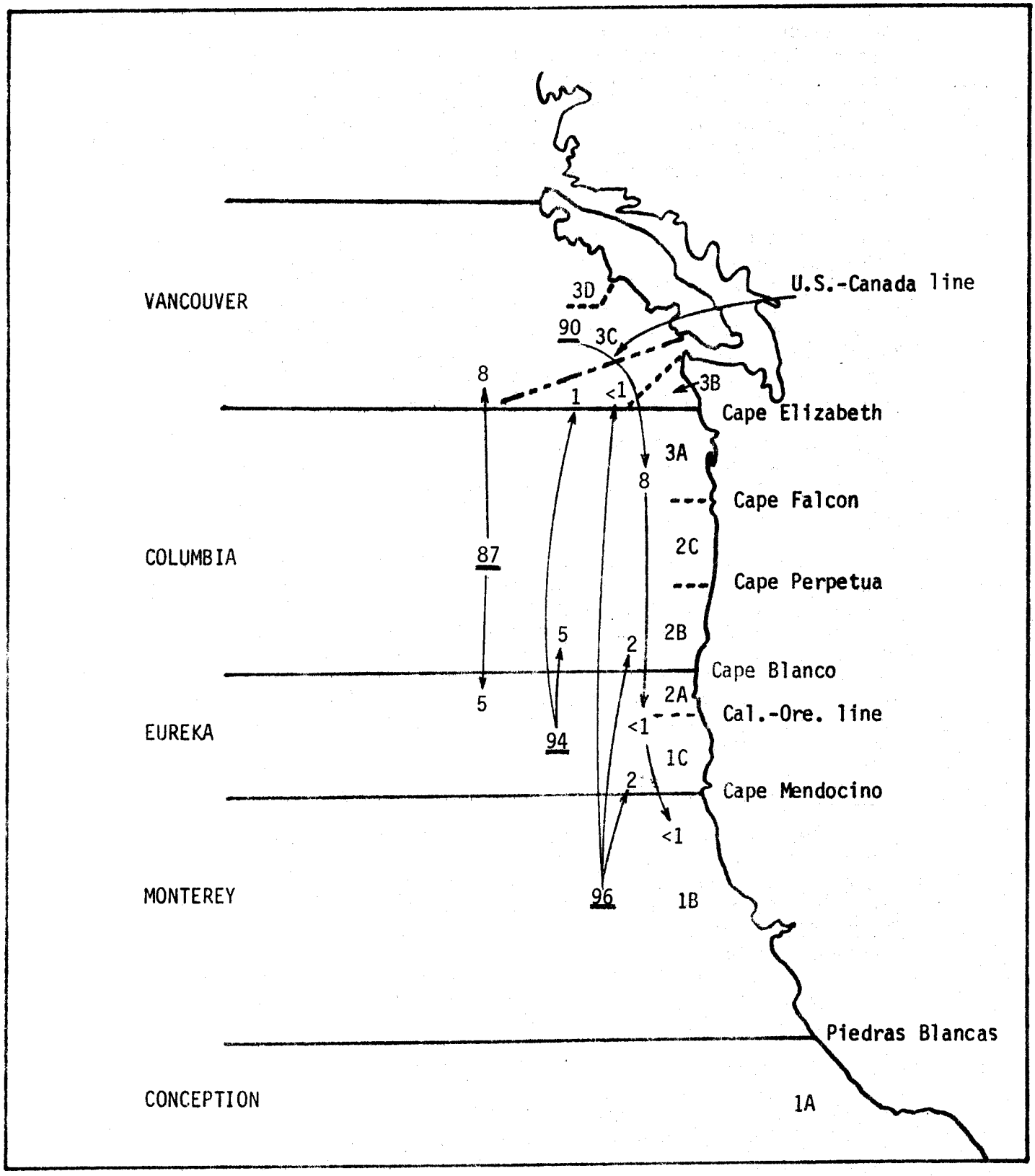

Figure 7. Petrale sole tag returns by INPFC area. Arrows show direction but not path of migration. Numbers show percentages of tags recovered. Underlined number is the percentage recovered in the area of release.

Commission (PMFC) and reported by PMFC and INPFC statistical areas. Effort data are presented as hours of fishing for the mixed species trawl fleet by month and area. Since the 1950's, catch and effort data have been available by individual drag for the Washington fleet, and a similar system was implemented in 1976 for the California and Oregon fleets. With the exception of the California trap (pot) fishery for sablefish, effort data is not available for other commercial nontrawl fisheries.

With the exception of commercial passenger fishing vessel (CPFV) data for California, long time series of catch and effort data are unavailable on recreational fisheries for groundfish. The State of Oregon has been making estimates of recreational catches (by species) since 1973, and corresponding estimates for Washington are available since 1966. In addition to CPFV data, California catch-effort data on recreational shore/pier (1975-76) and skiff (1957-61, 1964) fisheries are available from special short-term studies.

Beginning in 1979 a NMFS-funded study on west coast recreational fishing was implemented. This study will provide directed effort and catch data for both CPFV and private boats, as well as shore angling effort and catch.

Insufficient resource and economic data are presently available to adequately cover the recreational fishery at this time. When the necessary funds and assignments are made available to carry out studies and/or research, a more adequate presentation can be made in the plan. Reliable data on species catches and the economic impact of the recreational fishery need to be developed for the three states. In addition, social concerns, geographic differences, oceanographic differences, number of participants and trends, number and kinds of boats, etc. need to be covered.

5.4.2 Foreign Fisheries

Since 1967, the USSR has provided catch and effort data by large regions (i.e., British Columbia, Washington-Oregon-California), by calendar quarter, by vessel type, and by certain major species or species groups (e.g., whiting, rockfish, other fish) through bilateral agreements. From 1973 to 1976 a more complete species breakdown of Soviet catches was reported by INPFC area. Since 1977 the Soviet whiting fishery has been conducted under a PMP which requires even more detailed reporting of fishery statistics. For 1977-79, the Soviets reported data by ½°lat.x1°long. statistical blocks.

Japanese catch statistics, which are the most detailed furnished by a foreign nation, were provided through INPFC since 1964-76. These statistics consist of catch and effort, reported by statistical blocks of 1/2 degree latitude and 1 degree longitude, by month, by gear type, and by vessel size. Catch is given by the following species groups: Pacific ocean perch, other rockfish, sablefish, Pacific cod, pollock, turbot, and other flatfishes. Fishing effort is given in number of hours for their trawl fisheries and in 10 hachi units for their longline fishery (hachi is a basket of longline gear).

Polish trawl catches and effort are reported by the same ½ degree X 1 degree blocks as used by the Japanese, and are available for each year starting in 1974. Bulgaria, German Democratic Republic, and the Federal Republic of Germany fished off the Pacific Coast in a limited and sporadic manner from 1973 through 1976, but never reported any catch-effort data to the United States.

The Republic of Korea conducted a longline/trap fishery off the Pacific Coast from 1973 to 1976. This fishery was eliminated when the FCMA came into effect. The data from this fishery are generally incomplete, and reported by large statistical blocks (e.g., Washington-California) which are unsuitable for stock assessment.

5.5 Survey and Sampling Data

A variety of research cruises have been conducted off the Pacific Coast by Canadian, Soviet, and U.S. scientists. Most of these cruises have been geared toward tagging, life history studies, and exploratory fishing. Only in recent years have extensive resource assessment surveys been carried out.

In 1969, the California Department of Fish and Game conducted a trawl survey of Dover sole in the southern part of the INPFC Eureka area, and estimated the biomass of Dover sole out to 600 fathoms. The Oregon Department of Fish and Wildlife conducted extensive trawl surveys aimed at assessing the biomass and population biology of flatfish stocks off the Oregon and Washington coast during 1971-76, and the National Marine Fisheries Service coordinated its 1975 trawl/hydroacoustic survey of the whiting resource with the Oregon survey made that year. The 1975 whiting survey was the first comprehensive survey of the whiting resource made up to that time, and data emanating from that survey were used to estimate whiting biomass, age, and size composition off the Pacific Coast.

In 1977, a trawl/hydroacustic survey of Pacific Coast rockfish and whiting resources was conducted by NMFS, the Polish Sea Fisheries Institute, Washington Department of Fisheries, Oregon Department of Fish and Wildlife, and California Department of Fish and Game. This survey was distinguished by its broad geographic coverage (34°30'N - 48°30'N), high station density, use of a roller-gear equipped trawl with a 30-foot vertical opening, and incorporation of both demersal and hydroacoustic/midwater trawl survey techniques. Intensive sampling of the catches enabled a thorough analysis of the population characteristics of rockfish and whiting stocks in the survey area.

Ichthyoplankton surveys have been conducted as a part of the California Cooperative Oceanic Fisheries Investigation (CALCOFI). The density of whiting and jack mackerel eggs and larvae has been monitored routinely at standard stations over a large area off California and Mexico, providing indices of relative abundance.

Sampling programs aimed at obtaining species, size, and age composition data on commercial groundfish landings are carried out by the States of Washington, Oregon, and California. A sampling program to obtain

species, size, and age composition of rockfish in the commercial passenger fishing vessel and commercial catch (Monterey-Oregon) was begun in 1977. The State of Washington has been collecting biological data from recreational catches since 1976.

Limited data on the size and age composition of the fish in foreign catches have been provided to date, and have usually been restricted to whiting and Pacific ocean perch. Data collected by the United States' observer program should correct this inadequacy in the future.

5.6 Quality of Data

Fisheries data should include catch by species, time, and area, some standardized measure of the effort expended in obtaining that catch (i.e., hours trawled, skates of longline gear set, recreational angler-days), and estimates of the size/age composition of the catch. With this type of information, trends in stock abundance, mortality, and recruitment can be monitored and stock conditions assessed.

In the Pacific Coast region, only the North American fisheries data begin to approach this ideal, and the quality of the foreign fisheries data leaves much to be desired. Virtually all of the catch per unit effort and size/age composition data used in stock assessment work come from U.S. and Canadian sources. Only limited series of biological (size-age-sex) data are available for several groundfish species, particularly when specific time/area/depth strata are examined.

Although data on U.S. catches are relatively detailed and precise, corresponding data on discards are lacking. In some areas the weight of the fish discarded can equal or exceed the weight landed (Herman and Harry, 1963; TenEyck and Demory, 1975), yet no systematic series of data on discards currently exist. Since the bulk of the fish that are discarded are either dead or moribund, they are essentially lost to the population, and must be accounted for in stock assessment work. Discards of groundfish by shrimp trawlers should also be documented and reported on a systematic basis.

Another shortcoming in U.S. fisheries data lies in the reporting of "other rockfish" catches and until 1978 the nonreporting of whiting catches. At present, catches of rockfish are reported in the aggregate, and the species composition of these catches estimated through special market or dock sampling programs conducted by the States of Washington, Oregon, and California. Despite these sampling programs, however, effort data are still not separable for individual rockfish species. The only available indices of catch per unit effort (CPUE) pertain only to the rockfish species aggregate present in any given area. If fishing were switched to alternate species of rockfish, CPUE can remain high for the rockfish aggregate even though some species are at low levels.

Japanese data on catches have been the most detailed of any foreign nation fishing the rockfish complex, but corresponding data on catch per unit effort and size/age composition are quite limited and inappropriate for detailed analysis. Fisheries data supplied by the USSR have been extremely marginal, and even nonexistent for some years (1965-66). The

species breakdown provided for Soviet data is poor, and it was not until 1973 that Pacific ocean perch catches were reported separately from "other rockfish." Between the efforts of the U.S. observer program and the more stringent reporting requirements instituted under the Preliminary Management Plans, it is hoped that past inadequacies in foreign fisheries data have largely been corrected.

Chapter 6 --Status of Stocks

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<u>Summary</u>

This chapter provides a discussion of the biological status of each major species/species complex managed by this FMP. Maximum sustainable yield (MSY) and acceptable biological catch (ABC) specifications are provided along with their rationales. The MSYs and ABCs are the departure points for optimum yield specifications in Chapter 9.

This chapter states:

<u>Maximum Sustainable Yield and Acceptable Biological Catch Specifications</u>

- Maximum sustainable yield is the average largest allowable catch from a stock over a period of years. It assumes equilibrium in the population and relatively stable environmental conditions. Thus it has greatest applicability to the longer-lived species. It is not an annual goal. Estimates of MSY are made in several ways or combinations thereof.

  - Application of an equation relating MSY to the instantaneous natural mortality rate and the estimated (virgin) biomass ($MSY = 0.5\ MB_0$).

  - Use of general production models.

  - Use of yield per recruit models.

  - Observations of catch data or survey data.

  - Cohort analysis.

- Acceptable biological catch is the better tool to achieve management goals as it takes into account MSY, the current status of the stocks, and environmental conditions.

- Tables 13 and 14 (pages 6-6 and 6-7) provide the species/species complex MSY and ABC estimates by area where appropriate.

Information Utilized in Specifications

- Lingcod - For the Eureka, Monterey, and Conception areas, the MSY equals the mean annual catches in 1973-77. In Columbia and Vancouver, the MSY's are larger than mean catches based upon the 1977 rockfish survey. There is no deviation from MSY to ABC.

- Pacific Whiting - The MSY is set at 175,500 mt which is midway in the range of MSY estimates for the FCZ. There is no deviation from MSY to ABC.

- Sablefish - The MSY specified for the five management areas is 13,400 mt. This was derived by applying the estimated biomass of 60,800 mt X M of 0.22 (MSY = MB). The ABC provides a limitation of the Monterey Bay catch to 2,500 mt because of declines in CPUE and average size in a fairly intensive pot fishery.

- Pacific Ocean Perch - MSY for P.O.P. stocks in the Vancouver and Columbia areas are estimated at 2,300 mt and 3,000 mt respectively. This was derived using the MSY = 0.5 MB_0 equation and recent catch data. ABC is substantially reduced as the biomass is far below levels producing MSY. Therefore, ABC's are provided as a range with the lower catch level providing for faster rebuilding of the stocks and the higher rates for slower rebuilding.

- Shortbelly Rockfish - In Conception and Monterey areas an abundance of 295,000 mt of shortbelly rockfish applied to the 0.5MB, relationship (assuming M=0.3) provides a preliminary MSY estimate of 44,250 mt for the two areas. ABC is set at 10,000 mt.

- Widow Rockfish - Data on widow rockfish are insufficient to calculate an MSY or ABC.

- Other Rockfish - By definition the "other rockfish" category includes all rockfish species except Pacific ocean perch, shortbelly rockfish and widow rockfish. Shelf rockfish and inshore rockfish are major components of the "other rockfish" category.

  MSYs have been calculated for canary rockfish, yellowtail rockfish, bocaccio and chilipepper rockfish. For all others, there is insufficient data with which to calculate a meaningful MSY. However, since the FCMA requires a MSY value, for the purposes of meeting legal requirements only MSY is determined to be equal to or greater than the ABC.

  In the Conception area the MSY for bocaccio and chilipeppers are estimated primarily using yield per recruit analysis (trawl fishery for bocaccio) and catch data (other fisheries for bocaccio and chilipeppers). It was estimated at 2,000 mt for bocaccio and 1,000 mt for chilipeppers. In the Monterey area, yield per recruit analysis results in MSY estimates for bocaccio at 4,100 mt and chilipepper at 1,300 mt. There is no deviation from MSY to ABC for these stocks.

In the Vancouver and Columbia areas, the 1977 rockfish survey provides the basis for MSYs of yellowtail and canary rockfish. In the Eureka area catch data were used to estimate MSY of these species. There is no deviation from MSY to ABC for these stocks.

No estimates of MSY are available for the group which includes black and yelloweye rockfish in the Vancouver and Columbia regions; blue, black and olive rockfish in Monterey, and olive, blue, vermilion and greenspotted rockfish in Conception. ABCs were based on 1977 catches.

- Dover Sole - The Dover sole MSYs in Monterey, Vancouver, and Conception are based upon catch data and are set at 5,000 mt, 1,000 mt and 1,000 mt respectively. In the Columbia area, yield per recruit analysis and general production model analysis resulted in an MSY estimate of 4,000 mt. In Eureka, general production model analysis and catch data give an MSY estimate of 8,000 mt. There is no deviation from MSY to ABC.

- English Sole - Yield per recruit analysis, general production models, and survey data indicate a MSY of 2,600 mt in Vancouver and Columbia, combined. Based on catch data MSYs for Eureka, Monterey, and Conception are 831 mt, 910 mt and 171 mt respectively. There is no deviation from MSY to ABC.

- Petrale Sole - Yield per recruit relationships, as substantiated by general production model analysis, are the basis for MSY estimates of 611 mt for Vancouver and 1,105 mt for Columbia respectively. Catch data suggest MSY estimates of 447 mt for Eureka, 769 mt for Monterey and 232 mt for Conception.

- Other Flatfish - This grouping includes but is not limited to rex sole, Pacific sanddab, starry flounder, rock sole, sand sole and butter sole. MSYs for this group have not been calculated due to insufficient data. ABC is set by multiplying the highest record catch level by 1.5. Protection of these stocks is afforded by mesh size measures directed toward the major flatfish species.

6.0 STATUS OF STOCKS (MSY and ABC)

By definition, maximum sustainable yield (MSY) is the largest catch which can be taken from a stock over a reasonable period of years under current fishing practices. This assumes an equilibrium in the population associated with a degree of stability in the environment during the time period considered. Within such a time period, however, neither the environment nor the dynamics of the population are constant from year to year. MSY is consequently most applicable to longer-lived species such as Dover sole or Pacific ocean perch in which variations in recruitment are buffered by the presence of several year classes.

MSY should not be applied as an annual goal or criterion for fisheries management without proper evaluation of real-time indices of stock condition, such as current CPUE and age structure. In some instances, current environmental conditions may constrain recruitment to levels that are far below those that produce MSY. Under these circumstances, the population can be considered to be approaching a lower level of equilibrium which would require a correspondingly lower level of harvest.

In the case of stocks which are in virgin or near-virgin status, first approximations of MSY are made by using the equation developed by Alverson and Pereyra (1969);

$$MSY = 0.5\ M\ B_0$$

Where M = instantaneous natural mortality rate

B_0 = estimated virgin biomass

This method will overestimate MSY if age at recruitment is small compared to maximum age. The converse is true if age at recruitment is relatively large (Gulland, 1970). Age at recruitment of most of the exploited species appears to be reasonably close to that assumed by use of the above equation. Use of the equation also assumes that recruitment is constant at least over the range of stock sizes between the virgin stock level and the level producing MSY (Francis, 1974; Gulland, 1970). This assumption is probably safe with highly fecund species unless spawning stocks are reduced to very low levels, but experience indicates that fishing does lower recruitment to stocks with low fecundity at fairly high levels of spawning stock size (e.g., shark, Holden, 1977, and clupeoids, Murphy, 1977). Potential recruitment problems with low fecundity species are noted where appropriate.

Where stocks appeared to be near levels producing MSY, the relation MSY = MB was used, where B=estimated existing biomass. If B is greater than that which would produce MSY, the approximation will probably be too high. While the approximation may overestimate MSY, serious overfishing is not likely to occur if the stock is monitored and harvest levels are adjusted as MSY estimates are refined. If B is less than that which would produce MSY, the approximation will probably be too low, but MSY would not be obtained unless the stock is rebuilt. Hopefully, further monitoring of such stocks would reveal their depleted state and appropriate action could be taken.

Estimates of MSY for other Pacific Coast species are available via recourse to general production models (Schaefer, 1954; Pella and Tomlinson, 1969) or comparison of current levels of catch with those that would be predicted by using yield-per-recruit models (Beverton and Holt, 1957).

In other cases almost no information other than catch data is available or MSY approximations do not agree with observation of the fishery. In these cases catch data were used to approximate or adjust estimates of MSY.

In contrast to MSY, ABC is based on the best estimates of the current condition of stocks. It can be set at a yield to maintain a stock at the current level of abundance in succeeding years. However, if a stock is depleted it can be set below the above yield in order to rebuild the stock. Also if it is apparent that management measures other than quotas (e.g., mesh size restrictions) would ensure that a stock would not become depleted, ABC can be set at whatever can be caught under the specified management measures.

Estimates of MSY and ABC (acceptable biological catch) for each groundfish species or species-group described below are shown in Tables 13 and 14.

6.1 Lingcod

6.1.1 Maximum Sustainable Yield (MSY)

Proper assessment of lingcod stock conditions is difficult owing to: (1) the highly localized nature of the stocks, (2) an almost total lack of data on the age composition of the catches (due to technical difficulties in aging lingcod), (3) an inability to adequately determine the amount of fishing effort expended toward lingcod in multispecies fisheries, and (4) inadequacies in lingcod catch statistics from recreational, commercial line, and foreign trawl fisheries.

Conversations with CPFV owners suggest that lingcod have been depleted in certain restricted areas off California, but examination of catch data does not indicate depletion of stocks in either the Conception, Monterey, or Eureka areas as a whole. Similar comments on stock depletion in some coastal waters of Oregon and Washington (Columbia and Vancouver areas) have been received with similar conclusions.

Total 1977 lingcod landings by commercial and recreational fishermen in the Eureka-Conception region were 1,745 mt. There is nothing to indicate that lingcod catches in this region have declined as a result of the harvests made to date, and the mean annual catches during 1973-77 have been taken as preliminary estimates of MSY for this region.

Lingcod stocks in the Vancouver and Columbia areas have probably been lightly exploited to date. Even though MSY (= MB) estimates from the 1977 rockfish survey are known to be strongly biased on the low side (since a large fraction of the lingcod resource is found shallower than the region surveyed), they are still much higher than the MSY estimates

Table 13. Estimates of MSY in thousands of mt and method of derivation (in parenthesis) for California-Washington region by INPFC areas.

Species	Vancouver[1]	Columbia	Eureka	Monterey	Conception	Total
ROUNDFISH						
Lingcod	1.0 (a,b)	4.0 (a,b)	0.5 (b)	1.1 (b)	0.4 (b)	7.0
Pacific Cod	- - - - - - Not applicable - see section 6.2 - - - - - -					
Pacific Whiting						175.5[2] (a)
Sablefish						13.4[2] (a)
ROCKFISH						
Pacific Ocean Perch	2.3 (b,c)	3.0 (b,c)	3/	3/	3/	5.3
Shortbelly						44.2[2] (a,c)
Widow						4/
OTHER ROCKFISH:[5]						
Bocaccio	3/	3/	3/	4.1 (b,d)	2.0 (b,d)	6.1
Canary	4.0 (a)	1.3 (a)	0.6 (b)	3/	3/	5.9
Chilipepper	3/	3/	3/	1.3 (b,d)	1.0 (b,d)	2.3
Yellowtail	2.3 (a)	2.4 (a)	0.3 (b)	3/	3/	5.0
Remaining Rockfish	4/	4/	4/	4/	4/	4/
FLATFISH						
Dover Sole	1.0 (b)	4.0 (d,e,f)	8.0 (e)	5.0 (b)	1.0 (b)	19.0
English Sole	0.6 (a,d,e,f)	2.0 (a,d,e,f)	0.8 (b)	0.9 (b)	0.2 (b)	4.5
Petrale Sole	0.6 (b)	1.1 (b,d,e,f)	0.5 (b)	0.8 (b)	0.2 (b)	3.2
Other Flatfish (except arrowtooth flounder)	4/	4/	4/	4/	4/	
OTHER FISH[6]	4/	4/	4/	4/	4/	

1/ U.S. portion
2/ Total all areas
3/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, they are included in the "other rockfish" category for those areas only.
4/ There is insufficient data with which to calculate a meaningful MSY. However, since the FCMA requires a MSY value, for the purposes of meeting legal requirements only MSY is determined to be equal to or greater than the ABC.
5/ "Other Rockfish" are defined as all rockfish except Pacific ocean perch, shortbelly rockfish and widow rockfish.
6/ See Table 1.

MSY Methodology

a = survey data	c = MSY = 0.5 MB	e = general production model
b = catch data	d = yield-per-recruit	f = cohort analysis

Table 14. Estimates of ABC in thousands of metric tons (mt) for the California-Washington region by INPFC areas.

Species	Vancouver[1]	Columbia	Eureka	Monterey	Conception	Total
ROUNDFISH						
Lingcod	1.0	4.0	0.5	1.1	0.4	7.0
Pacific Cod	2.2	0.9	2/	2/	2/	3.1
Pacific Whiting						175.5[3/]
Sablefish				2.5[4/]		13.4[3/]
ROCKFISH						
Pacific Ocean Perch	0.0-0.6[5/]	0.0-0.95[5/]	2/	2/	2/	0.0-1.55
Shortbelly						44.2[3/]
Widow						6/
OTHER ROCKFISH:						
Bocaccio	2/	2/	2/	4.1	2.0	6.1
Canary	4.0	1.3	0.6	2/	2/	5.9
Chilipepper	2/	2/	2/	1.3	1.0	2.3
Yellowtail	2.3	2.4	0.3	2/	2/	5.0
Remaining Rockfish	2.0	2.5	1.9	4.3	3.3	14.0
FLATFISH						
Dover Sole	1.0	4.0	8.0	5.0	1.0	19.0
English Sole	0.6	2.0	0.8	0.9	0.2	4.5
Petrale Sole	0.6	1.1	0.5	0.8	0.2	3.2
Other Flatfish (except arrowtooth flounder)	0.7	3.0	1.7	1.8	0.5	7.7
OTHER FISH[7/]						
Jack mackerel						12.0[8/]
Others	3.0	7.0	2.0	2.0	2.0	16.0

1/ U.S. portion
2/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "other species" category for the areas footnoted and rockfish species are included in the "other rockfish" category for the areas footnoted only.
3/ Total all areas
4/ Monterey Bay only
5/ The upper limit of this range represents the estimate of what will be caught under the 20-year rebuilding schedule adopted by the Council (Table 15). Actual landings of POP will be governed by trip limits (see Section 1.4.2.4).
6/ There are insufficient data to calculate an ABC.
7/ Includes sharks, skates, rays, ratfish, morids, grenadiers, jack mackerel and arrowtooth flounder. See Table 1 for specific listing.
8/ All areas north of 39°N latitude.

from average catches. While the 1973-77 catches averaged 422 mt in the Vancouver area and 931 mt in the Columbia, corresponding MSY estimates from the 1977 survey were 700 mt and 3,800 mt. As a result, MSY estimates in these areas were increased above 1973-77 catch levels, and were estimated at 1,000 mt in the Vancouver area and 4,000 mt in the Columbia area.

6.2 Pacific Cod

6.2.1 Maximum Sustainable Yield (MSY)

Pacific cod are at the southern end of their geographic range in the Washington-Oregon region. Environmental conditions have a more significant influence on recruitment/stock abundance than fishing, and catches will fluctuate from year to year as recruitment varies. Recruitment and abundance fluctuate substantially from year to year (Ketchen, 1961), and since the fishery for cod is based principally on 2-3 year classes, stock size fluctuates widely. There is no evidence that unrestricted fishing has resulted in a significant sustained reduction in cod abundance. These facts suggest that the MSY concept is not applicable to Pacific cod. However, since the FCMA requires a MSY value, for the purposes of meeting legal requirements only, the MSY is determined to be equal to or greater than the Acceptable Biological Catch set forth below.

6.2.2 Acceptable Biological Catch (ABC)

Harvests at the current level are probably sustainable on a long-term basis. Because the fishery does not appear to affect the stock, ABC can be placed at 3,100 mt, the highest catch of record (1978).

6.3 Pacific Whiting

6.3.1 Maximum Sustainable Yield (MSY)

Soviet and U.S. estimates of MSY, based on a variety of survey results and population analyses in the late 1960's, ranged from 120,000 to 270,000 mt (NMFS 1966, 1968, 1974). More recently, a Soviet study (Efimov and Lokschina, 1977) utilizing catch and effort statistics, concludes that the maximum potential yield, given the average level of fishing effort for the period 1965-73, was 190,000-225,000 mt.

On the average during the last five years, the distribution of foreign catches and the 1975-77 surveys suggest that less than 10% of the whiting resource occurs off Canada. The MSY estimates for the portion of the resource off the United States have been modified accordingly by multiplying the estimates by 0.9, providing a range of 108,000-243,000 mt.

While foreign whiting fisheries have operated off Canada since the 1960's, there was little or no Canadian effort until 1978 when a joint fishing venture with Poland was initiated. In 1978, the total whiting catch off British Columbia was 6,360 mt, 1,836 mt of which was landed by the joint venture. The catch in 1979 increased to 12,135 mt (including

4,235 mt joint venture) and in 1980 was 19,000 mt[1/] (including 13,136 mt joint venture). These catches represent 6, 9, and 21 percent of the total Pacific whiting catch for 1978, 1979, and 1980, respectively.

Canadian management of the fishery has been based largely on U.S. assessments of the resource. Total allowable catches (TACs) for fisheries off Canada are derived through consideration of U.S. TACs established for the U.S. zone and information on the proportion of the stock occurring off Canada. Canadian scientists recommended TACs of 20,000, 35,000, and 30,000 mt in 1978, 1979, and 1980, respectively.

This management approach has been useful in the past but with increasing national interest and harvesting capability in both the U.S. and Canada, a more coordinated management scheme based on sound scientific principles becomes more important. In the absence of such a cooperative effort, resource problems could well emerge as full utilization of the resource is approached in both regions.

Results of the 1977 ichthyoplankton and trawl/hydroacoustic surveys (below) suggest that the size of the whiting stock has increased substantially since 1975. This increase can be at least partially explained by the presence of what appears to be an extraordinarily large 1973 year class which was not fully available during the 1975 survey. Estimates of adult Pacific whiting biomass (mt) in 1977 by INPFC areas are:

Conception	1,439
Monterey	129,549
Eureka	370,443
Columbia	344,613
Vancouver (U.S. waters only)	119,134
Total	965,278

The results of the hydroacoustic survey conducted by the Polish vessel Professor Siedlecki during the period and over a similar area provided a biomass estimate of 1,015,000 mt.

In the case of Pacific whiting MSY is considered attainable. The estimate of MSY is 175,500 mt, a value midway in the range of MSY estimates. This estimate may be conservative but is justifiable because (1) unexplained signs of population stress were observed when annual catches exceeded 200,000 mt, (2) the substantial variability in biomass estimates has yet to be fully explained, and (3) the inadequacy of past fishery statistics precludes assessment of the effects of fishing. In addition, large increases in catch would adversely impact our efforts to minimize the incidental catch of Pacific ocean perch and other rockfish.

Since 1973, there have been a number of years when the all-nation removal of whiting exceeded 200,000 mt. During this period several indicators were observed which suggested that the population was reduced substantially from what it was during the mid-1960's. These indicators

1/ Preliminary estimate.

included a change in fishing patterns normally adopted by the Soviet fleet, with an increased proportion of younger (immature) fish in the catch, and substantially decreasing CPUE.

Trawl/hydroacoustic surveys showed that these changes were accompanied by a sharp reduction in the number and geographic distribution of whiting schools in the Oregon-British Columbia region where adult whiting had concentrated in earlier years, while ichthyoplankton surveys demonstrated a contraction of the spawning area. Results of a 1975 trawl/hydroacoustic survey indicated that the biomass in the California-Washington region was about 445,000 mt, less than half the biomass estimated by studies in the 1960's.

6.4 Sablefish

6.4.1 Maximum Sustainable Yield (MSY)

The full potential of sablefish resources off Washington-California cannot be adequately assessed with the data currently available.

Limited size/age composition data are available, and the quality of sablefish catch-effort statistics is low. Only the Japanese longline statistics are sufficiently consistent, detailed, and uniform for any historical evaluation of the resource, yet the Japanese fleet operated sporadically off Washington-California and in offshore waters where U.S. fishermen generally do not fish.

The best available information on the sablefish resource, therefore, permits only an empirical approach in assessing stock conditions, utilizing data on catch history, selected CPUE data, and the size composition of the catch. Using this approach, Low et al. (1976) suggested that MSY in the Washington-California area would be at least 7,000 mt per year.

A new source of information for estimating MSY is now available because of the 1977 rockfish survey. The survey of the 50-250 fathom zone showed a biomass of 15,200 mt in the Vancouver-Conception region. Based on previous distributional studies (Alverson et al., 1964 and Low, 1977) showing that 75% of the exploitable biomass lies deeper than 250 fathoms the total biomass was estimated to be about 60,800 mt. Since the survey design and gear (trawl) were not designed to sample sablefish nor were the major sablefish grounds sampled, the accuracy of this biomass estimate is questionable. Nonetheless, the estimate of MSY (approximately equal to MB = 0.22 X 60,800 = 13,400 mt) based on the survey is the best available.

Tagging studies by Osada and Cailliet (1975) have shown that the sablefish stock in Monterey Bay is quite independent of stocks elsewhere. This stock has been the subject of an intensive pot fishery in recent years (1973-77) which has resulted in a decline in CPUE (30% from 1974-76) and average size of fish landed (Hardwick, 1978). Further examination of this and other data from the fishery indicates that the stock is in the process of being fished down and that ABC is probably

less than 2,500 mt. Out of the total Pacific Coast MSY of 13,400 mt, no more than 2,500 mt should be taken from the Monterey Bay area.

The quality of domestic fishery statistics, and the intensity of biological sampling of the catches (for data on size and age composition) must improve if more precise estimates of MSY are to be obtained. Studies of interrelationships between stocks in different portions of the geographic and bathymetric range must also be intensified, so that the distribution and discreteness of sablefish stocks can be determined. With this type of information, together with future survey data from the deep-water portion of the sablefish stock, more precise estimates of sablefish MSY in specific locations should be forthcoming.

6.5 Pacific Ocean Perch

6.5.1 Maximum Sustainable Yield (MSY)

The criteria MSY = 0.5 MB_0 can be applied to Pacific ocean perch using trends in catch per unit effort with time, and biomass estimates available from a variety of sources. The catch per unit effort data indicate that both the U.S., Vancouver and Columbia stocks were reduced to about one-half of the 1965 level (B_0) by 1967.

In the Golumbia area, the decline in stock abundance was quite abrupt, reaching 0.72 B_0 in 1966 and 0.24 B_0 in 1967. Gunderson et al. (1977) estimated the 1966-68 exploitable biomass in the Columbia area at 23,000 mt, while later (unpublished) cohort analysis has indicated that the 1966-68 exploitable biomass averaged 30,000 mt. Assuming that the 0.5 B_0 level was about 30,000 mt, and using F = 0.1 (Gunderson, 1977), the corresponding estimate of MSY would be 3,000 mt (F=instantaneous rate of fishing mortality).

In the Vancouver area, catch per unit effort data indicate that the stocks were reduced to 0.89 B_0 by 1966, 0.60 B_0 by 1967, and 0.34 B_0 by 1968. Gunderson et al. (1977) estimated the 1966-68 exploitable biomass to be 34,000 mt, and cohort analysis indicates that the exploitable biomass in 1966-68 was 29,000 mt. As in the Columbia area, the estimates suggest that 0.5 B_0 was about 30,000 mt, and that MSY would be 3,000 mt. The 1972-76 catches of Washington trawlers indicate that 75% of the Vancouver stock lies below the U.S.-Canada equidistant line, so MSY for the U.S. portion of this stock is about 2,250 mt.

6.5.2 Acceptable Biological Catch (ABC)

The abundance of Pacific ocean perch stocks is far below the level which produces MSY. In addition, the age composition of these stocks indicates that existing fisheries rely far too heavily on newly recruited year classes.

The latest available POP biomass estimates are:

Method \ Year and INPFC Area	1977 U.S. Portion Vancouver	1977 Columbia	1979 U.S. Portion Vancouver	1979 Columbia
Catch per Effort (CPUE)	13,350 mt	9,600 mt	N.A.	N.A.
Trawl Survey	7,730 mt	7,100 mt	5,711 mt	10,436 mt
90% Confidence Interval (mt)	0-16,388	4,200-9,800	1,331-10,091	6,266-14,604

The 1979 survey biomas estimates of 7,730 mt for the Vancouver area and 10,436 mt for the Columbia area are the latest and best available (Wilkens et.al., 1979). The 1979 survey generally verified the 1977 survey estimates and because of improved survey design, were statistically more precise. The 1977 estimate from CPUE analyses was probably too high because fishermen changed to a new, more effective high opening net in 1977 (Fraidenburg et.al., 1978).

Pacific ocean perch stocks are the most severely depleted of those addressed in this plan, and a considerable rebuilding period is necessary to return them to MSY levels (approximately one-half the virgin biomass). Two key biological considerations argue for the shortest rebuilding period possible: (1) There is a possibility that recruitment will fall off due to the reduced quantity of spawners present and will be less than that needed to produce MSY. Stock levels in 1979 were probably 25% and 35% of MSY levels in the Columbia and U.S.-Vancouver areas, respectively. For a low-fecundity species like Pacific ocean perch, this level of reduction could well reduce the level of recruitment considerably below MSY. (2) The age structure of the stocks has been changed drastically by exploitation, so that existing fisheries now rely on incoming year classes during the first years they recruit to the fishing grounds. In the Columbia area this has occasionally resulted in intensive harvesting of immature 6 and 7 year old fish, at a time in their life when additions to the stock through growth exceed losses due to natural mortality. This situation can be remedied by rebuilding the stock in such a way that older fish become more plentiful, and the harvest spread over a wider range of age groups.

The rate of stock rebuilding under different levels of annual catch has been examined by Gunderson (1979) and more recently by Tagart et al. (1980), and the results are shown in Table 15.

These estimates are on the conservative side, since they assume that fishing mortality for fish less than 10 years old will remain at the levels experienced by the 1957-63 year classes. If fishing intensity on these age groups is reduced below those levels, rebuilding could occur significantly faster than indicated in Table 15. Since those age groups were subject to high rates of discard by commercial fishermen, there is no way to estimate fishing mortality for them, and determine the exact magnitude of this bias, however.

Table 15. Years required to rebuild Pacific ocean perch biomass in the INPFC Vancouver and Columbia areas to levels producing MSY, given fixed levels of annual catch.1/

Annual Catch (mt)	Vancouver (years)	Columbia (years)
0	12	11
100	13	11
200	14	12
300	15	12
400	16	13
500	18	14
600	20	15
700	24	16
800	29	18
900	39	19
950	-	20

1/ Adapted from Gunderson (1979).

It should also be pointed out that the rebuilding process may take longer than estimated if future recruitment is below 1966-73 levels (the period covered by Gunderson's analysis) due either to the reduced abundance of spawners, or to environmental conditions. On the other hand, the rebuilding process could take a shorter time if environmental conditions favor strong recruitment of Pacific ocean perch stocks. Past experience indicates that year-classes of this strength only occur at about 9-year intervals (strong year classes occurred in 1943, 1952, 1961, and 1970).

The results shown in Table 15 indicate that in order to promote the most rapid building, ABC should be set at zero.

6.6 Shortbelly Rockfish

6.6.1 Maximum Sustainable Yield (MSY)

First approximations of the MSY for shortbelly rockfish can be obtained by using the relationship MSY = 0.5 MB_o, since the current, unexploited biomass (B_o) was estimated to be 295,000 mt during the 1977 rockfish survey. This estimate is based on hydroacoustic assessment of an aggregation extending from 37°07'-37°36' (Pt. Ano Nuevo to Pt. San Pedro) and is tentative at best. Owing to problems of identification of the echo sign and determination of target strength, this biomass estimate could be off by as much as a factor of 2. CALCOFI surveys indicate some concentrations of shortbelly rockfish larvae south of the survey region. In addition, only one concentration of adult shortbelly rockfish that was large enough to be estimated by the hydroacoustic technique was located during the survey. Undoubtedly there were concentrations of adults not included in the estimate, thus there is a

conservative bias in the estimate in addition to a low degree of precision. Assuming M = 0.3 for this species, a preliminary MSY estimate for shortbelly rockfish would be 44,250 mt.

6.6.2 Acceptable Biological Catch (ABC)

It is advisable to set ABC for shortbelly rockfish less than the MSY of 44,250 mt, because of the tentative nature of the MSY estimates, small sample size used in estimating incidental catches of below-optimal size fish of other important species, and poorly defined role of shortbellies in the ecosystem. While there is a conservative bias to the biomass estimate used to approximate MSY, the biomass estimate could also vary either way by a factor of 2. In addition, shortbelly rockfish have low fecundity, which suggests that if the biomass estimate is correct, use of 0.5 M as a multiplier of biomass to estimate MSY is optimistic. While data from the 1977 rockfish survey indicate that incidental catches of other important species will be low in a midwater trawl fishery directed at shortbelly rockfish, the sample size is small, and it is also difficult to predict what would happen under actual commercial fishery operations. Little information is available on the role of shortbelly rockfish in the ecosystem. One study indicated that it is of some importance as a prey item at times to chinook salmon (about 15% of diet) in the San Francisco region (Merkel, 1957). Another study indicated that it could compete with other important species for euphausiids (Phillips, 1964). With these factors in mind, it is advisable to set ABC at a level that would allow development of a fishery, while ensuring safety until more is known about the species. Potential use of the species (e.g. minced fish and pet food) requires a high volume fishery, and an ABC of about 10,000 mt would consequently be necessary to develop it. This value is in line with recommendations of a recent study of the resource (Lenarz, 1978c). If catches approach 10,000 mt and monitoring of the fishery does not reveal serious incidental catch problems or does not suggest that the approximation of MSY is too optimistic, ABC could be increased to 20,000 mt. Beyond that point, growth of the fishery could follow the scheme adopted for in-season adjustments to harvest guidelines (Section 9.3.2).

6.7 Widow Rockfish

6.7.1 Maximum Sustainable Yield (MSY)

MSY for widow rockfish is unknown. Results of the 1977 rockfish survey were not reliable because of their pelagic behavior. To estimate MSY either by a surplus production model or cohort analysis requires a long series of data thus even a most preliminary estimate of MSY cannot be calculated until the late 1980s.

Prior to 1978, widow rockfish was an underutilized resource. Coastwide landings ranged from 16 mt in 1970 to 666 mt in 1967 and averaged 211 mt[1/]. In early 1979 a fishery developed off the central Oregon

1/ Unpublished data from a workshop held at NMFS Tiburon Laboratory, December 11-12, 1980.

coast by vessels using midwater trawls. Catch in 1979 amounted to 4,293 mt delivered by nine vessels. Catch in 1980 amounted to 17,473 mt delivered by 52 vessels. The number of additional vessels that might enter the fishery in 1981 is unknown.

An unknown amount of widow rockfish was harvested by foreign fleets between 1967 and the FCMA. Since 1977, foreign catch has been regulated by incidental catch restrictions through the PMP. The foreign catch in 1977 was 498 mt. Foreign and joint venture harvests for 1978-80 are given below.

	Foreign (mt)	US/USSR Joint Venture (mt)
1978	304	6
1979	548	40
1980*	457	Retained 22.3 mt, discarded 39.2 Total 61.5

* Preliminary.

The 1980 catch of widow rockfish is without precedent in the history of the fishery for this species and in terms of stock assessment represents a single data point.

Biological sampling of widow rockfish began with the development of the midwater trawl fishery. Females reach 50% maturity at age 7 and males at age 5+. Age composition of the 1979 and 1980 catch shows that nearly all fish caught are mature.

Age composition of the catch in the Columbia area where removals are largest certainly indicates that the fishery started when a strong 1970 year class was present in the population comprising 43% of the catch in 1979 and nearly 33% of the catch in 1980. Age data from 1980 also show a moderately strong 1971 year class which comprised about 25% of the 1980 catch. Together, the 1970-71 year classes comprised 56% of the 1980 catch.

A comparison of the 1979-80 age composition suggests that the 1972-73 year classes are not strong. In 1979, age 8 fish comprised 21% of the catch but age 8 fish in 1980 comprised only 5% of the catch. However, age 5 and 6 fish comprised 5% each of the 1980 catch compared to less than 1% each in 1979, thus either or both the 1975 and 1974 year classes may be stronger than the 1973 and 1972 year classes, but this will not be known until these year classes are more fully recruited to the fishery at least at age 8, 4 or 5 years from now.

Age	1979 %	1980 %
5	0.1	3.8
6	0.1	4.0
7	4.1	3.1
8	20.7	4.9
9	43.4	25.1
10	14.5	32.3
11	8.1	11.9
12	4.6	6.3
13	2.9	3.6
14	0.6	1.2
15	0.1	2.2
16	0.4	0.5
17	0.3	0.1
18	>0.1	0.3
19	-	0.2
20	-	0.2
21	-	-
22	-	0.1

6.7.2 Acceptable Biological Catch (ABC)

There are not sufficient data to determine the ABC of widow rockfish. The fishery is developing rapidly with increasing effort. The present fishery is highly directed using midwater trawls and is expected to remain so.

This species and the associated fishery does lend itself to single species management; however, until several more years of data are obtained on catch and effort it will be impossible to determine a realistic MSY or ABC.

6.8 Other Rockfish

"By definition the category "other rockfish" includes all rockfish species, except Pacific ocean perch, shortbelly rockfish and widow rockfish.

Pacific ocean perch and shortbelly rockfish are discussed separately. Widow rockfish are apparently an underutilized resource and are included in the other fish section (Section 6.14).

Catches of rockfish other than POP have traditionally been reported as "other rockfish." Shelf rockfish (e.g., yellowtail rockfish, canary rockfish, chilipepper, and bocaccio) usually dominate "other rockfish" landings, although several species inhabiting the continental slope are also included in this group (Fraidenburg, et. al., 1977). Inshore rockfish (less than 50 fathoms) have also been reported in the other rockfish category. Because of the way "other rockfish" catches are reported, effort data are not separable for individual rockfish species, although CPUE indices of the "other rockfish" aggregate are available.

Shelf and inshore rockfish are discussed below to elucidate the status of stock as clearly as possible. Only four species of "other rockfish" (bocaccio, canary, chilipepper and yellowtail) are assigned separate MSYs and ABCs. All other species are grouped and a single ABC is assigned to the group.

There are insufficient data with which to calculate a meaningful MSY. However, since the FCMA requires a MSY value, for the purposes of meeting legal requirements only MSY is determined to be equal to, or greater than ABC.

Substantial domestic fisheries for shelf rockfish have existed along the entire Pacific Coast since the 1940's, but severe reductions in rockfish CPUE (Fraidenburg, et al., 1977) took place in the 1960's and 1970's, as a result of large catches by foreign trawlers. In the Vancouver area, CPUE declined 46% during 1973-75 since peak all-nation catches of 6,000 mt in 1974 and 15,000 mt in 1975. In the Columbia area, rockfish CPUE declined 29% during 1972-74 since the peak 1973 catch of 5,700 mt. In the Monterey area, rockfish CPUE declined 46% during 1973-75 since the peak catches of 1973-75 (8,400 mt, 9,700 mt, and 7,700 mt respectively).

An analysis by Jow (1979) suggests that traditional shelf rockfish stocks in the Eureka area are currently somewhat below levels that produce MSY, and estimates of fishing mortality (F = 0.4-0.6, Jow 1978) in the northern Conception area (the portion fished most heavily by trawlers) suggest that these stocks have also received intensive exploitation. There is little information on the combined effect of CPFV and commercial fishermen on shelf rockfish stocks in the southern portion of the Conception area (south of the Santa Barbara Channel Islands). CPFV owners in the area have expressed concern over recent declines in abundance.

Most shelf rockfish fisheries appear to be in a mature state of development, and current harvests are probably quite close to MSY levels. Preliminary estimates of MSY (= MB) can be obtained from data collected during the 1977 rockfish survey (Gunderson and Sample, 1979).

Any single resource survey has only limited usefulness because the availability of the species being surveyed may vary substantially in the case of rockfish (Gunderson et al., 1977). Furthermore, survey estimates of rockfish biomass are characterized by a relatively low degree of precision, with 90% confidence intervals typically ranging from ±50-150%, depending on the species and area being examined. For this reason, estimates of MSY based on survey data were applied with caution wherever they were at variance with historical catch trends.

In the Conception area, biomass estimates for bocaccio and chilipepper were far below the 1970-75 catch level, a situation which would occur only if there were violent reductions in abundance during 1975-77. Total landings of rockfish in the Conception area were 4,483 mt in 1977.

The portion of the MSY for bocaccio in the Conception area trawl fishery was set at 500 mt on the basis of yield per recruit analysis (Jow, unpublished). Jow's analysis indicated that fishing intensity on bocaccio during 1973-74 (F = 0.5) exceeded the levels that would provide maximum yield per recruit (F = 0.4 with a 4.5-in mesh in the codend). Even if fishing were restricted to F = 0.4, however, there might well be unacceptable reductions in abundance, a situation which ICNAF scientists have dealt with by taking F_{opt} (optimum fishing mortality) as that level of F that provides 90% of maximum yield per recruit. On this basis F_{opt} would be about 0.3 for bocaccio and MSY can be estimated from the relation:

$$MSY = \frac{F_{opt}}{Z_{opt}} (1-e^{-Z_{opt}}) B, \quad \text{where } B = 1974 \text{ catch} - \frac{F}{Z}(1-e^{-Z})$$

(F_{opt} = optimum instantaneous rate of fishing mortality; Z_{opt} = optimum instantaneous rate of total mortality.)

The corresponding estimate for chilipepper was tentatively set at 500 mt (the 1975 catch)[1] until more information on the status of this stock becomes available.

CPFV catches of bocaccio and chilipepper in the Conception area nearly equal those of commercial fishermen, but while the trawl fishery principally operates north of Pt. Hueneme, most CPFV catches occur from the Santa Barbara Channel Islands southward. Catches have increased to high levels in recent years, and MSY for stocks fished by CPFV fishermen are probably above 1970-76 averages of 821 mt for bocaccio and 171 mt for chilipepper. Provisional MSY levels for the region south of the Santa Barbara Channel can be set at 900 mt for bocaccio and 200 mt for chilipepper. The combined MSY estimate for CPFV and trawl fisheries in the Conception area is 1,400 mt for bocaccio and 700 mt for chilipepper. These estimates are conservative since they do not include chilipepper and bocaccio catches by nontrawl commercial fishermen. Some catches are also made by recreational groups other than CPFV fishermen. MSY for the Conception area as a whole is probably near 2,000 mt for bocaccio and 1,000 mt for chilipepper.

Extensive foreign and domestic catches increased total rockfish landings in the Monterey area from the 1960-72 level of 2,135 mt to 8,602 mt during 1973-75 (CPUE declined). The 1976 domestic trawl landings (after exclusion of most foreign fishing) were 4,931 mt and the 1977 landing figure is 8,230 mt. There is little reason to suspect that the stock is depleted.

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[1] The 1975 catch was used as a basis for setting MSY because it was the highest year of record.

Estimates of fishing mortality (Jow, unpublished) are available for 1974, and indicate that F was roughly 0.4 for both bocaccio and chilipepper. Assuming that the species composition of the foreign catches is the same as that of the domestic trawl fishery (71% chilipepper and bocaccio), and taking F_{opt} = 0.3, MSY can be calculated by employing the same procedure used in the Conception area. The resulting estimate of MSY for Monterey bocaccio and chilipepper combined is 5,400 mt. This can be divided into 4,100 mt for bocaccio and 1,300 mt for chilipepper on the basis of the species composition of the 1973-75 landings.

In the Eureka area, foreign and domestic fisheries have brought about a reduction in the relative abundance of shelf rockfish species (canary rockfish, yellowtail rockfish, and bocaccio) on traditional grounds, and rockfish production has been sustained by increased landings of species inhabiting the continental slope (principally shortspine thornyhead). New shelf rockfish grounds are currently being developed, however, using sonar and new trawl designs. It appears that undeveloped grounds still exist. MSY for shelf rockfish in the Eureka area has been set at 600 mt for canary rockfish, and 300 mt for yellowtail rockfish. These levels are about 20% higher than the 1978 catch.

Rockfish stocks in the Vancouver and Columbia areas have been exploited extensively by foreign nations in the past. Estimates of total rockfish removals by foreign fleets operating in this region are difficult to obtain, but the best data available indicate that foreign catches in the Vancouver and Columbia areas were far greater than domestic catches during 1973-75 (Fraidenburg et al., 1977). The results of the 1977 rockfish survey indicate that significant quantities of rockfish are still available in the Vancouver and Columbia areas[1/]. The biomass estimates (Gunderson and Sample, 1979) have been used as estimates of MSY for yellowtail and canary rockfish in these areas.

Inshore and offshore reefs, banks, and island areas from California to Washington are habitats for rockfish that support recreational and commercial fisheries. In the Vancouver-Columbia region, black, and yelloweye rockfish are the predominant members of this group. Monterey area catches are dominated by blue, black, and olive rockfish, while olive, blue, vermilion, and greenspotted rockfish predominate in Conception area catches.

Except in isolated locations, stocks of inshore rockfish in the Vancouver-Eureka region are underexploited by current fisheries. No estimates of MSY are currently available, but it is likely that current harvests are below MSY.

Monterey stocks are heavily fished near population centers and lightly fished on grounds distant from them. Inshore rockfish in the Monterey-

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1/ The other rockfish catch (trawl only, preliminary data) in 1978 was 8,746 mt, an increase of 164% over 1977 landings. The increase was due to good markets and improved gear but more importantly to the development of new grounds.

Conception region have become the target of increased numbers of recreational and commercial fishermen in recent years. This increasing trend is reflected in CPFV catches from all depths, which averaged 1.1 million fish from 1947-67, 3.4 million during 1971-76, and peaked at over 4 million in 1974. The fisheries data for these stocks are such that in-depth assessment of stock conditions is impossible, but most stocks should remain in satisfactory condition unless effort and catch escalate significantly. These stocks have been grouped into a "remaining rockfish" category under "other rockfish" in the determination of ABC presented in Table 14.

6.9 Remaining Rockfish

No ABC was set for several species of rockfish, because of their minor importance on an individual basis. As an aggregate they are significant, however, and some value of OY for rockfish other than those singled out in the ABC section is required. This value was obtained from the relation:

"Remaining" rockfish ABC = 1.2 X "Remaining" rockfish catch during 1977.

The factor 1.2 was included to allow for the possible development of fisheries on species or stocks that have been lightly exploited to date i.e., splitnose rockfish and darkblotched rockfish.

6.10 Dover Sole

6.10.1 Maximum Sustainable Yield (MSY)

Results of yield-per-recruit analysis (Lenarz, 1978a) suggest that the current exploitation rate in the INPFC Columbia area is somewhat below the level that produces MSY. General production model analysis for the Columbia area stocks substantiates this conclusion, indicating an MSY of 2,950 mt (Lenarz, 1978b) as compared to the average 2,031 mt catch taken in 1973-77. This estimate is probably conservative since a deep-water (greater than 250 fathoms) fishery has yet to be fully developed there, and MSY is estimated at 4,000 mt.

The Eureka area fishery is the most intensive Dover sole fishery of the Pacific Coast. Depths to 300 fathoms were first fished in the late 1940's and during the 1960's depths to over 500 fathoms were commonly fished. General production modeling indicates an MSY of 6,215 mt, slightly above the average catch of recent years (Jow and Quirollo, 1978). Examination of fishery data indicates an expansion of the fishery into deeper water and into previously unfished grounds within the Eureka area. The fishery is undergoing further development, thus assumptions of the model are violated and MSY may be underestimated. Taking these factors into account, MSY is estimated at 8,000 mt. The inshore fishery (under 200 fms) seems to be fully utilized but some expansion is expected to occur for the offshore fishery (200 fms and deeper).

The Dover sole fisheries in the Monterey, Vancouver and Conception areas have been expanding in recent years and MSY levels probably lie substantially above 1977 catches. On this basis MSY was estimated at 5,000 mt in the Monterey area and 1,000 mt in both the Vancouver and Conception areas.

6.11 English Sole

6.11.1 Maximum Sustainable Yield (MSY)

Stock production models (Lenarz, 1978b) indicate that English sole fisheries in the Columbia area (off Oregon) are currently operating near MSY levels. Estimated exploitation rate (based on ODFW survey data) during 1975-76 was 0.2 for the Washington coast. This is somewhat below the level producing maximum yield per recruit with present codend mesh sizes (Lenarz, 1978a). Since the fisheries in these areas have been operating near or slightly below the MSY level off Washington and Oregon, data available from the Oregon Department of Fish and Wildlife surveys (Demory et al., 1975; Barss et al., 1977) can be used to estimate MSY (MB). On this basis, MSY off Washington and Oregon is 2,600 mt (13,196 X 0.2). Apportioned by INPFC areas, estimates are Columbia 2,000 mt and Vancouver 600 mt.

There is little information with which to evaluate the status of English sole stocks in the Eureka, Monterey, and Conception ares, but empirical analysis of catch trends suggests that these stocks are also near levels that produce MSY. On this basis, mean 1973-77 catches provide the following tentative estimates of MSY: Eureka 831 mt, Monterey 910 mt, and Conception 171 mt.

6.12 Petrale Sole

6.12.1 Maximum Sustainable Yield (MSY)

Recent investigations into yield-per-recruit relationships for petrale sole (Pedersen, 1975; Lenarz, 1978a) suggest that stocks in the Washington-Oregon region are being harvested at or near maximum sustainable levels given the current mesh sizes being used. A general production model analysis in the Columbia area substantiated this conclusion (Lenarz, 1978b). On this basis, MSY estimates for the Vancouver and Columbia areas are 611 mt and 1,105 mt respectively, based on 1973-77 catch levels. Similarly, approximate estimates of MSY in the Eureka-Conception area are: Conception 232 mt, Monterey 769 mt, and Eureka 447 mt.

6.13 Other Flatfish

6.13.1 Maximum Sustainable Yield (MSY)

Other flatfish include (but are not limited to) the following species: rex sole, Pacific sanddab, starry flounder, rock sole, sand sole, and butter sole.

Some catch data, but no effort data exist for these species. They generally occur as incidental catches and are usually not target species.

The estimate of harvestable biomass (B) with current mesh size for the Columbia-Vancouver area is: rex sole 12,373 mt and Pacific sanddab 7,417 mt. Estimates of harvestable biomass (B) of starry flounder, rock sole, sand sole and butter sole are underestimated because the surveys did not cover their entire bathymetric range. The available estimates for the Columbia-Vancouver area are: starry flounder 1,767 mt; and other minor species 3,140. There are insufficient data with which to calculate a meaningful MSY. However, since the FCMA requires a MSY value, for the purposes of meeting legal requirements only MSY is determined to be equal to or greater than the ABC.

6.13.2 Acceptable Biological Catch (ABC)

In a practical sense ABC of the other flatfish group should be whatever the fishery harvests. Since the other flatfish group is caught incidental to other fishing activities, and since the critical size of most species (rex sole, butter sole, rock sole, and sanddab) is less than that of Dover, English and petrale sole, there is no need to set an ABC. Starry flounder and sand sole are protected in part because of their shallow distribution, plus the added fact that a large part of inshore grounds are preempted by crab pots during the crab season which gives them added protection. California prohibition of trawling within the 0-3 mile zone also provides some protection. There is no need to set an ABC.

However, if required, ABC of the other flatfish group can be set by increasing the highest recent catch of record by 50%. These estimates are shown below:

Area	Highest catch/year	ABC (mt)
Conception	342 (1975)	513
Monterey	1,188 (1977)	1,782
Eureka	1,165 (1973)	1,748
Columbia	1,991 (1976)	2,987
Vancouver	468 (1974)	702

Since there are uncertainties in market development of certain species in the other flatfish group, the established ABC's are subject to revision as markets develop and catch distribution becomes established.

6.14 Other Fish

6.14.1 Maximum Sustainable Yield (MSY)

Up to this section, the FMP has dealt only with those species that are currently used by commercial and recreational fisheries. There are many other species that have not been included because they have low or no acceptance under current economic conditions or are unwanted or unavailable to recreational fisheries. This group includes, but is not

limited to, the selachians (sharks, skates, rays, and ratfish), macrourids (grenadiers), morids (Pacific flatnose), arrowtooth flounder and jack mackerel.

Except for spiny dogfish and soupfin shark, little is known of the other species. At one time, however, sharks were a target species of the liver fishery. Peak landings of 56,000 mt occurred in 1944 but by the late 1950's the fishery had essentially collapsed after synthetic vitamin A was marketed.

A contemporary data base is essentially lacking although minimum estimates of biomass are available for the Oregon-Washington area for dogfish, skates, and ratfish. These are: dogfish, 22,300 mt; skates, 30,200 mt; and ratfish, 14,100 mt (Demory et al., 1976; Barss et al., 1977). Dogfish and skates are readily available to present fisheries, and since landings and marketability are increasing, this fishery should be more closely monitored in the future. Grenadiers and Pacific flatnose are deepwater fishes and quite abundant off the Columbia River (Alton, 1972), but coastwide distribution and abundance are unknown.

Biomass of arrowtooth flounder was estimated at 17,026 mt (Demory et al, 1975; Barss et al, 1977). The estimate for arrowtooth is minimal because they extend into deeper water than did the surveys.

According to MacCall et al. (1980), a crude approximation of MSY for the northern segment of the jack mackerel resource is a range of 12,000-27,000 mt.

There are insufficient data with which to calculate a meaningful MSY. However, since the FCMA requires a MSY value, for the purposes of meeting legal requirements only MSY is determined to be equal to or greater than the ABC.

6.14.2 Acceptable Biological Catch (ABC)

With the exception of jack mackerel, data are not available to determine an accurate estimate of the acceptable biological catch of this large group of other fish which are caught incidentally to the major commercial species. Accordingly, the ABC for each area is set using data in section 6.14.1, catch records and subjective considerations which minimize disruption of existing fisheries, provide for expansion into presently unutilized species and prevent overexploitation of any single species.

ABC for jack mackerel should be at the low end of the MSY range, 12,000 mt, because of the tentative nature of the MSY estimate.

Chapter 7 - Ecological Considerations

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Summary

This chapter contains a general description of the aquatic habitat and marine ecosystems related to the groundfish resource. A description of the inshore habitat related to groundfish is provided. The marine ecosystem of which the groundfish complex is a part, is also discussed.

The chapter points out that:

- The intertidal zone hosts English sole and bocaccio in their early years, and serves as a spawning and nesting area for lingcod.

- Areas inshore of 50 fathoms host Pacific ocean perch and sablefish in their early years and blue, black and olive rockfish for their entire lives. Much is unknown about the early life history of these important species. Studies of the central California kelp community suggest that many juvenile groundfish rely on rocky, heavily vegetated areas.

- Groundfish in the marine ecosystem function as predator and prey. Quantitative analysis is not available; however it is known that birds, marine mammals and other fish consume groundfish. A listing of suspected predators is in Table 16 (page 7-4). Most species of groundfish consume macroplankton (e.g. euphausiids) or benthic invertebrates (e.g. worms).

- It is not believed that any of the measures proposed in the FMP will have significant impact on the marine ecosystem.

7.0 ECOLOGICAL CONSIDERATIONS

7.1 Habitat Concerns

Lingcod are known to spawn and maintain nests in the intertidal zone as shallow as one fathom deep (Jewell, 1966). This species is consequently more likely to be exposed to effects of pollution, habitat destruction, or waste disposal than many of the other groundfish species. English sole and bocaccio are also known to frequent the intertidal zone during the early years of their life, although spawning is believed to occur offshore for these species.

Species characterizing the inshore rockfish community (blue, black, and olive) spend all of their life in waters less than 50 fathoms deep, and could also be quite susceptible to changes in the quality of their habitat. Pacific ocean perch and sablefish are also known to inhabit inshore (less than 50 fm) areas during the early years of their life. Little is known about the early life history of many important commercial species, and several additional species could depend heavily on inshore areas during the early years of their life.

Miller and Geibel (1973) have found that adult blue rockfish and lingcod were important members of the central California kelp community. They also suggested that rocky, heavily vegetated areas may be essential habitat for juveniles of many important commercial and sport groundfish species, and found that juvenile (5-13 cm) bocaccio, blue, olive, yellowtail, widow, and shortbelly rockfish were abundant in kelp bed areas from April to November of each year. Kelp harvesting is expanding and could have detrimental effects on these species. A study of kelp and its inhabitants is continuing in central California.

7.2 Marine Ecosystems

Species covered by the plan range from plant consumers, e.g., blue rockfish, to fish predators, e.g., lingcod. However, the majority of the species either are consumers of macroplankton such as euphausiids or benthic invertebrates such as worms.

Groundfish are consumed by species covered by the plan and other species of fish. Larval and juvenile stages of many of the species or species groups are known to be consumed by many fish species. With the exception of Pacific whiting, shortbelly rockfish and blue rockfish, single species have not been identified as substantial prey items for other fish. Shortbelly rockfish comprised 15% of the food of king salmon in the San Francisco area, Merkel (1957), and 9% of the food of lingcod off of central California, Miller and Geibel (1973). Most of the shortbelly rockfish sampled in the San Francisco study were smaller than 9 cm, indicating that immature fish were consumed. Roberts (1979) found juvenile blue rockfish to be an important item in the diet of predatory rockfish in shallow waters of Carmel Bay. Pacific whiting can comprise as much as 29% of the food of albacore tuna, but the amount is usually less than 2%, McHugh (1952).

Numerous studies indicate that sea birds and marine mammals consume groundfish. For example, Weins and Scott (1975) estimate that Brandt's cormorants and common murres annually consume 3,089 mt of rockfish off Oregon. When size is mentioned, prey items often appear to be juveniles. Most adult groundfish are demersal and thus often are not available to birds. Only one study indicated that a single species covered by the plan is an important food item for marine mammals. Pacific whiting comprised 74%, 100% (small sample) and 48% of the food of sampled Northern fur seals during the spring of 1964 off California, Oregon and Washington respectively; (Fiscus and Kajimura, 1965). Table 16 lists species of birds and marine mammals that are known or thought to prey on groundfish.

It would be difficult to classify the role that groundfish as a whole or any particular species plays in the marine ecosystem. Two of the most abundant species, shortbelly rockfish and Pacific whiting, have been singled out as having some importance as prey items. On the other hand, shortbelly rockfish, since it consumes euphausiids, may be an important competitor of many species of fish, birds and marine mammals that also consume euphasids. Pacific whiting is known to consume other fish, euphausiids and pink shrimp - indeed, some investigators, Abramson and Tomlinson (1974), have speculated that Pacific whiting may play an important role in fluctuations of pink shrimp populations.

To summarize, little is known in a quantitative sense about the roles that individual groundfish species have in the ecosystem. The two most abundant species, Pacific whiting and shortbelly rockfish, appear to be important as both prey and consumers. No evidence was found in the literature that groundfish are an important factor in the diet of any endangered species.

Based on the above information there is no reason to believe that implementation of any of the alternative measures proposed in this plan will have a significant adverse impact on the marine ecosystem as a whole.

Table 16. Known or suspected marine mammal and bird predators of groundfish. Species of occasional appearance in waters covered by the plan are not included.

Marine Mammals	
Delphinus delphis bairdi	Common dolphin
Phocoenoides dalli	Dall porpoise
Logenorhynchus obliquidens	Pacific striped dolphin
Callorhinus ursinus	Northern fur seal
Eumetopias jubatus	Steller sea lion
Zalophus californianus	California sea lion
Mirounga angustirostris	Northern elephant seal
Phoca vitulina	Harbor seal
Tursiops truncatus	Pacific bottlenose dolphin
Globicephola macrorhynca	Pilot whale
Possibly Baleen whales (except *Eschrichtius gibbosus*, the California gray whale)	

Marine Birds (* denotes endangered species)	
Gavia immer	Common loon
Gavia arctica	Arctic loon
Gavia stellata	Red-throated loon
Aechmophorus occidentalis	Western grebe
Podiceps grisegena	Red-necked grebe
Podiceps auritus	Horned grebe
Podiceps caspicus	Eared grebe
Diomedea nigripes	Black-footed albatross
Fulmarus glacialis	Fulmar
Puffinus creatopus	Pinkfooted shearwater
Puffinus bulleri	Buller's shearwater
Puffinus puffinus	Manx shearwater
Puffinus griseus	Sooty shearwater
Loomelania melania	Black petral
Oceanodroma homochroa	Ashy petral
Oceanodroma furcata	Fork-tailed petral

Oceanodroma leucorhoa	Leach's petral
Pelacanus occidentalis	Brown pelican*
Phalacrocorax penicillatus	Brandt's cormorant
Phalacrocorax auritus	Double-crested cormorant
Phalacrocorax pelagicus	Pelagic cormorant
Haliaeetus leucocephalus	Bald eagle
Pandion haliaetus	Osprey
Stercorarius parasiticus	Parasitic jaeger
Stercorarius pomarinus	Pomarine jaeger
Stercorarius longicaudus	Long-tailed jaeger
Catharacta skua	Skua
Larus glaucescens	Glaucous-winged gull
Larus occidentalis	Western gull
Larus californicus	California gull
Larus delawarensis	Ring-billed gull
Larus heermanni	Heermann's gull
Rissa tridactyla	Black-legged kittiwake
Sterna paradisaea	Arctic tern
Sterna hirundo	Common tern
Sterna forsteri	Forster's tern
Thalasseus elagans	Elegant tern
Thalasseus maximus	Royal tern
Hydroprogne caspia	Caspian tern
Uria aalge	Common murre
Cepphus columba	Pigeon guillemot
Lunda cirrhata	Tufted puffin
Cerorhinca monocerata	Rhinoceros auklet
Ptychoramphus aleutica	Cassin's auklet
Brachyramphus marmoratum	Marbled murrelet
Endomychura hypoleuca	Xantus' murrelet
Synthliboramphus antiquum	Ancient murrelet

Chapter 8 - Social and Economic Characteristics

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Summary

The social and economic aspects of the fishery are described in this chapter and where pertinent in other sections. At the outset, it is noted that very little in the way of social or economic information is available. Most information provided was compiled for this FMP. A contract has been awarded by the Pacific Council to provide some of the needed data.

The chapter relates that:

- The ex-vessel value of commercial groundfish landings in 1976 was:

	California	Oregon	Washington	Total
1967 dollars	6,454,836	2,134,311	2,800,271	11,389,188
1976 dollars	11,004,983	3,639,000	4,774,462	19,418,445

  The latest year for which complete value data are available is 1976.

- Value for 1972-76 commercial landings are provided in Tables 27-31 (pages 8-3 to 8-7).

- Information regarding processing, wholesale and retail markets, and labor force related to the fishery is not available in usable form.

- The potential revenue from the commercial fishery for landings of 170,000 mt in 1982 is 23 million 1967 ex-vessel dollars.

- The states impose certain taxes and fees upon fishermen and processors which generate state revenue. The types and amount of taxes/fees levied by the states are listed in Tables 25 and 26 (pages 8-15 and 8-16).

- Crew remuneration, in the form of crew shares, is discussed generally.

- Allocation of the resource occurs as an incident of any management measures. If active allocation is to be pursued, more detailed information than is presently available may be needed (see Section 8.6).

8.0 SOCIAL AND ECONOMIC CHARACTERISTICS

8.1 Consumer

The fish resources of the United States are common property and belong to every citizen of the United States. Since U.S. jurisdiction over fishery resources has extended from 3 to 200 miles offshore, the amount of fish owned by the citizens (consumers) of the United States has increased considerably. Through the Act the consumers have stated their desire to manage the fishery so that the fishery will supply an amount of fish "which will provide the greatest overall benefit to the Nation, with particular reference to food production...". It is this desire for food by the consumers which allows the fishermen to fish, the processor to process and the seller to sell. The consumer utlimately pays for all inefficient uses of the resource.

This plan has attempted to provide the consumer with quality fish at as low a price possible. However, we are generally managing by observing or quantifying the landings and landings may or may not be an accurate measurement of the amount of fish being made available to the consumer for food (Ueber, 1979). Data on processed products and recovery rates for groundfish are currently lacking. Therefore the management options have been proposed which will maximize landings and hopefully decrease wastage and stock declines. These options attempt to stabilize stocks which are near or at maximum production and also allow for increased landings of stocks which are underharvested or underutilized.

8.2 Ex-Vessel Value of the Commercial Fishery

PFMC and the NMFS is currently funding research which will delineate some of the basic data needed for economic analysis. This plan utilizes only limited social and economic information.

The value of the fishery is available only at the ex-vessel level and the most current complete year is 1976. In 1976 the ex-vessel landings were valued at nearly nineteen million 1976 dollars (eleven million 1967 dollars, see Tables 17-21 for 1967 value). During 1972 to 1976, 75-77% of the ex-vessel value of these landings was attributable to rockfish, Dover sole, petrale sole, sablefish and English sole (Table 22). The value added (as fish are processed) is not available nor are data pertaining to product form, domestic markets, export markets and market margins collected. Investment and cost parameters for harvesters, processors, wholesalers and retailers are not available, nor are employment statistics or employee demographics.

Although nine gear units of the groundfish fishery have been identified in 3.2.1.1, the commercial ex-vessel price of these fish caught by the different units vary. Two major fishermen's associations (Fishermen's Marketing Association, Inc., representing vessels from Moss Landing, California to Ilwaco, Washington; and the Fishermen's Marketing Association of Washington, representing predominantly the Seattle and Bellingham draggers) members account for nearly 80 percent of the domestic groundfish landings. These associations negotiate and publish ex-vessel prices biannually (see Table 23 Mid-1978 Prices). Prices may

Table 17. Ex vessel value 1/ of groundfish landed by commercial fishermen in California 2/, Oregon 3/ and Washington 4/ 1976

SPECIES OR GROUP	CALIFORNIA ($)	OREGON ($)	WASHINGTON ($)	TOTAL VALUE ($)
Lingcod	246,978	84,457	242,717	574,152
Pacific Cod	-	43,988	661,546	705,534
Pacific Whiting	1,004	-	-	1,004
Sablefish	820,986	75,660	58,182	954,828
Other Rockfish	2,012,571	429,325	790,346	3,232,242
Pacific Ocean Perch	7,240	167,742	239,737	414,719
Flatfish: Dover	1,835,226	412,317	199,384	2,446,927
English	502,368	323,754	173,419	999,541
Petrale	488,982	268,662	349,757	1,107,361
Other Flatfish	539,181	328,446	85,183	952,810
Total	6,454,536	2,134,311	2,800,271	11,389,118

1/ Deflated to 1967 levels using U.S. Department of Labor Bureau of Labor Statistics Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI = 170.5). To obtain 1976 values multiply by 1.705.

2/ Supplied by California Department of Fish and Game

3/ Supplied by Oregon Department of Fish and Wildlife

4/ Supplied by Washington Department of Fisheries

Table 18. Ex vessel value 1/ of groundfish landed by commercial fishermen in California 2/, Oregon 3/ and Washington 4/ 1975

SPECIES OF GROUP	CALIFORNIA ($)	OREGON ($)	WASHINGTON ($)	TOTAL VALUE ($)
Lingcod	261,787	104,336	248,620	614,743
Pacific cod	-	39,919	610,242	650,161
Pacific Whiting	1,241	-	-	1,241
Sablefish	868,486	45,856	29,467	943,809
Other Rockfish	1,993,921	153,164	392,790	2,539,875
Pacific Ocean Perch	-	59,553	214,104	273,657
Flatfish: Dover	1,555,211	355,831	82,556	1,993,598
English	494,541	188,114	128,623	811,278
Petrale	485,918	336,876	436,935	1,259,729
Other Flatfish	392,432	232,568	93,775	718,775
TOTAL	6,053,537	1,516,217	2,237,112	9,806,866

1/ Deflated to 1967 levels using U.S. Department of Labor Bureau of Labor Statistics Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI = 161.2). To obtain 1975 values multiply by 1.612.

2/ Supplied by California Department of Fish and Game.

3/ Supplied by Oregon Department of Fish and Wildlife.

4/ Supplied by Washington Department of Fisheries.

Table 19. Ex vessel value 1/ of groundfish landed by commercial fishermen in California 2/, Oregon 3/ and Washington 4/ 1974

SPECIES OR GROUP	CALIFORNIA ($)	OREGON ($)	WASHINGTON ($)	TOTAL VALUE ($)
Lingcod	342,654	144,259	193,172	680,085
Pacific Cod	-	51,016	549,695	600,711
Pacific Whiting	1,286	-	-	1,286
Sablefish	813,676	55,552	15,487	884,715
Other Rockfish	1,904,942	172,309	517,403	2,594,654
Pacific Ocean Perch	-	56,263	420,000	476,263
Flatfish: Dover	1,488,287	455,301	98,064	2,041,652
English	470,007	165,592	105,498	741,097
Petrale	531,957	373,636	427,962	1,333,555
Other Flatfish	366,215	202,512	181,845	750,512
TOTAL	5,919,024	1,676,440	2,509,126	10,104,590

1/ Deflated to 1967 levels using U.S. Department of Labor Bureau of Labor Statistics Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI = 147.7). To obtain 1974 values multiply 1.477.

2/ Supplied by California Department of Fish and Game.

3/ Supplied by Oregon Department of Fish and Wildlife.

4/ Supplied by Washington Department of Fisheries.

Table 20. Ex vessel value 1/ of groundfish landed by commercial fishermen in California 2/, Oregon 3/ and Washington 4/ 1973

SPECIES OR GROUP	CALIFORNIA ($)	OREGON ($)	WASHINGTON ($)	TOTAL VALUE ($)
Lingcod	291,961	120,150	121,195	533,306
Pacific cod	-	37,438	464,564	502,002
Pacific Whiting	826	-	-	826
Sablefish	496,319	94,440	8,475	599,234
Other Rockfish	1,691,510	213,854	718,377	2,623,741
Pacific Ocean Perch	-	32,457	434,380	466,837
Flatfish: Dover	1,710,218	331,781	90,359	2,132,358
English	333,884	231,578	105,742	671,204
Petrale	419,835	296,304	298,826	1,014,965
Other Flatfish	279,564	195,237	117,244	593,041
Total	5,224,117	1,553,239	2,359,162	9,136,518

1/ Deflated to 1967 levels using U.S. Department of Labor Bureau of Labor Statistics Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI = 133.1). To obtain 1973 values, multiply by 1.331.

2/ Supplied by California Department of Fish and Game

3/ Supplied by Oregon Department of Fish and Wildlife

4/ Supplied by Washington Department of Fisheries

Table 21. Ex vessel value 1/ of groundfish landed by commercial fishermen in California 2/, Oregon 3/ and Washington 4/ 1972

SPECIES OR GROUP	CALIFORNIA ($)	OREGON ($)	WASHINGTON ($)	TOTAL VALUE($)
Lingcod	270,311	77,848	86,955	435,114
Pacific cod	-	96,941	454,073	551,014
Pacific Whiting	239	-	-	239
Sablefish	518,386	39,868	6,784	565,038
Other Rockfish	1,189,385	234,122	551,852	1,975,359
Pacific Ocean Perch	-	34,740	533,715	568,455
Flatfish: Dover	1,442,698	416,381	82,252	1,941,331
English	273,264	181,039	57,737	512,040
Petrale	478,372	270,198	202,257	950,827
Other Flatfish	251,476	72,234	83,697	407,407
Total	4,424,131	1,423,371	2,059,322	7,906,824

1/ Deflated to 1967 levels using U.S. Department of Labor Bureau of Labor Statistics Consumer Price Index for Urban Earners and Clerical Workers (CPI = 121.3). To obtain 1972 values multiply by 1.213.

2/ Supplied by California Department of Fish and Game.

3/ Supplied by Oregon Department of Fish and Wildlife.

4/ Supplied by Washington Department of Fisheries.

Table 22. Percentage of total ex-vessel value of the five most important commercial groundfish by species or species group for Washington, Oregon and California, 1972-76.

Year	Sablefish	Rockfish 1/	Dover Sole	English Sole	Petrale Sole	Total
1976	8	28	21	9	10	76
1975	10	26	20	8	13	77
1974	9	26	20	7	13	75
1973	7	29	23	7	11	77
1972	7	25	25	6	12	75

1/ Does not include Pacific ocean perch

vary in local markets for a particular species caught by a particular economic unit (i.e., dark 14-18 inch rockfish caught by hook and line have an ex-vessel price triple that of drag fish of the same size and species). From 1953 until 1973, the real ex-vessel prices increased one half of a cent per pound for rockfish and decreased one cent per pound for Dover sole (disregarding size changes for Dover). From 1973 to 1978, the real ex-vessel prices have increased 33 percent for Dover sole (from 7 to over 10.5 cents), and 55 percent for rockfish (from 6 to over 10 cents) (Figure 8 and Table 24). The PFMC has funded a research project which will collect statistics on the domestic processing sector and the markets for these products. These data will be analyzed and additional information added to the Plan at a later date.

Some vessel characteristics for the commercial fishery have been collected but are neither easily retrieved, accurate nor available from all states. Other important characteristics have not been recorded. Tables 4-6 (Section 3.0) give a rough indication of the characteristics of the 1976 fishing fleet. Major changes caused by gear technology modification, new vessel entry and the enactment of the FCMA have greatly changed the 1976 fleet and its markets.

The recreational fishery is comprised of many vessels, many persons and many harvest methods, however, accurate data both interstate and intrastate are not now available (some gross figures are presented in Table 3). The Southwest Fisheries Center of NMFS has an ongoing contract which should delineate some of the aforementioned unknowns. Presently much of the needed information is only collected by private organizations; it is hoped that these organizations will allow access to their records.

8.3 Crew Remuneration

The method by which fishermen are paid, crew remuneration, is similar throughout the commercial fishing industry. However, actual payment to a fisherman from a given gross stock may vary greatly. Most fishermen receive a portion of the net stock (gross stock minus variable trip expenses). This portion may be 20-50 percent of gross or net, or it may be one share. Net stock may be divided so that the vessel receives one or more shares above the total number of shares the crew receives (i.e., for a boat with three crewman - the vessel would receive four shares or 57 percent of the net). Some of the variable trip expenses deducted from the gross stock are: fuel, water, ice, gloves, bait, and food. However, food may be paid for completely by the captain, owner or crew. Preliminary investigations indicate that the smaller the vessel and crew, the larger the percentage of the gross or net stock the crewperson receives. This remuneration system may retard technological change because nonfishing owners have little incentive to increase productivity per crewperson, if this change does not increase the owner's portion of the gross stock.

8.4 Federal, State and Local Tax Revenues

Governments at the federal, state and local levels tax the groundfish industry, as they tax other industries. Taxes such as income (corporate and personal), sales, fuel, property, and tariffs are applied similarly

Table 23. Ex-vessel prices (May, 1978) of groundfish for Washington, Oregon and California.

	Categoric Size or Condition	Fishermen's Marketing Associations		Fishermen's Marketing Association of Washington	
		$	1967 - $[a]	$	1967 - $[a]
ROUNDFISH					
Lingcod	Dressed	.39	.213	.40	.219
	Round	.195	.107	.1925	.105
Pacific Cod	Dressed			.40	.219
	Round	.195	.107	.1925	.105
Pacific Whiting (Hake)		.09	.049	.10	.056
Sablefish	Dressed - >5 lbs	.70	.383		
	3-5 lbs	.40	.219	.50 >3 lbs	.273
	Round - >7 lbs	.45	.246		
	5-7 lbs	.28	.153	.27 <5 lbs	.148
	<5 lbs	.125	.068		
ROCKFISH					
	All Species	.185	.101	.180	.098
	Small	.165	.090		
	Ocean Run[b]			.175	.095
FLATFISH					
Arrowtooth Flounder (Turbot)		.090	.049		
Dover Sole	13-1/2" Up	.1925	.105		
	14" Up			.185	.101
English Sole	12" Up	.265	.145	.200 12-1/2" Up	.109
	13-1/2" Up	.380	.208		
Pacific Sanddab		.280	.153		
Petrale Sole	>13	.380	.208	No).360	
	<13	.320	.175	Size)	
Rex Sole		.280	.153	.19	.104
Starry Flounder		.185	.101	14" .120	.066

a/ CPI of 183 utilized.
b/ Bocaccio, silvergray, widow and yellowtail rockfish.

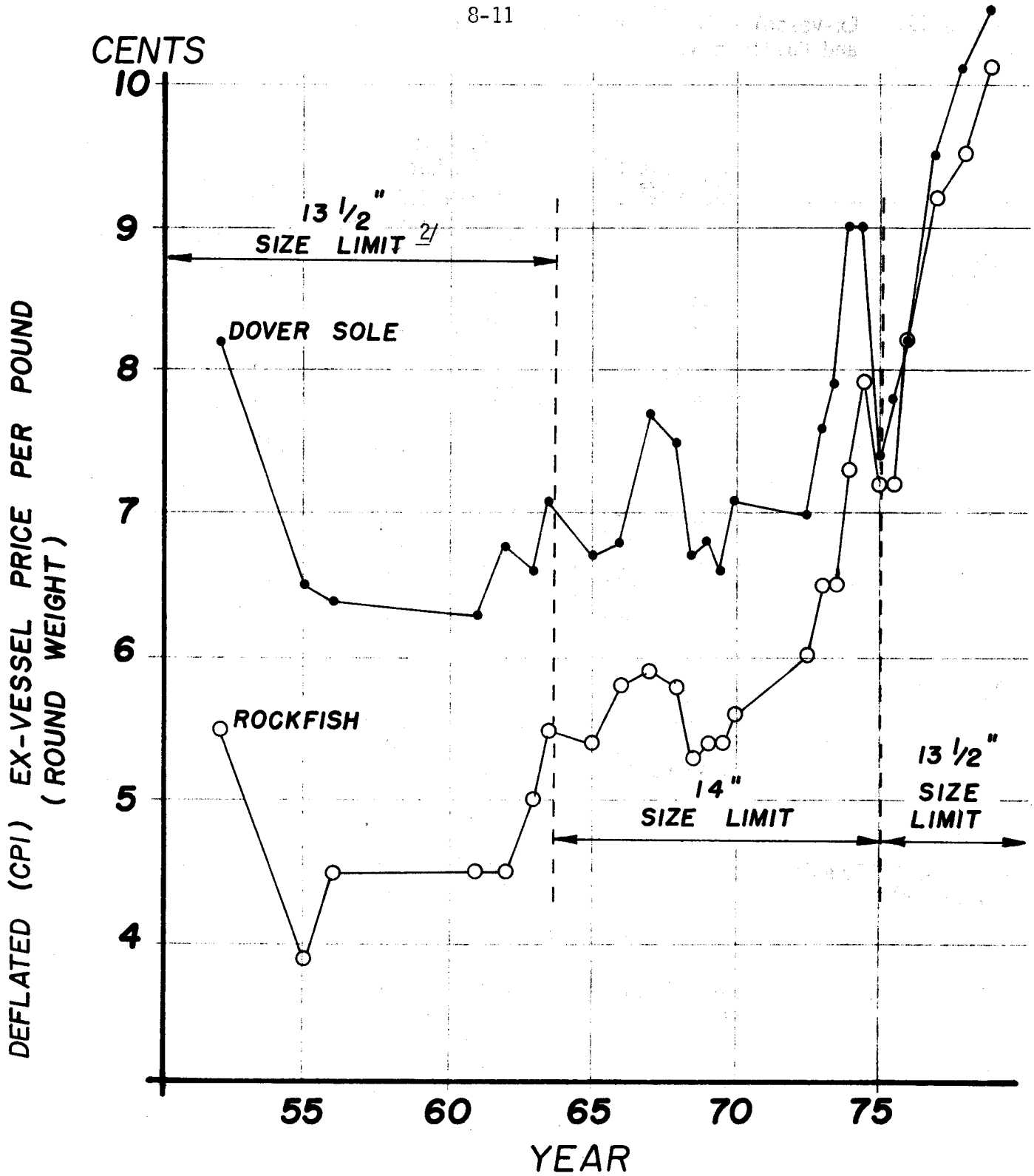

FIGURE 8 — FISHERMEN'S MARKETING ASSOCIATION DEFLATED EX-VESSEL PRICES FOR DOVER SOLE AND ROCKFISH. 1952 — 1978 1/

1/ DEFLATED TO 1967 LEVELS USING CONSUMER PRICE INDEX.

2/ SIZE LIMITS REFER ONLY TO DOVER SOLE.

Table 24. California Fishermen's Marketing Association (FMA) prices and California Fish and Game (CF&G) statistics.

Price & Condition effective	Consumer Price Index (CPI)	Species	FMA Value	FMA Indexed Value[1]	Dover Minimum Size	CF&G Indexed Value[1]
5/53	77.1	Dover	.05	.065		
		Rockfish	.03	.039		
11/55	78.4	Dover	.05	.064	(13-½")	
		Rockfish	.035	.045		
7/58	87.8	Dover	.055	.063	(13-½")	.066
		Rockfish	.04	.045		.061
5/61	88.9	Dover	.06	.068	(13-½")	.066
		Rockfish	.04	.045		.061
11/61	90.3	Dover	.06	.066	(13-½")	.067
		Rockfish	.045	.05		.065
11/62	91.5	Dover	.065	.071	(13-½")	.067
		Rockfish	.05	.055		.063
5/63	92.9	Dover	.0625	.067	(14")	.065
		Rockfish	.05	.054		.065
11/64	94.7	Dover	.065	.068	(14")	.064
		Rockfish	.055	.058		.064
11/65	95.9	Dover	.070	.073	(14")	-
		Rockfish	.055	.057		-
11/66	97.1	Dover	.075	.077	(14")	.069
		Rockfish	.0575	.059		.067
11/67	100	Dover	.075	.075	(14")	.065
		Rockfish	.0575	.058		.069
5/68	104.5	Dover	.07	.067	(14")	.065
		Rockfish	.055	.053		.068
11/68	110.2	Dover	.075	.068	(14")	.065
		Rockfish	.06	.054		.068
5/69	110.2	Dover	.0725	.066	(14")	.065
		Rockfish	.06	.054		.068

Table 24. (continued)

Price & Condition effective	Consumer Price Index (CPI)	Species	FMA Value	FMA Indexed Value1/	Dover Minimum Size	CDF&G Indexed Value1/
11/69	115.8	Dover	.0825	.071	(14")	.068
		Rockfish	.065	.056		.064
5/72	124.3	Dover	.0875	.070	(14")	.066
		Rockfish	.075	.060		.073
12/72	131.5	Dover	.10	.076	(14")	.077
		Rockfish	.085	.065		.078
5/73	131.5	Dover	.105	.079	(14")	.077
		Rockfish	.085	.065		.078
11/73	144.4	Dover	.13	.090	(14")	.080
		Rockfish	.105	.073		.091
5/74	144.4	Dover	.13	.090	(14")	.080
		Rockfish	.115	.079		.091
12/74	159.1	Dover	.1175	.074	(13-½")	.069
		Rockfish	.115	.072		.086
8/75	159.1	Dover	.1225	.077	(13-½")	.069
		Rockfish	.115	.072		.086
10/75	159.1	Dover	.13	.082	(13-½")	.069
		Rockfish	.13	.082		.083
5/76	168.0	Dover	.1375	.082	(13-½")	
		Rockfish	.14	.083		
10/76	168.0	Dover	.16	.095	(13-½")	
		Rockfish	.155	.092		
10/77	180.8	Dover	.1825	.101	(13-½")	
		Rockfish	.1725	.095		
5/78	183.0	Dover	.1925	.105	(13-½")	
		Rockfish	.1850	.101		
10/78	203.2	Dover	.21	.103	(13-½")	
		Rockfish	.20	.099		
5/79		Dover	.2175		(13-½")	
		Rockfish	.20			

1/ Value divided by CPI.

throughout all private and corporate sectors. The groundfish industry is taxed directly through license fees on fishermen, processors, brokers and vessels, and a landing tax (Tables 25 and 26).

8.5 Potential Revenues from the Fishery (Ex-vessel Only)

Potential ex-vessel revenues from the fishery are divided into two groups. Group one consists of Pacific whiting and shortbelly rockfish and group two is all other fish covered in this management plan. A projected deflated ex-vessel price[1/] of two and one-half cents a pound has been assigned to whiting and shortbelly, and an eight and one-half cents a pound assigned to all other groundfish.

Given a 1982 projected landing or transfer of group one fish totaling 65,000 mt and group two fish totaling 105,000 mt, an ex-vessel value of $3,582,475 and $19,676,050 (1967 dollars) was derived respectively.

1. (a) metric ton x price per pound x 2,204.6 pound per metric ton = total ex-vessel value;

   (b) $65{,}000 \text{ mt} \times \$\frac{.025}{\text{lbs.}} \times \frac{2{,}204.6}{\text{mt}} \text{ lbs.} = \$3{,}582{,}475.$

2. (a) See 1.(a)

   (b) $105{,}000 \text{ mt} \times \$\frac{.085}{\text{lbs.}} \times \frac{2{,}204.6}{\text{mt}} \text{ lbs.} = \$19{,}676{,}050.$

   This would be an estimated potential ex-vessel revenue of $23,258,525 (1967 dollars) in 1982. The 1982 ex-vessel value would be around 70,000,000 1982 dollars.

8.6 Allocation

Allocation is the apportionment of an item for a specific purpose or to a particular person. This may take the form of virtually any type of regulation, including regulations governing gear, seasons, areas or quotas. Fish resources may be allocated to accomplish single biological, social or economic objectives, or a combination of such objectives. The entire fish resource, or a portion, may be allocated to a particular group. Allocating the entire resource restricts other groups from fishing that specific resource. Striped bass, which are allocated entirely to recreational fishermen in California, are an example of this. Northern anchovy is an example of allocation of a fish resource among several user groups.

The FCMA requires that allocation among user groups be determined in such a way that no group, person, or entity receives an undue share of the resource. It is recognized that whatever management measures are adopted, allocation of the fishery resources will occur. This is

1/ All prices are deflated to 1967 prices by use of an estimated index of 300 for 1982.

Table 25. License and Poundage Fees. 1978

License/Fee	California	Oregon	Washington
Commercial Fishing License	$ 40	$ 40	$ 87.50
Boat License	$125	$170	None
CPFV License	$ 40	1/2/	$100
Canner/Processor License	$190	NA	$ 37.50
Wholesale/Processor License	$ 65	$100	
Broker/Importer License	$125	NA	$ 87.50
Groundfish Tax	$ 2.21/mt	$ 2.21/mt	2% of ex-vessel value
Property Tax	Variable	NA	NA
Exemptions: Tax	Yes	NA	NA
Fuel	Yes	NA	Yes3/
Recreational License	$ 5.00 4/	No	

1/ For vessels over 20 feet: $16 plus $2/ft in excess of 20 feet

2/ Guides license $15

3/ Road tax exemption

4/ It is estimated that total revenue is $500,000

NA = not applicable

Table 26. Revenue derived from license and poundage fees.

	California[1/]	Oregon[2/]	Washington[3/]
Commercial Fishing License	$ 24,840	$ 9,052	
Sport Fishing License	500,000[4/]	NA	
Boat License	27,000	13,430	
CPFV License	28,500	16,827[5/]	
Canner/Processor License	3/	NA	
Wholesale/Processor License	$ 2,015	$ 5,400	
Broker/Importer License	$ 14,625	NA	
Groundfish Poundage Revenue	$ 68,000	$37,079	

1/ 1977

2/ 1978 (preliminary)

3/ Not available

4/ Estimate

5/ Assumes average length of 40-ft = $56/boat: 237 boats X $56 per boat = $13,272; plus $15 guides license/boat - $3,555; Sum = $16,827; proportion due only to groundfish unknown.

NA = not applicable

because the act of management will invariably affect different user groups in different ways. Often allocation is not intentional, but management measures may also specifically be devised to set aside a portion of the resources to a particular user group by time of capture, method of capture or area of capture.

Currently, allocation occurs in the groundfish fishery in all West Coast states between commercial and recreational users because of bag limits. California intentionally allocates some resources completely to recreational fishermen, such as sturgeon (green and white). California has other allocation measures between commercial and recreational groundfish fishermen and within the commercial fisheries, e.g., the shrimp fishery, where vessels fishing shrimp may land only 500 pounds of groundfish each trip. Also, in California, trawlers are restricted from fishing most of the state's waters (0-3 miles).

Unintentional allocation occurs with mesh size for trawlers or escape ports for pot fishermen which may remove a portion of the resource from these capture methods while this portion of the resource would still be available to other gears (e.g., hook-and-line). Excluding a gear type is a form of allocation.

While present regulations appear to have only minor effects on the division of the resource, some of the management options presented in this plan could have significant allocation implications. If a yearly quota is set on a stock and it is not allocated to the various gear types, the gear type that can obtain large harvests early in the management year would have a distinct advantage over groups that could not. An example of this is the difficulty of choosing a management year for rockfish in the Conception area that would not give an advantage to one or more of the diverse gear types. Options presently developed for the sablefish fishery could make some, but not all, gears slightly less efficient than they are at present.

There are two major user groups: recreational and commercial. There are subgroups within each group. Recreational subgroups include: CPFV vessels, private vessels, pier anglers, shore anglers and scuba divers. Commercial subgroups include: trawl, trap, set net and hook-and-line.

During public comments, conflicts were stated to exist among groups and within a group: Gill net and recreational fishermen in southern and central California (Section 8.6.1); commercial and recreational hook-and-line fishermen and trawlers using bottom, midwater or roller gear (Section 8.6.3); sablefish pot fishermen north of 39° N, with sablefish longline and traditional bottom trawl fishermen (Section 8.6.3). However, no comments were received that indicated a desire for quota management among users. Quota management was attempted in New England, but objectives were not obtained; subsequently, this form of allocation was terminated. Public comments were directed at separation of users by restricting a user to a particular area, a specific gear type or requiring specific gear to be utilized in a particular manner. Also, persons who requested exclusive areas did not consider that they would be restricted from other areas.

Impacts of an allocation regime on one fishery transcend the boundaries of that fishery. An example of this occurred recently when West Coast troll salmon fishermen were restricted to allow adequate escapement of salmon to inside waters. This allocation in the salmon fishery caused many troll fishermen to enter the hook-and-line fishery for groundfish and/or the set gear sablefish fishery. Other allocative measures in other fisheries will probably result in similar shifts in effort within or among fisheries, which may cause or increase conflicts among users.

To determine an equitable system for allocation, an objective is needed. To evaluate this objective and decide among various allocation schemes, data are needed. Objectives which may be selected include any of the following examples:

1. Maintain economic viability of both user groups without limiting entry to either group;
2. Prevent abrupt changes in relative shares of both user groups;
3. Mitigate social conflicts which result from two or more user groups or subgroups utilizing a free entry common property resource;
4. Maintain fishable stocks within reasonable distance of ports so that continued opportunity exists for urban users to utilize resources adjacent to urban centers.

The Council acknowledges the allocative management regime of the State of California that addresses the recreational and gill net rockfish fisheries in Southern California (Section 12.3.2.5). California has in effect until January 1, 1983 management regulations that prohibit rockfish and lingcod gill-netting south of Pt. Sal (34°54'N) in waters less than 50 fathoms in depth along the mainland shore and elsewhere in waters less than 70 fathoms in depth.

The Council is aware of the possible need to address other allocation problems in the future but desires that allocation proposals be thoroughly evaluated. Evaluation will require considerable time because of the lack of data. Specific allocation problems and their solutions will be dealt with on a case-by-case basis as the problems occur and as information becomes available for analysis. If it becomes necessary to add measures to the Plan to resolve allocation problems, the Council will do so by plan amendment.

If allocative measures are required, the Council will select allocation objectives and will recommend acquisition and analyses of fishery, social and economic data required to develop allocation schemes which will best satisfy those objectives. An analysis of the cost and scope of the allocation types mentioned in Section 8.6.2 and 8.6.3 is also discussed. Table 27 lists types of information which could be utilized in evaluating allocation schemes as well as current data availability.

8.6.1 Recreational: Gill Net

The southern California recreational hook-and-line fishermen state that declining rockfish catches in the Conception area are directly related to increases in gill net effort and propose the following:

Table 27. Data availability by state for assessment of area allocation schemes (depth strata).

DATA NEEDS	TRAWL			POT			LONGLINE			HOOK-AND-LINE Comm.			HOOK-AND-LINE Rec.			GILLNET
	WA	OR	CA	WA	OR	CA	WA	OR	CA	WA	OR	CA	WA	OR	CA	CA
Species catch	1	1	2	1	1	2	1	1	3	1	1	3	1	2	2	3
by area	1	2	2	4	2	2	4	2	3	4	2	3	4	2	3	3
depth	1	2	2	4	3	2	4	3	3	4	3	4	4	2	3	4
time	1	1	2	4	1	2	4	1	3	4	1	2	4	2	2	2
Value of catch	1	1	1	1	1	1	1	1	3	1	1	3	4	1	2	3
Number of vessels and participants	1	1	1	2	1	1	2	1	3	4	1	2	4	2	2	2
Effort (trawl: hours, drag, days, trips) (hook & line: anglers, baskets of gear, trips)	1	2	2	4	3	2	4	3	4	4	3	3	4	3	2	3
% of total income	4	2	3	4	3	3	4	3	4	4	3	4	4	4	4	4
Other opportunities	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Social considerations	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Number of man-months																
crew	4	3	3	4	3	4	4	3	4	4	4	4				4
recreational													4	4	3	

CRITERIA OF AVAILABILITY:

1. Immediately
2. Requires short arrangement and processing time period (1-3 person-months)
3. Requires long time period (greater than 3 person-months)
4. Unavailable-presently is not collected.

1. Prohibit the use of gill nets to take rockfish in waters of less than 100 fathoms in depth, south of Point Buchon.
2. Increase the mesh size to 5-inches on rockfish gill nets south of Point Buchon.
3. Refinements on net design and flag buoys to carry boat's name and rockfish permit number.
4. Require a revocable non-transferable boat permit to use gill nets in waters off California.
5. Prohibit the use of gill nets within 3 miles of Santa Catalina Island, except for the taking of flying fish in specified waters of California District 20.

Gill net fishermen have responded that their fishery has not impacted the CPFV fishery to the extent claimed and that permits should be transferable, 60 fathoms should be the minimum depth for gill nets, and that the gill net mesh size remain at 4-1/8 inches; however, they do concur on item 3.

To properly address this issue, analysis of available data catches by species, gear, area, and time must be made to determine the extent of the conflict, to assess the status of the resource, to determine causes for the current resource condition, and to recommend appropriate action.

Data consist of logbook records of the CPFV fleet, commercial catches of rockfish by area and time, biological samples of CPFV and commercial catches, and published reports of resource studies.

Data on CPFV catches and associated effort are readily available. Catches of gill net and other commercial vessels are available in fish receipt form. Considerable effort would be required to obtain a long series of these data for analysis. Less effort is needed if the participating vessels could be identified. It is estimated that data compilation and analyses could be completed in 9 to 12 person months.

The quality and completeness of commercial data may not adequately determine the current situation for management decisions on allocation. Results of the above study should describe data adequacy and provide a basis for recommendations.

The Council acknowledges that the State of California has taken the initiative to implement measures as State law which have the effect of allocating approximately 367 square nautical miles of the FCZ along Southern California's mainland shore and 497 square nautical miles of the FCZ elsewhere off Southern California to users other than rockfish and lingcod gillnetters. The Council believes that the solution to this strictly local problem, involving but one state, is best left to agreement between users of the resource and implementation by the state as long as it is not inconsistent with federal law. Mindful of federal policy which discourages the unnecessary promulgation of federal regulations, the Council, finding that State implementation of this compromise agreement is not inconsistent with this FMP, believes it should be implemented as a matter of State law applicable to vessels registered in California while such vessels are fishing in the FCZ as

well as State territorial waters. The Council believes this procedure is authorized by Section 306(a), sentence 2 of the FCMA, and is consistent with the decision of the California Supreme Court in People v. Weeren, 26 Cal. 3d 654 (1980), cert. denied, 49 U.S.L.W. 3223 (Oct. 3, 1980).

It is anticipated that any modification of California law regarding this matter will be brought to the Council's attention for a reconsideration of its consistency with this FMP prior to the application of the modification to California registered vessels fishing in the FCZ.

8.6.2 Hook-and-Line: Trawl

Hook-and-line fishermen state that trawling has impacted or will impact groundfish stocks of importance to the hook-and-line fishery. Recreational fishermen have recommended areas or zones for prohibition of commercial fishing for groundfish. Recreational and commercial hook-and-line fishermen have also proposed that trawling and/or roller gear and midwater trawling be prohibited in certain areas. These areas include: Cordell Banks, Farallon Islands and areas adjacent to ports where CPFV and hook-and-line fishing exist.

Commercial hook-and-line fishermen oppose reserved areas for recreational fishing only. Trawl fishermen have expressed a desire to maintain open access to all areas currently being trawled.

In order to determine the extent of the interfishery conflicts, analyses of catches by species, gear, area and time; the assessment of the status of the resource and current resource condition; and the impacts of various appropriate actions should be accomplished.

Trawler logbook and landing records are available for the past several decades that document the extent and changes of the fishery. Similar data are available for the California CPFV catch. Trawl landings and California CPFV catches have been sampled in recent years to determine species, size, and age composition. The catches by commercial hook-and-line fishermen are available in fish receipt form. Little data exist on area of catches and species composition for commercial hook-and-line fishermen. The quality of available data precludes an adequate assessment of the current situation. Compilation, organization and analyses of the existing data could be accomplished in 9 to 12 person months.

8.6.3 Trawl and Longline: Pot

Trawlers and longline fishermen have charged that:

1. Sablefish pots (traps) permanently occupy grounds; thereby denying access to those grounds and increasing crowding on adjacent grounds;
2. Sablefish pots create an undesirable biological situation when lost pots continue to fish (ghost fishing);
3. Conflict could be reduced if pot fishermen were required to take their pots aboard whenever they leave the grounds;
4. Longline fishermen claim that pots entangle longlines.

Pot fishermen state that:

1. Other fishermen intentionally destroy pot gear even when pots are adequately marked;
2. Pots are less damaging to the environment than trawls;
3. New longliners have claimed large areas of the ocean bottom which have been fished by pots for six or seven years.

Other fishermen believe that the industry should handle the conflict themselves.

Some of the conflict could be resolved by better gear marking, a minimum mesh size or escape rings on pots, and consideration of keeping the gears separated by area.

Longliners also state that they catch larger fish than trap gear. Traps offer the best opportunity for adjusting the optimum age at recruitment through mesh size or escape rings. Longline fishing is cheaper than pot fishing and increases the possibility for increased effort in a short time frame.

Chapter 9 - Optimum Yield

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Summary

The estimates of optimum yield are the cornerstone of this plan. They are a statement of the amount of groundfish available for harvest in a given year. The concept of exactly how OY's should be specified for the many species and areas covered by this plan is discussed in Section 9.1. Alternative methods of combining species and areas are explored. In order to assure maximum flexibility to allow limited changes in harvest goals due to environmental fluctuations, new information and other circumstances, a method for OY adjustment is provided in Section 9.3. Finally, Section 9.4 provides actual OY estimates for each management subunit.

The chapter states:

- OY's are viewed as annual harvest guidelines with management measures specified in Chapter 12 designed to achieve such harvests.

- The most direct measures for achieving OY harvests are closing a fishery when the OY is harvested or setting trip limits at some point prior to reaching OY.

- Pacific ocean perch, Pacific whiting, shortbelly rockfish, sablefish and widow rockfish each have separate OY's specified in Table 28 (page 9-4). An "other fish" category which includes underharvested or unutilized species is included in Tables 29 and 30 (pages 9-6 and 9-8).

- Each OY option contains Table 28 as a part of the OY.

- Groundfish species are grouped in three proposed OY options.

  1. A limited grouping of the groundfish species is proposed as option 1, providing for 40 separate OYs by species and area. This method reflects more of a species by species management philosophy. Table 29 (page 9-7) demonstrates this approach.

  2. A broad grouping of the same remaining species is proposed in option 2. This would establish one OY in each INPFC management area for all major species of groundfish (18 OYs total). The grouping is shown in Table 30 (page 9-8).

3. Option 3 further groups species, however a major difference from options 1 and 2 is its lack of numerical OY's (except for the Table 28 species).

- To prevent unacceptably high catches, each species/species complex will have a point of concern. The point of concern triggers an assessment of the status of the species/species complex. Three options for determining the point of concern are provided.

- A system for adjusting the numerical OYs and/or ABCs upward by no more than 30% is provided. It may be used for either in-season or annual adjustments.

- OY's are specified for each species/species complex. The OY's for most species are simply the ABC's as specified in Table 14 (page 6-7), Chapter 6.

9.0 OPTIMUM YIELD

9.1 Optimum Yield Overview

Pacific whiting, sablefish, Pacific ocean perch (POP), shortbelly rockfish and widow rockfish have been selected for individual species management (9.1.1) with each species having been assigned an individual OY because of either the harvesting method or stock condition. These five individual species are included as a component of each option presented below and will be managed in the same way regardless of which option is selected for managing the remaining groundfish species. These five species will be managed by harvest guidelines (quotas). The recreational fishery will be managed by bag limits and gear regulations. Recreational harvests as well as groundfish harvests in other commercial fisheries (e.g., salmon, shrimp) are included in the determination of OY. In most cases discards are an unknown component of fishing mortality (Section 10.3.3). Since most OYs are determined on the basis of landings, discards are not relevant to the calculation of OY. Accordingly, discards will not be included in the tabulation of landings relative to the attainment of OY.

Three options are presented. Option 1 has 40 OYs, Option 2 has 18 OYs, and Option 3 has 7 OYs. (All options include the 7 OYs in Table 28.) Options 1 and 2 utilize both gear regulations and harvest guidelines (OY), to manage the fishery. Option 3, instead of treating OY as a harvest guideline, defines OY as the amount of fish that can be landed using legal gear (Chapter 12). Consequently the determination of the appropriate gear is essential to management.

Mechanisms are presented which will: (a) accommodate in-season conservation requirements and (b) provide for an increase in allowed landings if new fishery information suggests this is appropriate.

Although the three options are self-contained, they are not intended as the exclusive means of expressing OY nor is their presentation intended to preclude the choice of an additional option lying somewhere between the extremes which reasonably combines two or more of these three or any realistic options which may be brought to light during the public review process.

9.1.1 Individual Species OY's

The five species selected for individual OYs are:

1. Pacific whiting
   and
2. Shortbelly rockfish
   - These two species are segregated in that they can be caught with mid-water trawls with minimal bycatches.

3. Pacific ocean perch
   - This species is severely depleted and requires special management consideration (see Section 12.3.1.4).

4. Sablefish
   - Although some of the sablefish catch is by trawl gear, much of the catch is by directed effort with stationary gear. In addition, harvests in the Monterey Bay area deserve special attention.

5. Widow rockfish
   - A provisional OY was set at 17,500 mt, the highest catch of record (1980). The fishery for widow rockfish is highly directed and is almost entirely a single gear, single species fishery. The OY was set provisionally for the following reasons:

     (1) The 1980 catch represents a single data point in terms of stock assessment. MSY estimates will not be possible until the late 1980s.

     (2) Catch has increased 300% in just one year.

     (3) The number of participating vessels increased from 9 to 52 in just one year, a six-fold increase.

     (4) The fishery is expanding to new grounds while catch from original grounds has declined, a classic sign of the fishing down process.

     (5) Recruitment of incoming year classes is tentative at best but indications are that the 1972-73 year classes are not strong. The current fishery relies heavily on the 1970-71 year classes, which in the Columbia area comprised 56% of the 1980 catch. These year classes will have made their major contribution by 1983.

     (6) The provisional OY does not preclude expansion of the fishery. Adjustments to harvest guidelines, Section 9.3.2, allows for annual adjustments of up to 30%. If the provisional OY is too great, downward adjustments of any size can be made through the Point of Concern mechanism, Section 9.3.1.

     (7) Assigning an individual OY to widow rockfish will increase our ability to prevent overexploitation in this highly directed fishery. It would be prudent to avoid the rebuilding process required for POP.

The OY's for these species are included in all options and are listed in Table 28.

Table 28. OY determination, in thousands of landed metric tons, for species requiring special consideration. See Section 9.3.2 for adjustment procedures.

Species	Vancouver	Columbia	Eureka	Monterey	Conception	Total
Pacific whiting						175.5 1/
Sablefish				2.5		13.4 2/
Pacific ocean perch	0.0-0.6 3/	0.0-0.95 3/	4/	4/	4/	0.0-1.55
Shortbelly rockfish						10.0 1/
Widow rockfish						17.5 1/

1/ Total applies to the sum of catches for all areas.

2/ Total applies to the sum of catches for all areas except that of this total Monterey Bay (Section 12.3.1.3) catches may not exceed 2.5 thousand landed metric tons.

3/ The upper limit of this range represents the estimate of what will be caught under the 20-year rebuilding schedule adopted by the Council (Table 15). Actual landings of POP will be governed by trip limits (see Section 1.4.2.4).

4/ Included in "other rockfish."

9.2 Optimum Yield Options

Option 1 - Limited Grouping (40 Subunits/OYs)

This option establishes, within each INPFC area, individual OY's for as many species as is realistically possible. The individual species OYs listed in Table 28 (Section 9.1.1) are included as a component of this option.

In a multispecies fishery, even the best applied fishing technology and regulatory procedures sometimes fail to control the species composition of the catch well enough to avoid serious underharvest of some species as catches of others approach the acceptable biological catch (ABC). Accordingly, it was necessary to specify a single OY for several species groupings. Also, in some cases it was beneficial to include one OY for two or more areas to establish realistic management subunits.

The following guidelines were used in determining the OY values (management subunits) shown in Table 29:

1. All species that are amenable to management, have commercial or recreational value, and are taken as target species or as a major element in mixed stock fisheries have an OY specified for each species. A species was considered "amenable to management" if (a) there was a relatively sound basis for determining ABC and (b) either the fishery is reasonably capable of controlling catches for the species or the mortality caused by catching and releasing them is reasonably low.

2. Species that are not amenable to discrete management but are important either when taken as an incidental catch or as a minor element in directed mixed stock fisheries were grouped together with similar species that occur in the same geographic and bathymetric region. The desirability of maintaining each species as a functional element of the ecosystem was taken into account.

If species are grouped, a single stock or species could be overharvested before the problem was detected and remedied. While not completely analogous, severe depletion of several species of Antarctic whales was attributed to a management system which did not account for the status of individual species. Detailed management of the fishery may necessitate increased attention to the status of individual stocks. A considerable amount of effort would be necessary to manage the fishery in the detail proposed under this option. However, risks may be taken in not doing so.

Option 2 - Broad Grouping (18 Subunits/OYs)

This option combines major groundfish species not included in the individual species subunits and the other fish category into a group for each INPFC management area (for a total of 18 subunits). The individual species OYs listed in Table 28 (Section 9.1.1) are included as a component of this option.

The major group is comprised mainly of lingcod, Pacific cod, all rockfish, (except Pacific ocean perch, shortbelly and widow rockfish) and all flatfish except arrowtooth flounder (Table 30).

The intent of the broad grouping concept is:

1. To minimize disruption of existing fishing practices,

2. To maximize total sustainable production of grouped species which often are caught together in the multi-species groundfish fisheries, and

3. To allow in-season flexibility.

Table 29. OY determination, in thousands of landed metric tons, for species or species complexes covered in the limited grouped option, option 1. See Section 9.3.2 for adjustment procedures.

Species	Vancouver	Columbia	Eureka	Monterey	Conception	Total
Whiting						175.5 1/
Sablefish			2.5			13.4 2/
Pacific ocean perch	0.0-0.6 3/	0.0-0.95 3/	4/	4/	4/	0.0-1.55
Shortbelly rockfish						10.0 1/
Widow rockfish						17.5 1/
Lingcod	1.0	4.0	0.5	1.1	0.4	7.0
Pacific cod	------3.1------					3.1 1/
OTHER ROCKFISH: 5/						
Canary/ yellowtail	6.3	3.7	0.9	4/	4/	10.9
Chilipepper/bocaccio	4/	4/	4/	5.4	3.0	8.4
Remaining rockfish	2.0	2.5	1.9	4.3	3.3	14.0
Dover sole	1.5	5.0	8.0	7.0	1.5	23.0
English/petrale	------4.3------		6/	6/	6/	4.3
Other flatfish (except arrowtooth flounder)	0.7	3.0	3.0	3.5	0.9	11.1
OTHER FISH 7/						
Jack mackerel						12.0 8/
Others	3.0	7.0	2.0	2.0	2.0	16.0

1/ Total applies to the sum of catches for all areas.
2/ Total applies to the sum of catches for all areas except that of this total, Monterey Bay (Section 12.3.1.3) catches may not exceed 2.5 thousand landed metric tons.
3/ The upper limit of this range represents the estimate of what will be caught under the 20-year rebuilding schedule adopted by the Council (Table 15). Actual landings of POP will be governed by trip limits (see Section 1.4.2.4).
4/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, they are included in the "remaining rockfish" category for these areas only.
5/ By definition, the category "other rockfish" includes all rockfish species except Pacific ocean perch, shortbelly rockfish and widow rockfish.
6/ Included in "other flatfish."
7/ See Table 1.
8/ All areas north of 39°N.

With this use of the grouping concept, management of each species/species complex within the group is of secondary importance. Care is taken to assure the health of the individual stocks by

establishing a point of concern (see Section 9.3). This is consistent with the concept of fishery management units in Section 2.3. The specified OY equals the sum of the ABC's (except Dover sole in the Columbia area and shortbelly rockfish) of each species within the subunit. This assumes that there are not interactions among the species that would result in ABC of the group as a whole being significantly above or below the simple sum. There is not sufficient knowledge of the interactions to do otherwise (see Section 7.2). Table 30 lists the species included in the broad grouped OY and specifies OY's for each management area.

Table 30. OY determination, in thousands of landed metric tons, for the broad grouped OY option, option 2. See Section 9.3.2 for adjustment procedures.

Species	Vancouver	Col.	Eureka	Monterey	Conception	Total
Whiting						175.5 1/
Sablefish				2.5		13.4 2/
Pacific ocean perch	0.0-0.6 3/	0.0-0.95 3/	4/	4/	4/	0.0-1.55
Shortbelly rockfish						10.0 1/
Widow rockfish						17.5 1/
Lingcod						
Pacific cod						
Other rockfish 5/	15.1	22.0	14.3	21.3	9.1	81.8
Dover sole						
English/petrale sole						
Other flatfish						
OTHER FISH 6/						
Jack mackerel						12.0 7/
Others	3.0	7.0	2.0	2.0	2.0	16.0

1/ Total applies to the sum of catches for all areas.
2/ Total applies to the sum of catches for all areas except that, of this total, Monterey Bay (Section 12.3.1.3) catches may not exceed 2.5 thousand landed metric tons.
3/ The upper limit of this range represents the estimate of what will be caught under the 20-year rebuilding schedule adopted by the Council (Table 15). Actual landings of POP will be governed by trip limits (see Section 1.4.2.4).
4/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, they are included in the "other rockfish" category for these areas only.
5/ By definition, the category "other rockfish" includes all rockfish species except Pacific ocean perch, shortbelly rockfish and widow rockfish.
6/ See Table 1.
7/ All areas north of 39°N.

Option 3 - Broad Grouping

This option is a modified version of option 2 and combines all groundfish not included in the individual species subunits in Table 28 into a single OY. The intent of this option is the same as in option 2. The individual species OY's listed in Table 28 (Section 9.1.1) are included as a separate component of this option.

With the use of this grouping concept, management of each species within the group is important only if there are obvious impacts on the general productivity of the species complex. Care is taken to insure the health and conservation aspects of the resources by establishing points of concern as described in Section 9.3.1. It should be noted, however, that under this option some in-season catches of particular species are expected to vary above and below the estimated ABC.

Under this option, as in OY options 1 and 2, whiting, sablefish, Pacific ocean perch, shortbelly rockfish and widow rockfish each have a specific numerical OY which is intended to function as a quota which may be increased no more than 30% in any one year through the Adjustments to Harvest Guidelines Mechanism and may be decreased at any time through the Points of Concern Mechanism (Table 31).

All remaining species in the fishery are in a single group, the OY for which is defined as all the fish that can be taken (including discards) under regulations promulgated by the Secretary as they may be modified in- or between-seasons by exercise of the Points of Concern Mechanism. This OY allows for a variable amount of fish to be harvested taking into account established conservation principles. Secretarial regulations should provide protection for juveniles and maximize yield per recruit. The use of the Points of Concern for each species within the broad grouping will assure careful in-season monitoring of the stocks and should handle conservation issues which may arise. Although it is not possible to determine with precision the amount of fish in this broad group which will be harvested under regulations initially adopted by the Secretary, it is estimated that management measures recommended by the Council (see Chapter 1) may result in the harvest of approximately 90,000 mt in 1982. Assuming recommended regulations are implemented and remain unchanged for 5 years, the annual harvest of fish in this broad group could be expected to approximate 150,000 mt. It is emphasized that these numbers do not constitute OY and are not intended to be used as quotas, but rather, are estimates of the amount of fish in the broad grouping which will be harvested given the OY as it is defined above. These numbers also do not represent DAH or DAP for this group. This option continues the historical management practices of the states of managing the groundfish fishery without the use of quotas, but increases the monitoring and assessment of stock conditions.

In addition to review of the status of stocks of individual species/species complexes under the point of concern mechanism (Section 9.3.1), the Management Team will submit a written report to the Council if the catch of the major species group in any INPFC area reaches the sum of the individual ABC's. The report will list all data

Table 31. OY determination, in thousands of landed metric tons, for OY option 3. See Section 9.3.2 for adjustment procedures.

Species	Vancouver	Columbia	Eureka	Monterey	Conception	Total
Whiting						175.5[1]
Sablefish				2.5		13.4[2]
Pacific ocean perch	0.0-0.6[3]	0.0-0.95[3]	[4]	[4]	[4]	0.0-1.55
Shortbelly rockfish						10.0[1]
Widow rockfish						17.5[1]
Lingcod						
Pacific cod						
Other rockfish[5]						
Dover						
English/Petrale						
Other flatfish						
Other fish[6]						

All that are landed under regulations adopted by the Council.

1 Total applies to the sum of catches for all areas.
2 Total applies to the sum of catches for all areas except that, of this total, Monterey Bay (Section 12.3.1.3) catches may not exceed 2.5 thousand landed metric tons.
3 The upper limit of this range represents the estimate of what will be caught under the 20-year rebuilding schedule adopted by the Council (Table 15). Actual landings of POP will be governed by trip limits (see Section 1.4.2.4).
4 Included in"other rockfish." This species is not common nor important in the areas footnoted. Accordingly, for convenience, they are included in the "other rockfish" category for these areas only.
5 By definition, the category "other rockfish" includes all rockfish species except Pacific ocean perch, shortbelly rockfish and widow rockfish.
6 See Table 1.

and considerations incorporated in the review, summarize conclusions and make appropriate management recommendations. The recommendations may range from no action to retention restrictions on any or all species.

If the Management Team, after it follows its point of concern species*/species complex assessment, or major species group assessment, decides that an action is needed to protect the biological productivity of the complex, or important element of the complex, it will advise the Council and the Regional Director of its findings and recommend actions. The Regional Director will be authorized to implement in- and between-season management actions but will do so only after fully considering recommendations of the Council. Regional Director authority in no way alters the authority of the Secretary of Commerce to take emergency regulatory action as provided for in Section 305(e) and 305(g) of the MFCMA nor does it alter Council authority to amend the FMP. The Council will hold a public meeting to obtain social, economic and additional biological information before deciding on the need for new measures.

The management regime under this option is the most flexible proposed, but relies heavily on an effective system of monitoring for points of concern and responding to any conservation problems that may arise.

Any shortcomings in this system could result in overfishing of some stocks.

9.3 Adjustments

Because of poor knowledge of some species and the grouping of species in all three OY options, the management system adopted must include a way to revise regulations within or between seasons on the basis of better assessments and actual results in the fishery. This section explains how the Council will determine the need for such adjustments. When it does, it will request the Regional Director to implement them through the federal regulatory change process. An example of this process is given at the end of Section 9.3.1.

9.3.1 Points of Concern

To prevent avoidable and undesirably high catches of individual species or species complexes, each species/species complex will be subject to continuing assessment and monitored throughout the calendar year for signs of biological stress. A Council-appointed Management Plan Implementation Team will conduct this continuing review of the status of each species/species complex utilizing the most current catch and effort data from the fishery.

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*Applies to five individual species OY's in Table 28.

Point of Concern Option 1:[1/] If in the course of the Team's continuing review, a Point of Concern occurs when the catch of any species/species complex reaches 75% of the ABC or numerical OY; if the latter is specified (see Tables 14 and 28).

Point of Concern Option 2: In the course of the Team's continuing review, a Point of Concern occurs when any one or more of the following is found:

1. Exploitable biomass or spawning biomass below a level expected to produce MSY for the species/species complex under consideration;

2. Recruitment is substantially below replacement level;

3. Fishing mortality rate exceeds that required to take ABC for the calendar year;

4. Catch for the calendar year is projected to exceed best current estimate of ABC; or

5. Any other abnormality in the biological characteristics of the species/species complex is discovered, such as changes in age composition, size composition, and age at maturity.

Option 2 is designed to account for the fact that catches of some species are expected to vary above and below the estimated ABC because of environmental fluctuations, relative availability, and other unpredictable natural causes. There is also a certain margin of uncertainty inherent in each estimate of ABC. Large short-term catches of a species/species complex do not necessarily mandate catch restrictions under the grouped species concept of Optimum Yield Options 2 and 3.

Once a Point of Concern is identified under either Option 1 or 2:

1. The Team will evaluate current data to determine if the concerned stock shows legitimate signs of biological stress or is merely demonstrating aberrant tendencies which do not indicate biological stress;

2. If the Team concludes that there is evidence of stress, it will make findings regarding which one or more of the following management measures will relieve the condition of stress while at the same time

1/ Former drafts of this FMP contained 3 options for identification of Point of Concern: (1) When the catch of any species/species complex reaches 75% of the ABC or numerical OY; (2) continuing assessment; and (3) when signs of stress are identified. As "continuing assessment" has been incorporated in all Point of Concern options, it is no longer considered a separate option.

achieve the prioritized objectives[2/] of this FMP:

a. cessation of foreign fishing on the species/species complex;
b. cessation of both foreign and domestic fishing on the species/species complex;
c. cessation of directed fishing (foreign, domestic or both) on the species/species complex with appropriate allowances for incidental harvest of the species/species complex;
d. area or sub-area closures;
e. time closures;
f. gear limitations;
g. quotas;
h. other necessary measures.

3. The Team will prepare a report containing the rationale in support of the determination that the stock is stressed and a recommendation and supporting rationale indicating which management measure(s) should be employed to alleviate the stress consistent with the prioritized objectives of this FMP. The report will also contain reasons why other meausres were not recommended. The report will be presented at the first regularly scheduled Council meeting following report preparation.

4. At the time and place of the meeting when the Council considers the Team's report, a public hearing will be held to afford an opportunity for public comment.

5. The Council, following review of the Team's report, supporting data, public comment and other relevant information, will recommend management measures to the Northwest Regional Director of the National Marine Fisheries Service (RD)[3/], accompanied by relevant

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2/ Objectives of this FMP ranked according to importance for purposes of "signs of stress" are:
First Priority: - Prevent overfishing of stocks which are capable of management as a unit, including rebuilding those stocks which are now depleted through overfishing.
Second Priority: - Provide a favorable climate for existing domestic commercial and recreational groundfish fisheries within the limitations of other objectives and guidelines. When change is necessary, institute the regulation which accomplishes the change while minimizing disruption of current domestic fishing practices, marketing procedures and the environment.
Third Priority: - Provide for the orderly development of domestic groundfish fisheries, including new fisheries, consistent with priorities 1 and 2, at the expense of foreign participation.
- Recognizing the multi-species nature of the fishery, establish a concept of managing by species and by gear, or by groups of interrelated species.
- Promote rational and optimal use, in the biological, social and economic senses, of the region's fishery resources as a whole.
- Minimize gear conflicts among users.
- Provide for foreign participation in the fishery, consistent with the above priorities, to take that portion of the optimum yield not utilized by domestic fisheries.
- Promote the availability of quality seafood to the consumer.

background data, information and public comment. The recommendation will explain the urgency in implementation of the measure(s), if any, and reasons therefore.

6. The RD will review the Council's recommendation, supporting rationale, public comments and other relevant information, and if he concurs in the recommendation, will propose regulations in accordance with the recommendations. He may also reject the recommendation, providing written reasons for rejection.

7. If the RD concurs inthe Council's recommendations, he shall publish proposed regulations in the Federal Register and shall afford a reasonable period for public comment which is consistent with the urgency (if any) of the need to implement the management measure(s).

Nothing in this section shall be interpreted to derogate from the authority of the Secretary of Commerce to take emergency action under Section 305(e) of the MFCMA.

The following hypothetical example illustrates how a point of concern would be determined and acted on:

1. The Management Team has been monitoring the petrale sole fishery and on May 1 projects that the petrale sole ABC (1,100 mt) in the Columbia area will be reached by September 5. A point of concern has therefore been reached.

2. The Team reviews its assessments to see whether the ABC is still valid in light of the most recent data. Finding that it is, the Team concludes that continued fishing at current levels of effort would significantly reduce the future productivity of the stock.

3. The Team prepares a report of its findings and a set of management options to reduce fishing mortality (e.g., area closures, trip limits), with an evaluation of each, for consideration by the Council.

4. The Council reviews the report, accepts the biological conclusions, and selects a trip limit of 1,000 lbs. as its preferred management action.

5. The Council consults with the RD and recommends the regulation it has decided on, documenting its reasons.

6. The RD considers the Council's recommendation and supporting documents. Finding them sound, he begins regulatory action to impose a trip limit of 1,000 lbs.

7. Regulation implemented July 20.

3/ A delegation of authority from the Assistant Administrator for Fisheries, NOAA, to the RD is assumed.

9.3.2 Adjustments to Harvest Guidelines (Numerical OYs and ABC Values)

THIS PROCEDURE APPLIES TO ALL OPTIONS. It is understood that the numerical OY and ABC estimates in this Plan are, in many ways derived from minimal, incomplete, or preliminary data, and that there is an element of uncertainty in each estimate. It is further understood that environmental fluctuations will affect abundance and will therefore necessarily impart some variability to OYs. Safeguards to protect the resource are provided under "Points of Concern" mechanism (see Section 9.3.1). Use of the suggested OYs and/or ABCs as harvest guidelines in the absence of some mechanism for adjustment could well lead to less than optimum utilization of a healthy resource. Therefore, within-season and between-season upward adjustments of OY and/or ABC will be made if needed to allow full resource utilization.

A system which allows for in-season and annual upward adjustments of numerical OY and ABC values under guidelines and procedures provided in this section is desirable. Under this system increases not to exceed 30% of the specified harvest guideline may be made when warranted by new information about the fishery as it becomes available. Ideally, the maximum percentage selected should provide adequate flexibility for accommodating most underestimation without being so large as to threaten the health of the resource or require plan amendment, if fully applied. An increase of 30% would fulfill the above criteria. A portion or all of this increase may be applied depending on established need. (Downward adjustments of any size can be accommodated for resource conservation on a case by case basis through the "point of concern" mechanism.)

Possible maximum percentage increases to harvest guidelines and corresponding total percentage increases in OY should the entire increase be applied and retained in consecutive years are given below:

Maximum Percent Allowed	Number of Years Applied and Retained							
	1	2	3	4	5	6	7	8
10	110	121	132	145	160	176	194	214
15	115	132	152	175	201			
20	120	144	173	207				
25	125	156	195	244				
30	130	169	220					
35	135	182	249					
40	140	196	274					

There is no limit on the number of increases allowed in any given year under this mechanism, except that the total increase cannot exceed 30% in any one year. At the end of the management year, a decison will be made to permanently adopt a portion or all of this increase. Larger increases can be made only through the plan amendment process.

9.3.2.1 In-Season Adjustments to Harvest Guidelines

If, on the basis of the factors listed below and in the course of its continuing assessment under Section 9.3.1, the Team concludes that an increase in harvest guidelines for any species would not stress that or any other species and would maximize use of the resource, it shall present a written report of its findings at the next regularly scheduled Council meeting. The written report presented by the Team will contain data and analysis relevant to the conclusion that an increase of a harvest guideline is appropriate and shall include a recommendation, with analysis, of the allowable percentage increase by INPFC area. The report and recommendations shall be made available for public review and comment.

The Team's written report will include consideration of the following factors:

1. Exploitable biomass and spawning biomass relative to MSY levels for the species/species complex under consideration;

2. Fishing mortality rate relative to MSY levels for the species/species complex under consideration;

3. Magnitude of incoming recruitment;

4. Projected effort and corresponding catches relative to ABC;

5. In the case of species normally taken in mixed catches, the relative contribution of the species/species complex to the total catch; and

6. Any other pertinent factors.

The Council will consider the report and recommendations of the Team and such public comments as are relevant to the Team's submission. A public meeting will be held for the purpose of obtaining public comment. Written comments will also be considered. As early as practicable after receipt of the Team report, the Council will make findings regarding the advisability of increasing a harvest guideline in one or more INPFC statistical areas and, if an increase is appropriate, will, in writing, so advise the Northwest Regional Director of the National Marine Fisheries Service.*

* A delegation of authority from the Assistant Administrator for Fisheries to the RD is assumed.

If the RD, on the basis of the Team report and recommendations, the Council findings, public comment, and other relevant information, concurs that an increase in the harvest guideline for a particular species is appropriate, he shall promulgate regulations accordingly. The RD is authorized to adopt and implement by regulations only that portion of the increase in harvest guidelines which he finds would not, if caught on an annual basis, stress any species in any INPFC statistical area.

The RD will publish any proposed regulations in the Federal Register and will consider any public comment(s) received prior to finalizing any regulations.

9.3.2.2 Between-Season Adjustments to Harvest Guidelines

Adjustments to harvest guidelines may also be made between-seasons as per procedures set out in Section 9.3.2.1 for in-season adjustments.

9.4 Optimum Yield Estimates

Estimates of optimum yield are delineated by management unit in Tables 29, 30, and 31. These estimates were obtained by assuming that OY equals the ABC, or the sum of the combined ABC's, established in Chapter 6 for all species except those discussed below.

9.4.1 Pacific Ocean Perch

The OY for Pacific ocean perch is the annual amount that would be landed under a chosen trip allowance. An evaluation of trip allowances is in Section 12.3.1.4. Both the OY and trip allowance involve biological, economic and sociological considerations.

It may be desirable to set trip allowances at the lowest practical level at the beginning of a rebuilding plan. The objective of trip allowances, particularly in the early stages, would be to allow rebuilding of the stocks at the maximum rate possible, through discouraging all targeted catches. As the stock rebuilds, trip allowances would then be allowed to increase.

9.4.2 Dover Sole

General production curves (Lenarz, 1978b) for Dover sole are relatively flat-topped. Predicted catch is fairly stable over a wide range of effort values so that it would be safe to fish slightly above MSY levels to provide better assessments of the status of the stocks and more accurate estimates of MSY. For the Columbia area, an OY of 5,000 mt would allow development of the fishery within safe bounds. For the Eureka area OY can be set at 8,000 mt, the estimated MSY. The Monterey area fishery has been expanding in recent years and further expansion to 7,000 mt would probably not be detrimental. The Vancouver and Conception areas have sustained only minor Dover sole fisheries to date and yields of 1,500 mt in each area would allow for safe expansion.

9.5 Authority of Regional Director

The adjustment mechanisms specified in Section 9.3 do not affect the authority of the Secretary of Commerce to take emergency regulatory action as provided for in Section 305(e) of the MFCMA if an emergency exists involving any groundfish resource, or to take such other regulatory action as may be necessary to discharge the Secretary's responsibilities under Section 305(g) of the Act.

Chapter 10 - U.S. Harvesting and Processing Capacity and Utilization

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Summary

This chapter provides estimates and adjustment mechanisms for the amount of the OY which U.S. fishing vessels will harvest (Domestic Annual Harvest or DAH), the amount of DAH which domestic processors will process (Domestic Annual Processing or DAP), the amount of DAH not processed domestically and therefore available to foreign processors (joint venture processing or JVP). The remainder is available for foreign fishing (Total Allowable Level of Foreign Fishing or TALFF) after a reserve is subtracted. TALFF is discussed in the next chapter. JVP = DAH - DAP. TALFF = OY - DAH - Reserve.

The chapter states:

- DAH = DAP for the multispecies group (non-numerical OY), and consequently there is no JVP or TALFF for this group. There will be no annual estimates of DAH, DAP and JVP for these species.

- Range estimates of DAH, DAP and JVP have been calculated for Pacific whiting, sablefish, shortbelly rockfish and widow rockfish species with numerical OYs. Annual point estimates will be made between seasons so that JVP and TALFF can be calculated. The use of range estimates avoids the lengthy plan amendment process.

- So that the domestic industry will not be disadvantaged by low estimates of DAH, a reserve of 20% of the OY is established for all species with a TALFF.

- In-season adjustments of DAH, DAP, JVP and TALFF will be made around August 1 as follows:

  (1) All or part of the reserve will be apportioned among DAP, JVP and TALFF with domestic needs met first.

  (2) Unused portions of DAH will be released to foreign harvesters if performance of U.S. harvesters is clearly falling short of DAH estimates and if foreign harvesters indicate a desire to utilize excess amounts.

- 1982 point estimates of DAH, DAP and JVP for Pacific whiting, sablefish, shortbelly rockfish and widow rockfish are:

	Pacific whiting	Sablefish	Shortbelly rockfish	Widow rockfish
DAH	100,000 mt	13,400 mt	10,000 mt	17,500 mt
DAP	10,000 mt	13,400 mt	10,000 mt	17,500 mt
JVP	90,000 mt	0	0	0

10.0 U.S. HARVESTING AND PROCESSING CAPACITY AND UTILIZATION

The MFCMA provides for foreign use of a species of fish only if domestic producers do not have the capacity and intent to use the optimum yield of that species. Accordingly, the concepts discussed in this chapter include the capacity and the extent to which U.S. fishing vessels will harvest the OY specified in this plan (called domestic annual harvest, or DAH), the capacity and extent to which U.S. processors will process the domestic annual harvest (called domestic annual processing, or DAP), the amount of the domestic harvest available to foreign processors (called joint venture processing, or JVP), and the remainder of the OY that is available for foreign fishing (called total allowable level of foreign fishing, or TALFF).

Most groundfish fisheries are multispecies operations. This is true of the trawl fishery which accounts for most of the landings (80% in 1977). Except for Pacific whiting, Pacific ocean perch, sablefish, possibly shortbelly rockfish and widow rockfish, it is virtually impossible to fish for a single species without significant incidental catches of other species. Recreational, commercial hook-and-line and fixed gear fishermen also are unable to control the species composition of their catches. The multispecies nature of the fishery has been demonstrated with domestic bottom trawl surveys, foreign bottom trawl surveys, domestic trawl records, and recreational fishery statistics.

Consequently, there are two basic divisions of species encountered in Pacific coast groundfish operations. Those species which cannot be fished without significant incidental catches have a non-numerical OY and their DAH estimates and TALFFs are not calculated annually. Those species which have a numerical OY, except for Pacific ocean perch, require annual determinations of DAH and TALFF (i.e. Pacific whiting, sablefish, shortbelly rockfish and widow rockfish).

Pacific ocean perch (POP) are severely depleted, and restrictions are needed on landings in order to rebuild the stocks. The Council has recommended that domestic fishermen be placed on trip limits in order to achieve a 20-year rebuilding schedule. In this case DAP certainly equals or exceeds DAH, and OY is not greater than DAH, thus there is no JVP or TALFF for Pacific ocean perch in the forseeable future. An annual assessment of DAH and TALFF for POP is therefore not necessary.

That portion of DAH (for the species with a numerical OY) which is not utilized by domestic processors may be made available to joint-venture operations (Section 3.2); JVP = DAH - DAP (equation 1). The amount of fish made available for JVP is dependent upon whether domestic processors have the capacity and intent to process DAH. The portion of OY (for those species with a numerical OY) which is not utilized by U.S. harvesters may be made available to foreign harvesters; TALFF = OY - DAH - Reserve (equation 2). The amount of fish made available for TALFF is dependent upon whether domestic harvesters have the capacity and intent to use the entire OY.

10.1 Non-Numerical OY Species

For those species or species groups that are managed with non-numerical OYs, neither JVP nor TALFF will be allowed for the following reasons.

DAH = DAP for the multispecies group. Even though DAP does not equal DAH for every species in the multispecies fishery (which includes flatfish and most rockfish), JVP is infeasible since it would be virtually impossible to selectively harvest the underutilized species. Moreover, domestic processors depend on a mix of species to maintain their economic viability and have demonstrated the capacity and intent to handle the entire catch from the utilized component of the multispecies group. A directed joint venture or foreign fishery on any component of the multispecies group would unavoidably impact species that are fully utilized by the U.S. For example, sanddabs and arrowtooth flounders, bottomfish species harvested below their MSY, are spatially associated with stocks of fully utilized petrale sole, lingcod, chilipepper, and other rockfish.

Another consideration is the potential impact on domestic markets if the multispecies complex is available to JVP or TALFF. In 1979 the sale of petrale, Dover and English soles, rockfish and sablefish comprised over 80% of the groundfish revenues received by processors. Any transfer of these stocks to foreign processors would diminish the amount U.S. processors could obtain. From 1977 to 1979, 49% more groundfish were purchased by domestic processors. Foreign imports, increase in U.S. inflation, product substitution caused by price differential in the market, and lack of price flexibility in a portion of the production sector undoubtedly influenced 1979 market expansion.

Thus, due to the multispecies nature of the groundfish trawl fishery and the potential for economic interference, there is no TALFF and no JVP for the non-numerical OY group. DAH will not be assessed for the non-numerical OY species as long as this situation continues. If, however, a surplus of any species/species group becomes available (as determined by the continuous assessment specified in Section 9.3.1) without negative impact on domestic operations, or if the technology to target on an underutilized component of the mixed species group is acquired, then an appropriate reevaluation of the non-numerical OY would occur. In the process as required, the annual estimates of DAH, DAP, JVP or TALFF would then be included by plan amendment.

10.2 Numerical OY Species

A numerical OY has been calculated for those species which can be fished selectively or need special protection (POP). Two types of DAH estimates will be used: a multiyear range estimate and a between-season (or pre-season) point estimate. The between-season estimate may be further modified in-season by the regulatory amendment process.

10.2.1 Procedures

10.2.1.1 Range Estimates

The Council will use a range estimate to determine DAH. This will allow relatively rapid between-season and in-season modifications within the estimated DAH range. If the range estimates for DAH, DAP, and JVP become inappropriate, they may be modified by the plan amendment process. Evaluation and determination of range estimates for DAH, DAP, and JVP involve consideration of past and projected U.S. catch, effort, and processing and current and previous between-season estimates.

Alternative procedures considered by the Council required modification of DAH estimates by plan amendment and were not sufficiently responsive for appropriate management.

10.2.1.2 Between-Season Estimates

Annual between-season estimates of DAH and DAP for Pacific whiting, sablefish, shortbelly rockfish and widow rockfish will be made to determine their availability for JVP (equation 1) and TALFF (equation 2) and to evaluate the appropriateness of the range estimates for DAH, DAP and JVP. The between-season estimates of DAH, DAP and JVP may be modified from year to year within their respective ranges as long as DAH = DAP + JVP.

The Regional Director's determination of between-season estimates will include consideration of past U.S. catch, effort, and processing, projections of these factors for the current fishing year, and consultation with the Council. The proposed between-season estimates will be published in the FEDERAL REGISTER near December 1, subject to public comment. The Regional Director will subsequently publish the final determination, the basis for his decision, and responses to comments received.

10.2.1.3 In-Season Adjustments

There are inevitable uncertainties in estimating stock strength and DAH that can be accommodated by establishing a reserve and using in-season adjustment to modify DAH, DAP, JVP and TALFF. Each year, two adjustments will be considered: apportionment of the reserve and of DAH in excess of domestic needs for the season. (In addition, the between-season estimates will be modified to reflect any changes in OY made by the point of concern and harvest guideline adjustment procedures).

To assure that the domestic industry will not be disadvantaged by low estimates of DAH, a reserve of 20% of the optimum yield will be established for all species with a TALFF. All or part of the reserve may be apportioned among DAP, JVP and TALFF with domestic needs met first (and with DAP supplemented before JVP). If the domestic industry is not interested in all of the reserve, the remainder will be available to TALFF.

In addition to apportionment of the reserve, further modifications may be made if the domestic industry will not use the quantities designated for DAH. This release would only be made if in-season performance of U.S. harvesters was clearly falling short of DAH estimates, and if the foreign harvesters indicated a desire to utilize amounts in excess of their initial allocation (Section 11.4).

The in-season adjustments regarding apportionment of the reserve and excess DAH will be combined as a single proposed action resulting from an in-season survey of the domestic industry. The proposed modifications will be based on actual and projected domestic catch, effort, processing, and intent to utilize DAH and the reserve. Subsequent to consultation with the Council, the proposed adjustments will be published in the FEDERAL REGISTER, near July 1. Comments will be accepted for the following 15 days during which aggregated

information will be available for public review. Near August 1, the final determination, the reason for the decision, and responses to comments received will be published.

10.2.1.4 Survey Procedures

The estimate of domestic capacity and intent will be made prior to and during the fishing season. A survey of domestic processors and joint venture operations will be conducted to estimate processing capacity, planned utilization, and related information. Fishermen's trade associations will be contacted to estimate fishing capacity, intent, and related information. Unaggregated data submitted in response to the surveys will remain confidential pursuant to 50 CFR 603 concerning Confidentiality of Statistics.

Catch data will be used to monitor in-season domestic activity. This information will be collected by the states as catches are off-loaded on shore, and soon will be incorporated in a coast-wide data system which will facilitate retrieval and consistent interpretation of domestic data.

10.2.2 Estimates

The range estimates of DAH, DAP and JVP (which will be used until future modifications are needed) and the between-season estimates for 1982 are shown in Table 32 for Pacific whiting, sablefish, shortbelly rockfish and widow rockfish. These 1982 estimates will be reassessed by the survey described above and any changes announced, prior to plan implementation in January 1982.

Table 32. Range and between-season estimates of DAH, DAP, and JVP for species with numerical OYs (in 1,000 mt).

	Whiting	Sablefish	Shortbelly Rockfish	Widow Rockfish
DAH				
Range	27.0-175.5	8.0-21.0	5.0-25.0	1.1-22.75
1982-season	100.0	13.4	10.0	17.5
DAP				
Range	2.0-25.5	8.0-21.0	5.0-25.0	1.1-22.75
1982-season	10.0	13.4	10.0	17.5
JVP				
Range	25.0-150.0	DAH minus DAP	DAH minus DAP	DAH minus DAP
1982-season	90.0	0	0	0

10.2.2.1 Pacific Whiting

Range estimate - The range estimates for Pacific whiting are based on recent landing statistics and domestic industry's involvement. The DAH range estimate for whiting is 27,000 - 175,500 mt, of which 2,000 -

25,500 mt is DAP, and 25,000 - 150,000 mt is JVP. In 1977-80, joint venture operations for whiting were conducted under the trawl Preliminary Management Plan and it appears this fishery will continue. It should be noted that small catches of other species may be received by the foreign joint venture whiting processors (Section 1.6.4).

1982 season - The between-season estimate for 1982 shows that whiting is the only species available to JVP. The DAP of 10,000 mt falls short of the DAH of 100,000 mt, allowing 90,000 mt for JVP.

10.2.2.2 Sablefish

Range estimate - The U.S. sablefish industry has been expanding with the average catch for 1973-77 of 6,645 mt. The 1978 catch was 10,125 mt (preliminary data) and the catch for 1979 exceeded 16,700 mt (preliminary data). The 1979 catch was 3,300 mt over OY for that year. Consequently, DAP is expected to at least equal OY and all possible growth increases under the controlled growth criteria of Section 9.3. Shore-based processors are expected to utilize the entire DAH, so there will be no JVP in the near future. The sablefish range was determined by assessing domestic landings in the last five years (1975-79), the upper limit being 30% greater than the maximum landings and the lower limit being equal to the smallest annual landing in this time frame. The range is 8,000-21,000 mt.

1982 season - The between-season estimates for 1982 indicate that DAH and DAP are the same and they will at least equal OY at 13,400 mt. Consequently, JVP = 0.

10.2.2.3 Shortbelly Rockfish

Range estimate - Shortbelly rockfish involves a new fishery and thus some uncertainty. Shore-based processors have the capacity to utilize all of this species that are expected to be harvested in the near future (and any possible increase under the controlled growth criteria of Section 9.3). However, the current markets for human and pet food are tentative. If they develop as anticipated, domestic processing will range between 5,000 - 25,000 mt in the next few years. In 1981, permits were requested for joint venture harvest of 2,500 mt under the 1981 PMP. The Council recommended to NMFS that the permits be disapproved because of concern over incidental catch. As of this writing, the proposed joint venture is not a certainty.

1982 season - The beween-season evaluation for 1982 indicates that DAP = DAH = 10,000 mt and JVP = 0.

10.2.2.4 Widow Rockfish

Range estimate - A range estimate for widow rockfish is not realistic at this time because a directed fishery is only two years old. However a range based on the 1978 catch of 1,107 mt before the directed midwater trawl fishery began could be used as a lower limit. An upper limit is unknown but allowing for a 30% increase as allowed in Chapter 9, the upper limit would be 17,500 x 1.3 or 22,750 mt. Shore based processors are expected to use all of the DAH, thus there will be no JVP in the forseeable future.

1982 season - The current estimate for 1982 indicates that DAH and DAP are equal and that they will equal 17,500 mt. Consequently, JVP=0.

10.3 Overview

In contrast to other parts of this chapter, this section discusses the domestic groundfish fishery as a whole, regardless of the numerical or non-numerical OY status of the species. This approach not only puts the required DAH estimates in perspective with domestic intentions for the entire fishery, but it also presents additional background data that was considered in making the DAH estimates for the three species.

10.3.1 Domestic Harvest

Domestic fishermen could be catching 215,000 mt of groundfish in 1982: 105,000 mt of traditional species (the mixed species group plus Pacific ocean perch, sablefish and widow rockfish) and 20,000 mt of whiting and shortbelly for DAP and 90,000 mt of whiting for JVP.

The estimated domestic harvest of groundfish, excluding shortbelly rockfish and Pacific whiting, is expected to be around 105,000 mt (given stock and market availability) when this plan is implemented. Landings during 1978 were 75,748 mt (Table 8), an increase of 20 percent over the 1977 catch of 62,910 mt, and during 1979 were 94,000 mt (preliminary data).

The domestic annual fishing capacity (DAC) is the total potential physical capacity of the fleets modified by logistic factors. DAC is estimated to be greater than DAH but less than one million mt for the groundfish fishery.

10.3.2 Domestic Market

The U.S. market for groundfish is substantially greater than U.S. landings. It is estimated by NMFS that 80% of the groundfish used in the U.S. is imported. This market is large enough to use all the groundfish included in this management plan. The barriers to entry into these markets are quality, market form, and price. Domestic production is expected to replace imports for many products.

10.3.3 Discards

Catch data often represent only a portion of the fish caught because some fish are discarded at sea. Discarded fish usually are: (1) species which have little or no market value, (2) fish which, because of size, have little or no market value, and (3) prohibited species.

Discards of harvested fish exist in varying degrees in the Pacific groundfish fisheries. Hermann and Harry (1963) found that on a poundage basis, 36% of the fish caught by Oregon trawlers was discarded at sea in 1961. Trumble and Pedersen (1980) state that of 100 commercial bottomfish hauls observed during seven trawl trips in 1979, 35% (by weight) of the groundfish caught were discarded at sea. Mesh size of

the nets used in these tows ranged from 3-5 inches. Species catch and discard composition varied by depth fished.

These discard rates were not utilized in the current DAH computation because fish discarded in 1961 reflect the market conditions in 1961, and the 1980 data are not a representative sample. By 1978 more species of fish, and fish of smaller sizes, were being utilized in the market. There also are new or more selective fisheries in which few discards occur, such as Pacific whiting and directed midwater rockfish fisheries. Other fisheries may be relatively free of discards including deep-water Dover sole and directed rockfish fishing with specific rockfish gear. Based on discussions with fishermen and biologists, a discard of one-quarter pound to every pound of fish landed in 1978 was estimated. However there is insufficient data to accurately estimate discards for all facets of this fishery, and consequently, discards will not be considered in DAH determinations in this plan.

Chapter 11 - Total Allowable Level of Foreign Fishing

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Summary

The total allowable level of foreign fishing (TALFF) is the amount of surplus fish, if any, available to foreign fishing after U.S. harvesting and processing demands are met. To determine if any TALFF is available, the Domestic Annual Harvest (DAH), as determined in Chapter 10, and a reserve is subtracted from the Optimum Yield, determined in Chapter 9.

This chapter states:

- Any foreign fishery which attempted to harvest underutilized species in the multi-species group (non-numerical OY) would catch fully utilized species at the same time. Therefore, there can be no TALFF for any species in this group.

- Annual TALFF determinations will be made for Pacific whiting, sablefish and shortbelly rockfish, species which have numerical OYs.

- For 1982 there will be a TALFF for Pacific whiting only of 40,500 mt. This is derived by subtracting the DAH (100,000 mt) and reserve (35,000 mt) from the optimum yield (175,500).

11.0 TOTAL ALLOWABLE LEVEL OF FOREIGN FISHING

In accordance with Section 201(d) of the FCMA, a TALFF shall be allowed on the portion of the optimum yield which will not be harvested by vessels of the United States. As discussed in Chapter 10, there are two basic divisions of species encountered in Pacific coast groundfish fisheries. For those species where a directed fishery is not feasible due to the mixed species nature of the fishery, TALFF cannot be established since foreign fishing would harvest substantial quantities of species that historically are fully harvested by domestic fisheries. A selective fishery is feasible only for Pacific whiting, Pacific ocean perch, sablefish and possibly shortbelly rockfish.

11.1 Non-Numerical OY Species

Any foreign fishery which attempted to harvest the underutilized bottomfish species would catch fully utilized species which were harvestable by U.S. fishermen and would have been processed and merchandized by U.S. processors. It would be virtually impossible to target on underutilized groundfish species in the non-numerical OY group. There has been a rapid expansion of domestic landings from 1977 (62,910 mt) to 1979 (approximately 94,000 mt). Projected landings are expected to level off in 1980, but are not expected to decline significantly in the foreseeable future and may increase in 1981. Thus there can be no TALFF on this mixed species fishery. If a surplus of any species/species complex becomes available without negative impact on domestic operations, or if the technology is developed to selectively harvest an underutilized component of the mixed species groups, then a reevaluation of this species would occur and changes would be incorporated in the plan by amendment.

11.2 Numerical OY Species

Those species which have a numerical OY, except for Pacific ocean perch, require annual determinations of TALFF (i.e., Pacific whiting, sablefish, shortbelly rockfish and widow rockfish). TALFF will be determined at the beginning of the fishing year, January 1, using the equation TALFF = OY - DAH - Reserve. DAH will be determined as described in Chapter 10. A reserve which equals 20% of the OY of any species with a TALFF allows for uncertainties regarding estimates of stock size and DAH by providing a buffer for the domestic industry should its abilities exceed initial estimates. The value of 20% has been used in other plans for TALFF calculations and has been shown to be workable and effective.

Pacific ocean perch are severely depleted, and the Council has recommended that domestic fishermen be placed on trip limits in order to achieve a 20-year rebuilding schedule. In this case DAH is equal to the OY and thus there can be no TALFF for Pacific ocean perch in the forseeable future. An annual TALFF assessment for POP therefore is not necessary.

11.3 In-Season Adjustments

There are two scheduled ways of supplementing TALFF within a given fishing year, both involving an in-season amendment in the regulations. The first deals with release of all or part of the reserve that is not needed by domestic industry. The second allows TALFF to be supplemented by the amount

of DAH in excess of domestic needs. These determinations will be proposed at the same time near July 1. The factors considered in these reapportionments include actual and projected domestic catch, effort, and processing during the fishing year. Any reapportionments will involve consultation with the Council, notification in the FEDERAL REGISTER, availability of pertinent aggregated data for public review, and a public comment period before final determinations are made near August 1, in accordance with the regulatory amendment process.

11.4 Estimates

In 1982, DAH = OY, and thus there is no TALFF for sablefish, shortbelly rockfish and widow rockfish. Only Pacific whiting has a TALFF. Explanations for these determinations are as follows:

Pacific whiting. The Pacific whiting OY has been set at 175,500 mt for 1982. Domestic annual harvest (DAH) for 1982 is estimated to be 100,000 mt (See Chapter 10). Domestic Annual Processing (DAP) and Joint Venture Processing (JVP) are estimated to be 10,000 mt and 90,000 mt, respectively. In addition, a domestic reserve of 35,000 mt has been established as a buffer against uncertainties in the estimate of DAH. Accordingly, the 1982 TALFF for Pacific whiting is 40,500 mt.

Sablefish. Sablefish can be harvested in traps with little incidental catch of other species. However, this is not true of longline and trawl harvests. Significant quantities of sablefish are caught incidentally in other trawl fisheries, e.g., for Dover sole. The U.S. sablefish industry is growing at a rapid rate. The total average catch for all gears for 1973-77 was 6,646 mt while the preliminary total catch figure for 1978 is 10,125 mt and the preliminary total catch for 1979 exceeded 16,700 mt. The 1979 catch exceeds the OY by over 3,300 mt. It is expected that domestic harvest will at least equal OY (13,400 mt) in 1982. This precludes a TALFF for sablefish.

Shortbelly rockfish. Shortbelly rockfish are harvested by midwater gear and currently a small fishery exists for human and pet food. This fishery is in the infant stage and projections by industry indicate the capacity and intent to harvest and process between 5,000 mt and 25,000 mt in 1982 if markets develop, with domestic harvesters and processors possibly wishing to exceed the 10,000 mt OY. There will be no TALFF for shortbelly rockfish in 1982.

Widow rockfish. The fishery for widow rockfish is a highly directed fishery with little by-catch. It is expected that domestic harvest will equal the OY (17,500 mt) in 1982. This precludes a TALFF for widow rockfish.

Chapter 12 - Management Alternatives

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Summary

The management regime is made up of the specific fishery management measures or restrictions which will be used to achieve the optimum yield for a fishing year. Alternative measures are discussed. Those that are ultimately selected will be implemented as fishing regulations.

Management Areas

- The FCZ is subdivided into the five statistical areas of the International North Pacific Fisheries Commission which overlap the Council's management area (Figure 1).

Measures of General Domestic Application

- Trawl Mesh Size

  Option 1 (status quo)

  California: trawl mesh size less than 4.5 inches (115 mm) is prohibited.

  Oregon: trawl mesh size less than 4.5 inches (115 mm) is prohibited unless no more than 250 sole (Dover, English, petrale) under 11 inches are landed.

  Washington: trawl mesh size less than 3.0 inches (76 mm) is prohibited except when fishing for Pacific whiting.

  Option 2

  All areas: trawl mesh size less than 4.5 inches (115 mm) is prohibited.

  Option 3

  Conception, Monterey and Eureka: trawl mesh size less than 4.5 inches (115 mm) is prohibited.

  Vancouver and Columbia: trawl mesh size less than 3.0 (76 mm) is prohibited.

Option 4

Same as Option 3 except that in Vancouver and Columbia areas trawl mesh size of not less than 3.0 inches (76 mm) may be used only if no more than 250 Dover, English and petrale sole under 11" are retained.

Option 5

Bottom trawl - mesh size less than 4.5 inches is prohibited
Roller trawl - mesh size less than 3.0 inches is prohibited
Pelagic trawl - mesh size less than 3.0 inches is prohibited
The above applies to all areas in the FCZ.

Option 6

This option allows the use of chafing gear on trawl nets with certain restrictions.

Species Requiring Additional Management Measures

- Lingcod
  Option 1 - Recreational bag limits - 3 to 5 fish.

  Option 2 - Recreational bag limits plus a reduction of effort when a specified percentage of OY is reached.

- Pacific Whiting
  Option 1 - Trawling must be conducted off the bottom when using a mesh size not legal for bottom trawling. The trawl may have no contact with the bottom, i.e., no bobbins, rollers, etc. There is no limit on incidental catches.

  Option 2 - Same as 1 except that incidental catches of fish other than shortbelly, widow and yellowtail rockfish are restricted to an average of 500 pounds per fishing day.

  Option 3 - No other restrictions than incidental catch restrictions in option 2 plus a minimum mesh size of 89 mm (3.5 in).

- Sablefish

  Option 1 - Reduction of fishing effort when a specified fraction of OY is reached.

  Suboption A - Establish sablefish trip limits not to exceed 10% of the weight of all fish landed when 75% of the coastwide OY and 90% of the Monterey Bay OY are reached.

  Suboption B - Prohibition of sablefish landings once the OY is reached.

  Suboption C - Trip limits imposed when 75% of OY is reached.

Option 2 - Any of above, but with addition of minimum size limit in all areas other than the Conception area.

Other Management Measures Proposed - Prohibition against unattended fixed gear; fixed gear marking and identification; and biodegradable escape panel; and limitations on the number of traps or amount of groundline.

- Pacific Ocean Perch

Option 1 - Rebuild stocks.

Suboption A - Vessel trip poundage limits upon reaching 75% of OY.

Suboption B - Establish winter quotas for November through February.

Suboption C - Establish summer quotas for March through October.

Option 2 - No rebuilding of stocks.

Suboption A - Use of sub-options A-C above but to lesser degree.

Suboption B - No restrictions.

- Other Rockfish

Status quo:
No trawling within three miles off California.
Restrictions of California gill net fishery.
Bag limit of 5-15 rockfish for all recreational fisheries.
Trawl mesh size restrictions of general application.

Option 1 - status quo plus reduction of fishing effort when x% of OY is reached.

- Dover, English and Petrale Sole - status quo - general mesh size restrictions.

Option 1 - Mesh size as adopted for general application plus reduction of fishing effort when 75% of OY is reached. Incidental catch restriction imposed at this time.

- Pacific Halibut

Jurisdiction retained by International Pacific Halibut Commission
No retention per IPHC and state regulations.

Joint Venture Management

Option 1 - Joint venture fisheries will be managed as per foreign fisheries on Pacific whiting.

Option 2 - Joint venture fisheries will be managed independently of foreign fisheries.

A number of suboptions are presented which address gear regulation, incidental catches, area closures, number of processing vessels, and observers.

Foreign Fishery Management

Option 1 - Foreign regulations as per 1980 PMP.

Option 2 - Same as option 1 but with suboptions which:

(a) control the number of vessels in the fishery,

(b) specify partial or complete observer coverage, and

(c) set different incidental catch levels.

12.0 MANAGEMENT ALTERNATIVES

12.1 Fishery Management and Conservation Strategies

In the early stages of fishery development there is generally little concern with management strategies. As fishing effort increases management measures becomes necessary to prevent stock collapse, long-term declines in reproductive capacity, and social and economic impacts.

Recruitment, growth, natural mortality and fishing mortality affect the size of fish populations. Fishing mortality is the only factor which man can effectively control in the ocean and therefore marine fish management has been limited to measures which influence fishing mortality. Such measures which have been used include, but are not limited to:

1. Mesh size
2. Size limits
3. Escape panels or ports
4. Time/area closures
5. Bag limits
6. Prohibited species
7. Quotas/trip limits
8. Effort control

Mesh Size

In the trawl fishery, particularly for flatfish, the most used management measure applied has been mesh size. Through manipulation of mesh size it is possible to increase the size, thus the age, at entry to the fishery and thereby insure long-term productivity because immature fish are allowed to escape. However, mesh size is not a panacea because each species has its own optimum mesh size. Thus, in a multispecies fishery, particularly flatfish, a single mesh size will underharvest some species and perhaps overharvest other species. As fishing effort increases, biological yield can only be sustained if age or size at entry to the fishery is delayed. The effect of this action will increase the yield per recruit, decrease the catch per unit of effort, but insure long-term biological productivity.

Size Limits

Size limits can be applied to all fisheries but are generally used where fish are handled individually or in small groups such as trap-caught sablefish and recreationally-caught fish. Size limits lose their utility in cases where the survival of the fish returned to the sea is low, e.g., rockfish.

Escape Ports and Panels

Escape ports and panels are used in traps. Sablefish is the most important groundfish species caught using traps. Escape ports allow small fish to escape once caught in the trap. An escape panel is part of a trap which is constructed of biodegradable material or which is secured with biodegradable material. The panel prevents continued fishing if gear is lost or not attended for extended periods of time.

Time/Area Closures

Time/area closures have been used extensively to control human activity. This practice is used in forest management (controlled cutting) and fisheries (seasons and closed areas). Time/area closures have not been used extensively to regulate the domesitc trawl, pot or set line fisheries for groundfish species (other than halibut).

Time/area closures are most applicable to species showing substantial changes in seasonal availability such as Pacific whiting, or area availability such as rockfish. In the case of whiting the foreign fishery is controlled by season (June 1 - October 31), area (no fishing inside 12 miles and south of 39°N lat.) and quota. In the case of rockfish, area closures (0-3 miles in California) provide a ready means of controlling fishing effort.

Time/area closures are less useful in managing multispecies flatfish fisheries because there is less aggregating outside the spawning season; however, time/area closures could serve to protect spawning stocks.

Quotas/Trip Limits

Quotas or trip limits can be used to control landings of species in need of protection. However, in a multispecies fishery, trip limits might serve no useful purpose if the initial fishing mortality on species in need of protection cannot be controlled. Trip limits are most useful in fisheries where the fisherman can control what is caught. In a multispecies fishery an incidental catch can be allowed on protected species whose spatial distribution overlaps species not in need of protection.

Bag Limits

Bag limits have long been used in the recreational fishery and are perhaps the oldest method used to control recreational fishing. The intended effect of bag limits is to spread the available catch over a large number of anglers and to avoid waste.

Prohibited Species

Prohibited species are incidentally caught species which are required to be returned to the sea. This management measure is currently applied nonuniformly, but three species or species groups are prohibited species relative to the trawl fishery. These are summarized below:

Species	Legal Gear	Applicability
Pacific halibut	Hook-and-line only	Any user
Salmon	Hook-and-line only	Any user
Dungeness crab	Ring or pot	Any user; California allows 500 lb trawl trip limit

Effort Limitation

An option that may be chosen to obtain optimum yield from some of the stocks, or the groundfish fishery as a whole, is effort limitation. Effort limitation in a specific fishery may utilize many methods directed at various fishery conditions. These conditions may be oriented toward biological, social, economic or legal aspects of the fishery.

At present, information available does not indicate a need for effort limitation for the majority of the stocks comprising the west coast groundfish fishery (possible exceptions are Pacific ocean perch in the Columbia-Vancouver area and sablefish in the Monterey Bay area). However, should effort increase substantially, limitation may become a viable option to protect stocks and enhance the social and economic climates of the fishery.

Any program of effort limitation directed at the domestic fleet for a particular fish or sub-fishery of the groundfish fishery should not be implemented until directed foreign fishing for that species or sub-fishery has been terminated. Domestic effort limitation during directed foreign exploration is contrary to the purposes of the Fishery Conservation and Management Act of 1976 in Sec. 2(b)(6) by failing to "encourage the development of fisheries which are currently underutilized or not utilized by Unites States fishermen."

12.2 Areas, Fisheries and Stocks Involved

12.2.1 Area of Jurisdiction and Applicable Stocks

The management regime of this Fishery Management Plan applies to:

A. The U.S. Fishery Conservation Zone of the Northeast Pacific Ocean that lies between the line connected by the following coordinates: 32°35'22.11"N lat., 117°27'49.42"W long.; 32°37'37.00"N lat., 117°49'31.00"W long.; 31°07'58.00"N lat., 118°36'18.00"W long.; 30°32'31.20"N lat., 121°51'58.37"W long. in the south, to a line running 200 n.mi. offshore connected by the following coordinates: 48°29'37.19"N lat., 124°43'33.19"W long.; 48°30'11"N lat., 124°47'13"W long.; 48°30'22"N lat., 124°50'21"W long.; 48°30'14"N lat., 124°54'52"W long.; 48°29'57"N lat., 124°59'14"W long.; 48°28'44"N. lat., 125°00'06"W long.; 48°28'09"N lat., 125°05'47"W long.; 48°27'10"N lat., 125°08'25"W long.; 48°26'47"N lat.,

125°09'12"W long.; 48°20'18"N lat., 125°22'48"W long.; 48°18'22"N lat., 125°29'58"W long.; 48°11'05"N lat., 125°53'43"W. long.; 47°49'15"N lat., 125°40'57"W long.; 47°36'47"N lat., 127°11'58"W long.; 47°22'00"N lat., 127°41'23"W long.; 46°42'05"N lat., 128°51'56"W long.; 46°31'47"N. lat., 129°07'39"W long. in the north. The northern boundary may be modified if a U.S.-Canada bilateral fisheries agreement is in effect when this plan is officially implemented.

B. All foreign and domestic commercial and private recreational vessels which are used to fish for groundfish in the area described in A.

C. All groundfish stocks which comprise this fishery management unit (see Section 2.3).

12.2.2 Management Areas

Upon consideration of stock distribution and domestic and foreign historical catch statistics reporting, the International North Pacific Fisheries Commission statistical areas have tentatively been determined to be the most convenient administrative and biological management areas. These areas are, from south to north:

Conception - Southern boundary of FCZ (refer to Section 12.2.1) to 36°00'N latitude.

Monterey - 36°00'N to 40°30'N

Eureka - 40°30'N to 43°00'N

Columbia - 43°00'N to 47°30'N

Vancouver 47°30'N to Northern boundary of California-Oregon-Washington region (refer to Section 12.2).

12.3 Management Measures and Rationale

Numerous management options contained within the draft plan were included at the request of the Council or the Advisory Panel solely for the purpose of soliciting public comment. It is the intent of the Council to select on the basis of public comment a preferred course of action which is fully evaluated and rationalized relative to achieving the objectives of the plan. This action will have the effect of evaluating all options in the draft plan.

12.3.1 Domestic

The steady but relatively slow development of the California-Washington region groundfish fishery has permitted management without extensive regulation. Resource agencies in California, Oregon and Washington have developed those regulations over the years which were necessary to control harvest within their specific areas of jurisdiction. The state regulations are based on biological principles, historic data and sociological considerations.

The complex multispecies nature of the recreational fisheries and the trawl fishery for groundfish and their interactions with the relatively species-specific longline, pot and gill net fisheries create problems in developing management options designed to produce maximum biological yields from the many stocks involved. A management option that would produce maximum biological yields from one stock could cause serious over- or underproduction of another stock. The situation becomes even more complex when the social and economic consequences of management options are considered, especially when it is realized that fishing effort for groundfish could be changed significantly over a short period of time by the relative economic attractiveness of the groundfish fishery compared to other Pacific Coast fisheries. The situation is further complicated by the fact that social and economic information needed for optimal management of most stocks is scanty. Much improvement is needed in the quantity, quality and timeliness of statistics on the fisheries.

While the preceding paragraph is somewhat pessimistic on the prospects of developing optimal management policies, there is room for optimism. Total yield of groundfish to domestic fishermen increased by 49% between 1973-79, Table 8. There appears to be considerable room for increasing the domestic catch. Yields from some stocks of Dover sole, sablefish and shelf rockfish possibly could be increased. There seems to be a large biomass of shortbelly rockfish. Foreign fleets harvested an average of 175,000 mt of Pacific whiting between 1972 and 1976. This yield, which appears to be sustainable, could be taken by domestic fishermen under the right conditions. The state of the domestic fishery for groundfish, as a whole, allows some time for development of an optimal management regime, but there are already some problem areas in the fishery, and a number of stocks appear to be fished at levels close to MSY.

With the above thoughts in mind, a number of management options have been developed for consideration. First, options for individual stocks or groups of stocks are presented. Then these options are followed by a section of options for the fishery as a whole. In developing these options several concepts discussed by a colloquium on multispecies fisheries were considered. The following quote from the report of the colloquium (Hobson and Lenarz, 1977) summarizes these concepts.

> "The colloquium examined the relations among certain critical variables that characterize the diverse fisheries to be managed. A 3 x 3 matrix was constructed to do this (Fig. 9).
>
> "As illustrated by the matrix, the various fisheries can be assigned to one of the following categories: 1) a single-species fishery where only one species is taken in significant numbers, 2) a multiple-species fishery, where two or more species taken in significant number lack important interactions among them, and, 3) a multiple-species fishery where two or more species taken in significant number interact in important ways.
>
> "As further illustrated by the matrix, these fisheries can also be characterized by the types of gear used:

1) fisheries using specialized gear that takes a single species, 2) fisheries using flexible gear to take a species mix that can be altered during a given deployment, and 3) fisheries using inflexible gear to take a species mix thought to be unalterable.

"It was recognized by members of the colloquium that these categories are artificial, and that the cells in the matrix are in reality points on continua. Also, it was recognized that few, if any, fisheries are characterized by any single point on the matrix. Furthermore, most fisheries can be expected to evolve under a wide range of varying pressures (economical, sociological, political, biological, and technological) that would change their positions on the matrix over time. Nevertheless, although the positions of most fisheries on the matrix are changeable rather than fixed, their characteristics at a given time center around specific points.

"Further elaboration of the matrix (Fig. 10) shows the relationships among degree of management control, difficulty of determining sustainable yield, and the numbers of management options--all under the various combinations of biological and technological considerations defined above. Let us consider how the matrix might be used in planning research of management strategy. By examining the relationships shown, we can predict that a single-species fishery using specialized gear offers many management options and a high degree of management control. Under these circumstances it is relatively easy to determine sustainable yields and then implement management control if necessary--a highly desirable characteristic for management. Many fisheries, however, use what is in practice inflexible gear to take multiple species that interact significantly. Here, with few management options, and low degree of management control, the situation is unfavorable from management's point of view. Under these circumstances, management may wish to encourage more flexible fishing practices that permit greater selectivity in the catch, that is, introduce specialized methods that limit the catch to the target species."

FISHERY TARGET

	SINGLE SPECIES	MULTIPLE SPECIES	
		w/o interactions	w/ interactions
Specialized Gear			
Flexible Gear			
Inflexible Gear			

Figure 9. —Variables that characterize a fishery. Terms listed in the column at the left refer to the gear used.

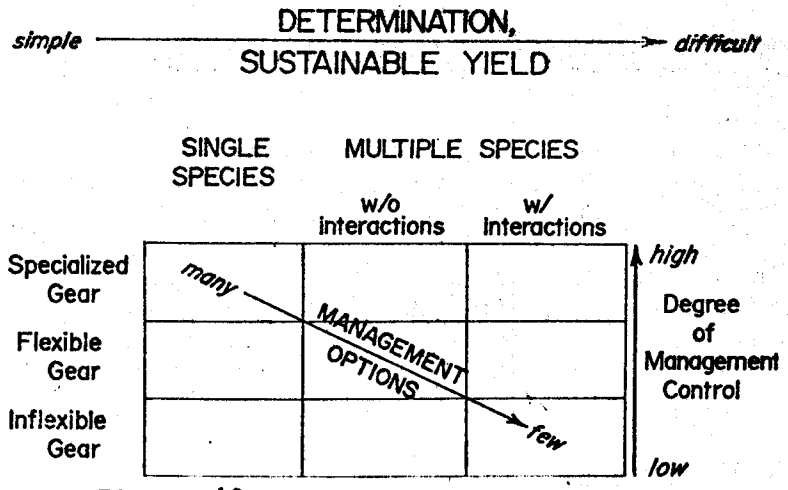

Figure 10.—Relationships among variables of a fishery.

Fisheries covered by the plan range from the foreign fishery for whiting which lies close to the upper left hand of the matrix to the shallow water bottom trawl fishery which probably lies close to the bottom right hand corner.

12.3.1.1 Lingcod

Lingcod stocks appear to be lightly fished in the Columbia area, and the MSY level is not likely to be reached in the near future. Stocks appear to be more heavily fished in the other areas and MSY could be reached in the near future. The only regulations currently aimed specifically at lingcod are bag limits of 5 for recreational anglers in California and 3 in Oregon and Washington. Prohibition of trawling within three miles of California prevents some fishing on lingcod.

Option 1

A uniform lingcod recreational daily bag limit of 3 to 5 fish.

California allows up to three daily bag and possession limits of saltwater finfish for recreational fishermen during a multi-day trip in offshore waters ten or more miles distant from the mainland shore provided a declaration of such a trip is filed in advance with the California Department of Fish and Game. This provision is consistent with any bag limit option as no more than one bag limit may be taken on each day of the multi-day trip.

No biological consequences to lingcod stocks as a whole could be identified for bag limits within this range.

Option 2

Uniform daily bag limit of 3 to 5 fish and reduction of commercial fishing effort when OY or a specified fraction of OY is reached.

OY for lingcod in the Conception, Monterey, and Eureka areas could easily be reached. Since lingcod are seldom a target species for trawlers, closure of the fishery does not seem to be a viable choice. Many lingcod are alive when brought aboard commercial and recreational vessels. Thus a prohibition of landing of lingcod once OY is reached may not result in much wastage. An alternative action would be to allow an incidental landing once some percentage of OY is reached. If restricted fishing occurs, allocation of lingcod among user groups is a social problem deserving attention of the Council.

12.3.1.2 Pacific Whiting

The Pacific whiting stock is currently producing an average yield (1972-1976) of 175,000 mt to foreign fleets. The yield appears to be sustainable. Since a purpose of the MFCMA is ". . .to encourage the development of fisheries which are currently underutilized or not utilized by United States fishermen. . .," management options should be considered that promote transfer of the whiting yield from foreign to domestic fishermen.

Pacific whiting are currently being fished by domestic fisheries for human consumption. These fish were previously harvested by domestic fishermen in the mid 1960's, primarily as a reduction fishery. This above change is significant because whiting do not keep as well aboard a vessel as most other fish (i.e., rockfish and soles). Therefore, new techniques need to be developed, harvest methods perfected, markets investigated, and consumers informed. Had this transition from reduction to human consumption been gradual, these innovations would have occurred. However, the change was not gradual nor did it occur solely from within the domestic fishing industry.

Large foreign catches of this species over ten years have given the foreign fishermen expertise in capture and market leadership. Their method of fleet capture also allows them to concentrate effort. This concentration of effort has been reported by domestic fisherman in the area to exclude smaller vessels from fishing. The above circumstance increases the cost per unit catch to domestic fishermen which will ultimately be paid for by the consumer, because processors, wholesalers and retailers will not market a product, for very long, if they cannot sustain needed profit margins. Therefore, the price a consumer is willing to pay for a particular product determines the amount of the product made available in a free market. For example, if consumers are willing to pay only $1.50/pound for whiting fillets, harvesters may not be able to receive an adequate ex-vessel price. Various industry persons indicated that a harvester requires a gross of at least $1,500

per fishing day during the whiting season. If the ex-vessel price were 6¢/pound, landings of eleven metric tons (25,000 pounds) of whiting/day would be required. However, if the ex-vessel price were 10¢/pound, landings would need to be 6.7 metric tons (15,000 pounds/day). The difference in cost to consumers of 454 grams (one pound) of filleted whiting (with a 27 percent recovery rate) under similar cost structures with two different ex-vessel prices follows:

	Costs (¢/Pound)[1/]	
	6¢/Pound	10¢/Pound
Raw material (3.75 x ex-vessel cost)	22.5	37.5
Cutters	6.0	6.0
Packaging (in plant work)	15.0	15.0
30 percent for overhead and profit	13.0	17.5
Shipping	5.0	5.0
Brokers' cost	61.5	80.0
Five percent	3.5	4.0
Wholesalers' cost	65.0	84.0
20-30 percent overhead and profit	13-20	17-25
Retailers' cost	78-85	101-109
40-60 percent overhead and profit	31-51	40-65
Consumer cost	109-136	141-174

1/ All figures represent a reasonable range but should not be considered to be actual costs.

Current domestic markets have been marketing whiting as a headed and gutted product, with the major markets in Los Angeles. It appears that the volume of the harvest, the quality of the fish and the size of the fish could make whiting suitable in three product forms. These three forms are headed and gutted, individual fillets (fresh or frozen) and frozen blocks for institutional and fast food outlets.

Another aspect is the current strong condition of the stock. This is advantageous for all fishermen, but especially the less experienced fishermen. The foreign fishery began under such conditions.

The options presented below reflect the view that the fishery can and should be managed as a single-species fishery, but are designed to be as unrestrictive as possible to encourage participation and evolution of effective harvest gear and techniques. As the fishery develops, the effectiveness of an initial, relatively liberal management system will be closely monitored so that unforeseen practices which may be damaging to the whiting resource or to associated species can be identified and addressed.

Option 1

Trawling must be conducted off-bottom when using a mesh size not legal for bottom trawling. Trawl doors may be in contact with the sea bed, but the trawl may not. The trawl must be constructed of equal headrope and footrope length and not incorporate bobbins, rollers, or any other feature that would facilitate its use on the bottom.

This option is the most unrestrictive and would maximize opportunities for domestic fishermen to utilize all their experience and ingenuity in the development of the fishery. Almost all of the whiting resource would be available to such trawling. No mesh size restrictions are imposed under this option, consequently large amounts of other species, for example bocaccio, could be captured and landed at sizes below the optimum.

Option 2

Trawling must be conducted with off-bottom gear when using a mesh size not legal for bottom trawling and landings of all flatfish and all rockfish other than shortbelly rockfish (*Sebastes jordani*), widow rockfish (*S. entomelas*), and yellowtail rockfish (*S. flavidus*) are restricted to an average of 500 pounds in the aggregate per fishing day on any given trip.

This option is the same as option 1, except that incidental catch restrictions are incorporated with the intent of discouraging targeting on species other than Pacific whiting and some rockfish species, therefore minimizing conflict with regulations which may be imposed on bottom trawling (i.e., minimum mesh size).

An incidental catch level of 500 pounds was selected because it is considered an adequate amount to allow for prosecution of a new fishery while preventing targeting on other groundfish with a small mesh net. The incidental catch level is subject to adjustment as information from the fishery is accumulated and evaluated.

Option 3

No restrictions other than incidental catch limits described under option 2 and a minimum mesh size of 89 mm (3.5 in).

On- and off-bottom trawling would be allowed, but targeting on species other than Pacific whiting is controlled through incidental catch limits. A minimum mesh size of 89 mm (3.5 in) will probably not inhibit the harvest of adult whiting but provides some protection for juvenile flatfish and rockfish. See Section 12.3.2.1 for discussion of mesh size options for species other than Pacific whiting.

Domestic fishermen stated that 89 mm mesh was required for effective harvest of Pacific whiting based on limited experience off northern California and southern Oregon. On the other hand, foreign fishermen requested and were granted in 1978 a 100 mm mesh size which they believe is adequate for their fishery. Neither size is expected to have major adverse impact on the stock.

12.3.1.3 Sablefish

Declining catch per effort and average size of sablefish caught by the pot fishery in Monterey Bay may indicate heavy fishing. At present California, Oregon and Washington require that pots have biodegradable panels to reduce capture of fish by lost pots. The effect of state trawling regulations (mesh size) is not known for sablefish. The status quo would probably allow OY to be exceeded in the Monterey Bay area and in the Washington to California area. Since the value of large sablefish is considerably higher than smaller fish, the lack of size restrictions may result in decreased earnings for the fleet (see Section 3.3.1).

Option 1

Reduction of fishing effort in the respective areas when a specified fraction of the 2,500 mt OY in the Monterey Bay area (36°30'N - 37°00'N) is reached or when a specified fraction of the 13,400 mt OY in the Washington to California area is reached.

OY for sablefish in the Monterey Bay area or in the Washington to California area could be exceeded, and reduction of fishing effort and catch should be considered as an option. This could be achieved by:

Suboption A - prohibition of sablefish which comprise more than 10% of the total weight of fish in a landing:

1) in the Washington to California area when 75% of the OY (10,500 of 13,400 mt) is landed; or

2) in the Monterey Bay area when 90% of that OY (2,250 of 2,500 mt) is landed.

Landings of targeted catches of sablefish are prohibited when the percentages of the total landing that fixed gear fishermen catch and land are reached. Trap and longline fishermen landed 74% of the sablefish in the Washington to California area in 1979 while they typically land 90% of the sablefish in the Monterey Bay area. Other fisheries which catch sablefish incidentally would be allowed to continue without disruption. Discards of incidentally caught sablefish would be reduced. After the percentages are reached, this suboption prevents targeted fishing for sablefish by any gear.

Sablefish landings by fixed gear fishermen would be reduced slightly as the result of all gear catch contributing to landings of the 75 to 90 percentage levels. Mobile gear fishermen would land slightly more sablefish but would be limited to an incidental catch when the percentages are reached. The 10% allowance will prevent discards in non-targeted fisheries. Discards will result in cases where high catches of sablefish are encountered.

Suboption B - Prohibition of sablefish landings in the Monterey Bay area if the 2,500 mt OY is reached or in the Washington-California area if the 13,400 mt OY is reached.

This suboption would allow the OY to be reached. Prohibition of landings would not prevent catch and discards of sablefish; some catch and discard of sablefish will occur.

Suboption C - When 75% of the OY is reached in either the Monterey Bay area or in the Washington to California area, trip limits for vessels could be implemented for the respective areas. Characteristics of the pot, line, and trawl fleets including total catch and effort, distribution of effort and catches, time of year the specified catch of OY was attained, and other factors would have to be considered to formulate equitable and realistic trip limits.

After 75% of the OY is reached, this suboption would allow a reduced level of catch by all gear that is estimated to achieve OY. Some discards would result because catches above trip limits would be discarded.

Option 2

Option 1 with addition of minimum size limit:

Calculations based on biological considerations (Section 3.3.1) indicate that maximum biological production occurs between ages 5 and 6, length of 24 in, and average weight of 5.0 lbs. Considerations of economic factors (Section 3.3.1) indicate that maximum economic production is achieved at ages between 7 and 8, length of 28 in and average weight of 8 lbs. The desired size of entry into the fishery could be facilitated by (1) regulating the size of escape openings incorporated in traps and (2) regulating minimum size of retention.

The appropriateness of a minimum size limit for sablefish caught in the Conception area is unknown due to inadequate knowledge of the biology and stock uniqueness of sablefish therein. Until better information is obtained, a minimum size restriction would not apply to the Conception area where a fishery is developing on sablefish that are largely below sizes that would maximize the biological or economic yields in other areas.

Discards of undersized sablefish would result with varying rates of mortality dependent on methods used in returning fish to the sea. A specialty fillet market based on small sablefish would be eliminated.

Yields would temporarily decrease due to the size limit but yields would increase in the long run.

Other Management Measures

Measure 1 - Prohibition against unattended fixed gear:

This measure is directed at unattended fixed gear resulting from fixed gear being set and the fishermen diverting fishing to a different fishery. Unattended fixed gear resulting from inclement weather or breakdown is not considered. Fixed gear (either pot or set line) should not be left unattended for more than one week (7 days).

This measure was requested by fishermen who believe the use of grounds is occasionally usurped by the presence of fixed gear not actively fished. Enforcement would require "on-site" monitoring and costs would likely be substantial.

Measure 2 - Fixed gear marking and identification:

Fixed gear should be marked at the terminal ends with the following: poles, flags, lights and radar reflectors attached to each end of the fixed-gear line. A buoy showing identification of the owner should also be included. The gear should be marked at the surface every one mile of groundline with any of the above markers.

The purpose for marking fixed gear is for nonverbal communication of location of fixed gear to other users of waters (other fishermen, cargo vessels, etc.).

Gear marking measures would have a small capital cost and result in high social acceptance. Again, this measure was included at the request of fixed gear fishermen through the Advisory Panel, and the practice is followed to some extent by most of them.

Measure 3 - Biodegradable escape panel:

This measure would prevent "ghost" fishing and provides for fish escapement from pot or trap gear if such gear is inadvertently lost. The cost of biodegradable panels in trap gear would be relatively small. It is an established practice in many trap fisheries as a result of state law or FMP.

Measure 4 - Limit the number of traps per vessel to that amount which can be hauled, rebaited and reset in a 24-hour period.

The placement of sablefish traps on the fishing grounds prevents fishing by others in the same area. When traps are placed which cannot be retrieved in a 24-hour period, sablefish caught in a trap are subject to mortality. The longer the period before retrieval, the greater the mortality, and this fishing mortality results in no increase in product to the consumer.

The criteria for determining the number of traps per vessel would need to be developed. A fisherman could be required to state the number of traps he can work in a 24-hour period when obtaining his permmit to fish with traps. He would then be required upon demand to take an inspector (enforcement officer) to sea to demonstrate this ability. Inspections could be done randomly with some minimum coverage stipulated.

Measure 5 - Limit the amount of groundline which could be fished per vessel (for longliners) in a 24-hour period.

This measure would have effects similar to Measure 4 and similar criteria for determining the appropriate amount of groundline could be used.

12.3.1.4 Pacific Ocean Perch

Stocks of Pacific ocean perch are depleted in the Vancouver and Columbia areas. A first choice to be made is regarding rebuilding of the stocks. A rebuilding schedule is presented as Table 15, which is included again below. This choice can range from no restrictions which may result in no rebuilding, to allowing no fishing for perch which would probably result in the most rapid rate of rebuilding possible but may impact existing multispecies fisheries.

Table 15. Years required to rebuild Pacific ocean perch biomass in the INPFC Vancouver and Columbia areas to levels producing MSY, given fixed levels of annual catch.1/

Annual Catch (mt)	Vancouver (years)	Columbia (years)
0	12	11
100	13	11
200	14	12
300	15	12
400	16	13
500	18	14
600	20	15
700	24	16
800	29	18
900	39	19
950	-	20

1/ Adapted from Gunderson (1979).

12.3.1.4.1 Rebuilding

If rebuilding is chosen, a series of options is available for restricting catches to OY.

Option 1 - Vessel trip limits established once a set percentage of OY is reached:
This option would place a vessel trip limit in effect once a specified fraction of OY is reached. An extreme case would be to place vessels on limits throughout the year. The trip limit would discourage targeting on perch while allowing retention of most if not all incidentally caught fish. Vessel logbook data collected by the Washington Department of Fisheries clearly demonstrates that trawlers can target on P.O.P. on specific tows (Ueber, et. al., 1979). They also indicate that incidental catches of P.O.P. are usually small when fishing for other groundfish.

Trip limits imposed by Oregon (20,000 lbs per trip) and Washington (10,000 lbs or 25% of the total catch whichever is greater) in 1978 and

1979 have successfully limited the overall catch of P.O.P. and reversed a trend toward trip targeting on P.O.P. which started in early 1978.

If measures are necessary to protect P.O.P., the imposition of trip limits has proved to be successful in reducing the catch of P.O.P. while minimizing the overall negative impact on the trawl fishery.

Option 2 - Winter quotas (November - February):

November through February quotas will be established in the Columbia and Vancouver areas to reduce fishing intensity during the period when P.O.P. are concentrated. No landings of P.O.P. will be permitted after the quota is reached. Historically landings have been low during this period, despite the high availability of P.O.P. This effect is largely the result of adverse winter weather and would reduce the effectiveness of the restriction if it occurs in the future. Landings of species other than P.O.P. are such that P.O.P. are a dominant component of winter landings and restrictions during this period would impact fishermen more adversely than during other seasons.

This option could provide for rebuilding of stocks but may prevent full harvest of spatially associated species. Additional measures (i.e., option 1) should be taken in the event OY is exceeded in spite of winter quotas.

Option 3 - Spring - Summer Quotas (March - October):

Some fishermen state that P.O.P. stocks could be protected with the least disruption to the trawl fishery by allowing unrestricted fishing during the winter. During the spring and summer months, species other than P.O.P. are more available than during the winter and a broader variety of fish can be caught.

12.3.1.4.2 No Rebuilding

Option 1 - Regulations as proposed in Rebulding options 1-3.

Regulations would be imposed only to prevent declines from current stock levels. Regulations have proven necessary in the states of Oregon and Washington to achieve this objective in 1978-79. If the fleet increases and incidental catches increase proportionately, the regulation would become more restrictive.

Option 2 - No restrictions.

Short term effects: This option would preclude disruption of the fishery. It could also allow further depletion of P.O.P. stocks.

Long term effects: This option could lead to pulse fishing in that the fishery would depend on recruitment of strong year classes to support a directed fishery. This option could also lead to instability in the marketing and processing sector since supply would be erratic. Biological effects are difficult to assess. Stocks have returned to greater abundance than in 1973-74 following drastic reduction by foreign fishing.

12.3.1.5 Other Rockfish

Two problem areas were noted with other rockfish. Shelf rockfish appear to be heavily fished in the Conception-Columbia area and recent catches are near the estimated MSY. The other problem area is conflicts between commercial and recreational gear in the Monterey and Conception areas. Allocation of rockfish among user groups is a social problem deserving further attention.

The status quo in the fishery is as follows:

In addition to mesh size restrictions California prohibits trawling within three nautical miles (two areas excepted, see Table 11). California has also instituted a number of area and gear restrictions on the gill net fishery for rockfish that are designed to reduce gear conflicts and protect young rockfish.

California, Oregon and Washington allow recreational anglers to retain 15 rockfish.

Proposed Management Regime: Commercial: status quo with mesh restrictions as outlined in Section 12.3.2.1 and reduction of fishing effort when specified fraction of OY is reached.

Recreational: a uniform daily bag limit of 5-15 rockfish.

An incidental catch would be allowed when a specified fraction of OY is reached. Under this option stocks of shelf rockfish would be protected while utilization of other stocks would be permitted.

California allows up to three daily bag and possession limits of saltwater finfish for recreational fishermen during a multi-day trip in offshore waters ten or more miles distant from the mainland shore provided a declaration of such a trip is filed in advance with the California Department of Fish and Game. This provision is consistent with any bag limit option as no more than one bag limit may be taken on each day of the multi-day trip.

12.3.1.6 Dover, English and Petrale Sole

Dover sole appear to be lightly fished in all areas except Eureka. As a consequence it may be desirable to place as few restrictions on the fishery as possible to encourage increased yields.

Petrale and English sole stocks appear to be fished at near the MSY level in all areas.

Proposed Management Regime: Status quo with mesh size restrictions as outlined in Section 12.3.2.1 and reduction of fishing effort when 75% of OY is reached.

It is essentially impossible to bottom trawl in the area of concern without catching flatfish. An incidental catch will be allowed when a specified fraction of OY is reached. Stocks of flatfish would be protected while utilization of other stocks would be permitted.

12.3.2 Management Options for the Fishery as a Whole

12.3.2.1 Mesh Size

It is not possible to wholly standardize to achieve protection of the resource and allow an efficient prosecution of a trawl fishery. Minimum mesh size will not insure protection of any multispecies resource unless mesh size is large enough to achieve the biologically appropriate size at recruitment of the largest species. This will allow total escapement of smaller species.

A minimum mesh size serves the same purpose as a minimum size limit as it controls the size of entry into the fishery. It has a definite advantage as fish are released alive in the sea rather than released from aboard in a condition ranging from alive to dead.

California prohibits mesh size less than 115 mm (4.5 in) in order to optimize size at recruitment for the dominant commercial species in California waters. Oregon requires mesh size to be at least 115 mm (4.5 in) when fishing for flatfish while smaller mesh sizes can be employed if no more than 250 Dover, English and petrale sole (combined) smaller than 11 inches are landed. Washington requires mesh size to be at least 76 mm (3.0 in) when not fishing for Pacific whiting. Oregon regulations are aimed at minimizing capture of small flatfish while allowing fishermen to avoid gilling problems by using smaller mesh when fishing for Pacific ocean perch. The less restrictive mesh size regulations of Washington prevent excessive gilling of Pacific ocean perch when fishing for flatfish.

Relationships between size of fish captured and mesh size have not been determined for Pacific Coast groundfish using modern twine. A study using cotton twine (Best, 1961) showed that the ratio of length of 50% retention to mesh size is 3.17:1 for Dover sole, 2.56:1 for English sole, and 2.18:1 for petrale sole. This means that a specific mesh size retains larger Dover sole than petrale sole, which is unfortunate because an increase in size at recruitment would benefit yield per recruit of petrale sole more than Dover sole.

Studies of Oregon fisheries (Lenarz, 1978a) indicate that an increase in size at recruitment would result in a significant increase in yield per recruit of petrale sole, minor increase in yield per recruit of English sole and no effect on Dover sole. Studies of the California fishery (Jow, 1978) indicate that an increase in mesh size would result in an increase in value landed per recruit of sablefish, a possible increase in yield per recruit of bocaccio and probably little effect on yield per recruit of chilipepper and Dover sole. Discard and wastage of flatfish that have not yet reached a marketable size would tend to decline as mesh size is increased.

Studies of the effect of changes in size at recruitment on yield per recruit have not been made for other important species. However, an increase in size at recruitment would probably reduce yield per recruit for species such as rex sole, Pacific sanddab and splitnose rockfish.

Different mesh size regulations are somewhat confusing because fishermen do cross state borders. In addition, the method of measuring mesh size differs among the three states. A uniform method of mesh measurement is necessary. Uniform mesh size regulations would reduce confusion but create local problems, such as gilling of Pacific ocean perch in Washington and Oregon if mesh size is increased in those states, or reduced yield per recruit of Dover sole, petrale sole, English sole, bocaccio and chilipepper in Oregon and California if mesh size is reduced.

In developing mesh size regulations, a broad spectrum of options can be considered and these are outlined below:

A. Pacific Whiting

Mesh size restrictions for fishermen targeting only on Pacific whiting are included in the options in Section 12.3.1.2.

B. Groundfish Other than Pacific Whiting

Option 1 - Status quo.

This option would continue current mesh size regulations in effect in each state and create the least disruption in current fishing practices.

The Washington trawl minimum mesh size regulation of 3.0 inches was implemented to protect juvenile fishes and, as much as possible, prevent entanglement ("gilling") of rockfish (primarily POP) in the meshes of trawls. A larger mesh size would optimize escapement of juvenile flatfishes, but would cause unacceptably high gilling of rockfishes. WDF field samplers have observed that vessels targeting on flatfish use larger mesh sizes (4.5 inches or greater) to maximize catches of marketable flatfish and reduce sorting and discarding of unmarketable fish. Vessels targeting on rockfish with 3.0 inch mesh generally fish in areas where small flatfishes are not abundant. Thus a conservation issue has been avoided by the industry in its response to practical and economic considerations.

The current Oregon mesh size regulations evolved during the 1950's because of two fisheries. These were Pacific ocean perch and the animal food fishery. A 3-inch mesh was proposed for perch fishing because of a gilling problem. A problem occurred because some fishermen using the 3.0-inch mesh were fishing flatfish for the animal food fishery. This caused other fishermen who were using 4.5-inch mesh to fish for flatfish, to ask for restrictions on the amount of Dover, English and petrale sole which could be landed under eleven inches to prevent these species from being used as animal food.

For the trawl fisheries in the Conception-Eureka area, 4.5-inch mesh has advantages over smaller mesh. The major flatfish and rockfish species are caught near their critical sizes and one or more

spawning opportunities are allowed with the use of 4.5-inch mesh. Trawling effort is sufficiently high in these three INPFC areas (an average of 85,400 hours 1973-77) that to achieve the same yields (Jow 1978) with a smaller mesh size, reductions in real effort would have to be made. California currently allows the use of mesh size less than 4.5 inches on a special permit basis. Widow rockfish and Pacific whiting are presently being harvested under California permit using 3-inch mesh.

Option 2 - Minimum 115 mm (4.5 in) mesh in all areas.

This option would provide for a uniform mesh size in all states. It would cause gilling problems with Pacific ocean perch in the Vancouver and Columbia regions however and could make fishing for flatfish difficult in areas where Pacific ocean perch are abundant. It would improve the yield per recruit from Dover sole and petrale sole stocks if they are currently being fished with 3.0 inch codends.

Option 3 - Minimum 115 mm (4.5 in) mesh in the Conception-Eureka region; minimum 76 mm (3.0 in) mesh in the Vancouver-Columbia region.

This option would provide for a uniform mesh size in areas where Pacific ocean perch are uncommon (Conception-Eureka areas) but reduce Pacific ocean perch gilling problems north of Cape Blanco (Columbia-Vancouver areas). It leaves the possibility of targeting on flatfish with 3.0 in mesh open. This option is not viable in the Conception-Eureka areas because it would result in poor utilization of the bocaccio-chilipepper resource. The 3-inch mesh is used in catching whiting and rockfish off Oregon and Washington. Some juvenile fish are taken with large rockfish in these areas, which is undesirable, but 3-inch mesh is permitted in order to reduce the gilling common in larger meshes. A larger mesh size may be needed to protect the stocks through gear regulations alone; if 3-inch mesh remains legal, it is possible that quotas will have to be imposed for conservation purposes.

Option 4 - Option 3 with incidental catch limits for vessels employing a 3.0 in mesh.

Under this option (taken from Oregon regulations) a 3.0 in mesh would be allowed in the Vancouver-Columbia areas but no more than 250 Dover, English and petrale sole (combined) smaller than 11 inches could be landed or iced in the hold. The sorting problems associated with this regulation have generally acted as a significant deterrent to targeting on undersized flatfish with a 3.0-inch mesh codend.

Option 5

Flatfish Bottom Trawl - All trawl nets used for flatfish which have continuous footrope contact with the bottom shall have a minimum mesh size of 4.5 inches or larger throughout the net.

The use of 4.5-inch mesh appears to be a good compromise for flatfish at present levels of fishing. Increase in mesh size probably would result in significant increase in yield per recruit for petrale sole but significant decrease in yield per recruit of sanddabs and rex sole. If fishing mortality increases, an increase in mesh size would result in significant increases in yield per recruit for petrale sole and Dover sole. An increase in yield per recruit would also occur for English sole.

Bobbin or Roller Bottom Trawl - This trawl has non-continuous footrope contact with the bottom and is designed to catch roundfish (particularly rockfish). Non-continuous contact is achieved by use of 14-inch minimum diameter roller (or bobbin) footropes or drop chain rigged footropes designed to minimize continuous footrope contact with the bottom. Three-inch mesh or greater is allowed for this trawl net.

The 3-inch mesh proposed for roller trawls is used now in catching whiting and rockfish off Oregon and Washington. Some juvenile fish are taken with large rockfish in these areas, which is undesirable, but 3-inch mesh is permitted in order to reduce the gilling common in larger meshes. A larger mesh size may be needed to protect the stocks through gear regulations alone; if a 3-inch mesh remains legal, it is possible that quotas will have to be imposed for conservation purposes.

Three-inch mesh is not suitable for biological needs of bocaccio and chilipepper rockfish. An analysis of differences in yield per recruit for 3 and 4.5-inch mesh indicates that yields from using 4.5-inch mesh were 12-25% greater for bocaccio at fishing levels of F from 0.2 to 0.5 compared to yields from 3-inch mesh. For chilipepper there is no difference in yield for the two mesh sizes but with F of 0.3 to 0.5, yields increase from 7 to 22% with 4.5-inch mesh. Actual estimates of F for these species are in this range. Fishing effort must also be considered because as effort increases, it may be necessary to increase the age of first capture in order to maximize yield per recruit.

The use of 3-inch mesh for rockfish in the Conception, Monterey and Eureka areas would recruit the major species, bocaccio and chilipepper, when immature at ages of 2 and 3 respectively. The year classes would be exposed to up to 3 years of fishing between recruitment and average spawning age with the use of 3-inch mesh because the average age of maturity for bocaccio and chilipepper is 5 and 6, respectively. Reductions in spawning biomass range from 33 to 62% for bocaccio and 45 to 78% for chilipepper for year classes exposed to the additional years in the fishery at F values 0.2 to 0.5.

If it can be shown that there is a high degree of separation between mature and immature fish then the 3-inch mesh poses no hazard to immature fish provided fishing occurs on the mature fish only. A 3-inch mesh is appropriate for some species of rockfish but clearly

inappropriate for others. To maximize biological yield per recruit for bocaccio and chilipepper at present levels of effort in the Conception to Eureka area, it is necessary to have a mesh size of at least 4.5 inches. To maintain maximum yield per recruit with increasing effort, then other management measures should be considered (e.g., quotas, time/area closures).

Roller or bobbin trawls will catch flatfish in all INPFC areas. While this gear is usually not directed to flatfish species, it does catch them.

Pelagic Trawl (midwater) - A pelagic trawl has the following characteristics:

1. Equal headrope and footrope.
2. Extended mesh in the main body (sequentually increasing mesh size from the codend to the mouth of the net).
3. Weights on the bottom bridle or footrope.

Three-inch mesh or greater is allowed for this trawl net.

Option 6

Chafing Gear - Pelagic and minimum contact bottom trawls (3-inch minimum mesh) may have chafing gear around the circumference of the codend with a minimum mesh size of 6 inches. Chafing gear of less than 6 inches may cover the bottom 60% of the codend. Other trawl nets (4.5-inch minimum mesh) may have chafing gear around the circumference of the codend with a minimum mesh size of 15 inches. Chafing gear of less than 15 inches may cover the bottom 60% of the codend. Chafing gear or chafing gear sections cannot be connected directly to the codend at the terminal end of a chafing gear section or sections.

The purpose of chafing gear is to protect against chafing while it enhances strength and shape of the codend when the codend is filled with fish. Retaining straps serve the purpose of maintaining the elongated shape required for hauling the codend up a stern ramp. Encircling chafing gear on codends of minimum contact bottom trawls offers some protection to the codend over rough irregular terrain particularly when the codend rolls as the trawl is pulled around sharply by the trawler to maintain depth over irregular bottom. Encircling chafing gear on a 4.5-inch flatfish trawl might well defeat the purpose of minimum mesh size. The effect of 15-inch encircling chafing gear is unknown, but any design feature that compromises the most efficient codend escapement will have adverse biological impacts and subsequent economic impacts.

C. Special Instances

If a domestic fishery develops for shortbelly rockfish or other species requiring reduced codend mesh sizes, special permits will be required (see Section 13.6 on Experimental Fisheries).

D. Net Regulations

Regulations regarding codend construction and the method used to measure mesh size opening will be uniform throughout the California, Oregon, Washington region. The intent of an effective mesh measurement system shall be to measure the actual opening of the mesh between the knots regardless of the diameter of the twine used in the netting. The status quo is detailed in Table 11 and should be discussed and amended by a special working group.

12.3.2.2 Set Nets (Trammel Nets and Gill Nets)

Trammel nets and gill nets are two common types of gear used in the Conception and Monterey areas to catch rockfish. They have been prohibited elsewhere by state law because of social conflicts over salmon. See Section 3.2.1.1 for a discussion of these gears.

Option 1 - prohibit set netting in the FCZ.

While there appear to be no biological reasons for prohibiting the use of set nets, there is a social conflict because of the potential capture of salmon.

Option 2 - allow set netting in the FCZ.

Gill nets have proven to be an effective gear for selecting rockfish where historically allowed, i.e. southern California.

Option 3 - allow set netting in the FCZ south of 38°N (Pt. Reyes).

This option would minimize social conflicts. Gill netting could be allowed in other areas north of 38°N on a permit basis only because of the potential catch of salmon.

12.3.2.3 Commercial Hook-and-Line Fisheries

Option 1 - No restrictions on the use of hook-and-line gear to harvest groundfish.

12.3.2.4 Recreational Fisheries

The management concept relative to the recreational fishery should include these considerations:

1. Large fish are more desirable than small fish.

2. A high catch per unit effort is desirable.

3. The recreational experience is a factor whether a catch is made or not.

4. Access to the resource is important.

5. An opportunity to catch food is provided.

The recreational fishery will be managed by bag limits and gear regulations. Under this regime no additional regulation is necessary. Advantages of this regime are:

1. The traditional role of the recreational fishery is maintained.

2. Maintains maximum flexibility.

3. Simplifies regulation.

4. Minimizes enforcement and administrative costs.

5. Assures access to the resource by recreational users.

6. This approach is consistent with that used in the Salmon Management Plan.

Proposed Recreational Gear: hook and line, spear.

12.3.2.5 Rockfish Gill Net/Hook-and-Line Allocation Measures

Hook-and-line fishermen (Section 8.6.1) have stated that the rockfish gill net fishery in southern California causes hardship to them. This has become a significant social conflict with undetermined economic and biological implications. The incidental catch of salmon by gill nets is minor south of Pt. Reyes (38 °N). Set net fishermen have been allowed to fish south of 38°N for bottomfish. To minimize these conflicts, the California Legislature is considering regulation changes in the Conception area. Management alternatives in this plan for diminishing these social and gear conflicts are presented below.

The social conflict arises when set net and hook-and-line fishermen fish in an area to a point where hook-and-line fishermen claim they can no longer make acceptable catches. A gear conflict occurs when hook-and-line fishermen tangle their lines in set nets, or gill nets break free or go unattended and may "ghost" fish for long periods.

Option 1. Prohibit gill net fishing in areas where the water depth is less than ____(50 to 100) fathoms.

Option 2. Prohibit hook-and-line fishing in waters greater than ____(50 to 100) fathoms.

Option 3. The Council recognizes the allocative measures of California. In the Conception area south of Point Sal, 34°54'N, gill nets shall not be used to take rockfish and lingcod in waters less than 50 fathoms in depth when within the first 100 fathom curve along the mainland shore and elsewhere in waters less than 70 fathoms in depth. This fishery involves only California registered fishermen and vessels and can be regulated by California.

Most hook-and-line fishermen do not fish in depths greater than 150 fathoms because of the physical effort needed to raise fish from those depths. Prior to 1975 and also today, most recreational effort occurs within 50 fathoms. Gill nets are fished in California waters from 40 to

120 fathoms. South of Point Sal the majority of the catch is believed to come from depths of 50 to 100 fathoms. From 38°N to 34°54'N the catch comes from 40 to 120 fathoms. This overlap in areas of fishing would be reduced if gillnets and/or hook-and-line fishermen were restricted in the areas of conflict.

Gill nets are acknowledged to have greater fishing power than hook-and-line gear. Studies of rockfish (Miller and Geibel, 1973) indicate the presence of rockfish that do not take baited hooks. These fish while not completely available to line gear would be available to gill nets. Testimony by hook-and-line fishermen and gill net fishermen support the superior fishing power of gill nets. Line fishermen claim they cannot make satisfactory catches in areas where gill-netters operate. On the other hand, gill-netters claim they can make satisfactory catches in areas where line fishermen encounter reduced catches. It is unlikely that this allocative measure would result in an unequal advantage to line fishermen because of the superior fishing power of gill nets.

A conservation problem has not been identified because assessments of rockfish and lingcod stocks in this area are impossible due to the lack of accessible data and time constraints for analyses. However, the allocation of inshore areas to hook-and-line fishermen, with the absence of gill net effort, would result in a reduced total catch from inshore areas and would provide a reservoir of rockfish and lingcod that could be recruited to line fisheries and that could also enhance spawning populations.

In southern California for an 11-month period from July 1977 to May 1978, CPFV fishermen took 742 mt (45%) of rockfish, commercial hook-and-line fishermen took 632 mt (39%) and gill-netters caught 267 mt, 16% (Rick Hartman, personal communication). Subsequent user shares are unknown but it is not anticipated that this allocative measure will give any group an excessive share.

Improvement in recreational and commercial fishing for rockfish cannot be predicted because current status of stock information is lacking.

With the implementation of gill net regulations in southern California, the California Department of Fish and Game was directed to conduct a study on the impact of gill net depth restrictions on the taking of rockfish and lingcod.

This measure is consistent with the Plan's objective to minimize gear conflicts.

Gear Measure 1. Rockfish and lingcod gill net mesh size will be 4-1/8 inches or larger.

There have been no biological studies to indicate gill net mesh sizes that optimize yield. This mesh minimum should protect small rockfish. Hook-and-line fishermen prefer a larger mesh size (4-1/2-inch) and gill net fishermen would accept a larger size provided adequate lead-in time was allowed to phase out current nets in use. New nets would be costly ($1,200 each) and need to be assembled.

Gear Measure 2. Rockfish and lingcod gill nets shall not be constructed of twine larger than number six nylon, except that the bottom fifteen meshes may be constructed of heavier twine.

This twine size measure will facilitate the early destruction of lost gear and prevent continued fishing. The heavier bottom meshes are necessary for protection against chafing and to prolong life of tended gill nets.

12.3.3 Relationship of this Management Plan to Existing Laws and Policies

There are three prohibited species/species groups that are impacted by groundfish fisheries. These are Pacific halibut (domestic trawl fisheries), Dungeness crab (domestic trawl fisheries), and salmon (domestic and foreign trawl fisheries). For all three species/species groups, there are federal or state prohibitions on retention of the species when caught by trawl gear [with the exception of Dungeness crab in California, where 500 lb (0.25 mt) per trip can be retained and marketed]. These prohibitions exist so that there is no incentive for trawlers to target on these species, and tends to simplify enforcement of management regulations.

Allocation of these resources between setliners, potfishermen, and salmon fishermen of all types entered into the formulation of these regulations but it should be pointed out that a clear-cut allocation problem exists only in the case of Dungeness crab. Crabs must be alive when marketed, and many trawl-caught crabs that find their way to California markets could be released and survive to be caught in another fishery. In contrast, marketing of dead salmon and halibut that are caught incidental to trawling operations causes no economic loss to other user groups. However, it does result in increased revenue to trawlers and increased product availability to the consumer; and provides a loophole by which live fish could be kept as "dead" fish.

Documentation of the amount of incidental catch of prohibited species is minimal. However, the International Pacific Halibut Commission (IPHC) has compiled the best available data on the incidental catch of halibut and NMFS has documented the incidental catch of salmon in the foreign hake fishery. In the early 1970's , the IPHC determined that halibut made up 1% of the domestic trawl catch south of Willapa Bay, Washington (46°45'N). Based on this incidence and 1977 catch levels the catch of halibut greater than 26 inches was estimated to be approximately 200 mt in the Columbia-Vancouver area.

Although some interchange of halibut north and south of the U.S.-Canada equidistant line occurs (Skud, 1977) halibut south of the line are not very abundant, and contribute little to the important halibut set line fisheries north of the line. Commercial landings (set line, troll and hand line; dressed weight) south of the U.S.-Canada equidistant line averaged only 141 mt during 1970-77. A large proportion of the halibut caught by trawl gear are immature, and estimates by Hoag (1975) indicate

that those fish that are caught and discarded have a mortality of about 50%. Halibut are managed by the IPHC, and are not within the jurisdiction of the plan.

The incidental catch of salmon by the domestic trawl fishery is unknown. However, the catch, when it does occur, is always incidental to other fishing activities. Because scales of salmon are highly deciduous in the ocean environment and fish are badly descaled by chafing action of the netting, survival is negligible even if fish appear lively when returned to the sea. A "Fishery Management Plan for Commercial and Recreational Salmon Fisheries Off the Coast of Washington, Oregon, and California Commencing in 1978" was approved by the Secretary of Commerce on March 2, 1978, and subsequently has been amended yearly. That plan as well as regulations implementing it prohibit net fishing for salmon in the FCZ. (See, 1978 Salmon FMP at pp. 110-111 and 50 CFR Part 661). Current Federal fisheries policy discourages salmon fishing using nets as do State regulations in California, Oregon, and Washington. Consistent with these laws and policies, retention of trawl caught salmon will not be allowed.

The incidental catch of salmon in the foreign hake fishery was estimated to be less than one fish per 10 metric tons of hake in 1977. The estimated incidental catch was 14,672 fish weighing about 50 mt. Chinook salmon, with an average weight of 3.4 kg, comprised 91.3% of the incidental salmonid catch (French, 1978).

The other prohibited species is Dungeness crab. At present no Federal fishery management plan for Dungeness crab exists and management restrictions regarding incidentally trawl caught crab are a matter of State regulation. Absent a Federal FMP for Dungeness crab, State regulations will continue to apply to the incidental catch and retention of crab. With the exception of the 500 lb (0.25 mt) trip limit allowed in California, Dungeness crab cannot be landed in west coast ports when caught by trawls. It has long been recognized that gear conflicts occur between crab fishermen and trawl fishermen. In some Oregon ports, a gentlemen's agreement has been reached to reduce this conflict. In California the conflict has been addressed by a general trawling prohibition landward of three nautical miles.

Other Fisheries which Harvest Groundfish

All removals of groundfish in other fisheries will be counted in assessing annual harvests by domestic fishermen.

Troll Salmon - During ocean troll salmon fishing, incidental groundfish are frequently caught. In years prior to MFCMA the troll landings of groundfish were quite low, due in part because they were discarded. In recent years the shorter salmon season and increased value of groundfish has made it more attractive for troll fishermen to land groundfish.

Incidental groundfish catch statistics (mt) for years 1975-79 are shown below. California landings were not available. Over the five year period groundfish landings have generally increased. The reduced landings in 1979 probably reflect shortened salmon fishing seasons.

Year	CA	OR	WA	Total
1975	n.a.	157	340	497
1976	"	219	200	419
1977	"	290	360	650
1978	"	369	423	792
1979	"	243	304	547

Species composition, based on Oregon and Washington catch statistics shows that the incidental catch is almost entirely rockfish (75.9%) and lingcod (18.6%). Other species amount to less than 6%. Groundfish caught by trollers come under hook-and-line regulations (see Section 12.3.2.3).

Pink Shrimp - Groundfish are caught incidentally and sometimes deliberately by shrimp trawlers. Non-targeted catches of groundfish by shrimp fishermen have resulted in few problems while returning some economic benefits to the shrimp fishermen. Other harvesters of groundfish have expressed concern only when shrimp fishermen target on groundfish. The targeted catches are of concern for two reasons:

(1) There is a potential for directed fishing on groundfish with shrimp gear, which would defeat the purpose of gear regulations set for other groundfish fisheries. Catches of substantial quantities of small groundfish in the small-mesh shrimp fishery could reduce recruitment to directed fisheries for larger fish.

(2) Landings of targeted catches of groundfish by shrimp trawlers have caused some social problems in Oregon and Washington, where no landing restrictions exist.

Landings of groundfish by the shrimp fishery in the Columbia-Vancouver Areas shows that for the 1970-79 period groundfish landings by shrimpers ranged from 216 mt to 1,891 mt. From 1970 through 1978 these landings ranged from 3.0 to 6.3% of the shrimp landings (Table 33). In 1979 the landings were 11.1% of the shrimp landings, more than double any of the previous nine years. Reasons for this dramatic increase are not entirely clear but the most plausible explanation was the poor shrimp year coupled with a record number of vessels (203 landed in Oregon alone; a 142% increase from 1976).

The total catch of groundfish can only be estimated because the State of California limits the landing to 500 lbs. per trip. By using the observed groundfish landings above and applying this value to the coastwide shrimp landings, it is estimated that shrimp fishermen landed 2,286 mt of groundfish in 1979.

Table 33. Landings (mt) of groundfish in the shrimp fishery for the Columbia-Vancouver area, 1970-79.

Year	Shrimp landings, mt	Groundfish landings by shrimpers, mt	Groundfish as % of shrimp landings
1970	5,942	274	4.6
1971	3,941	216	5.5
1972	8,824	423	4.8
1973	12,128	654	5.4
1974	12,076	761	6.3
1975	14,979	442	3.0
1976	13,620	699	5.1
1977	25,332	917	3.6
1978	28,890	1,344	4.7
1979	16,984[a]	1,891[a]	11.1[a]
Average	14,272[a]	762[a]	5.3[a]

a Preliminary

The user group most impacted by groundfish landed by shrimpers is the trawl fishery. Since in most years the shrimp fishery does not extend south of the Monterey area, a measure of the impact on the trawl fishery can be estimated by applying the landings from the shrimp fishery to the trawl fishery in the Monterey through Vancouver areas. Estimated removals in 1979 were 2,286 mt and in 1978 were 1,794 mt. The calculations are as follows:

Year	Total shrimp landings mt	Observed groundfish landings as % of shrimp landings (Van.-Col.)	Estimated groundfish landings mt (Mont.-Van.)	Monterey-Vancouver trawl landings	Groundfish landings by shrimpers as % of trawl landings
1978	38,164	4.7%	1,794	58,004	3.1%
1979	20,597	11.1%	2,286	67,039	3.4%

Thus in the area where nearly all shrimp fishing takes place, the groundfish landings by shrimp fishermen were about 3% of the total groundfish landings in 1978 and 1979. These estimates provide some measure of the discard if by-catch was prohibited.

The major component of groundfish landings by shrimpers is rockfish. Using the average value of 72% in Table 34 and multiplying this value times the 1978 Monterey-Vancouver area catch, the landings of rockfish in the shrimp fishery would amount to 5.9% of the trawl rockfish landings. In the Columbia-Vancouver area, where the major shrimp fishery occurs, the corresponding value was 7.0% in 1978 and 7.7% in 1979 (Table 35).

Table 34. Species composition of groundfish landed by shrimpers, 1971-75.

Species	Landing, mt	Percentage
Flatfish	77	12
Lingcod	73	12
Rockfish[1]	446	72
Sablefish	16	3
Misc.	9	1
Total	621	100

[1] Includes Pacific ocean perch.

Table 35. Landings (mt) of groundfish in the shrimp fishery compared to the groundfish trawl fishery in the Columbia-Vancouver areas, 1973-79.

	Trawl Landings		Groundfish landings by shrimp fishermen		Groundfish landings by shrimp fishermen as:	
Year	All spp.	Rockfish	All spp.	Rockfish[2]	% of total trawl landings	% of trawl rockfish landings
1973	10,751	2,412	654	471	6.1	19.5
1974	12,175	2,060	761	548	6.3	26.6
1975	14,655	2,849	442	318	3.0	11.2
1976	20,089	6,541	699	503	3.5	7.7
1977	20,269	9,052	917	660	4.5	7.3
1978	30,007	13,837	1,344	968	4.5	7.0
1979[1]	37,542	17,,726	1,891	1,362	5.0	7.7
Average	20,784	7,782	958	690	4.6	8.9

[1] Preliminary
[2] Average percent of rockfish from Table 34 (72%).

Annual landings of the groundfish by shrimp fishermen do not show the full impact on trawl landings because of the seasonal nature of the shrimp fishery. The seasonal aspects of rockfish landings are limited to Oregon because of data limitations.

In Oregon there is a shrimp season from April 1 to October 15.[1] In 1978, Oregon trawl landings of rockfish during the shrimp season were 2,633 mt (54% of the annual trawl landings) while the rockfish landings in the shrimp fishery was 884 mt or 34% of the trawl rockfish landings during the shrimp season and 18% of the annual trawl rockfish landings (Table 36).

Prior to the beginning of the 1980 shrimp season, processors in some areas offered incentives to shrimp fishermen. These incentives were somewhat reduced by mid-season. Incentives of no restrictions on groundfish landings when coupled with the same processors limiting landings of rockfish by groundfish trawlers pose social problems. The landings of rockfish by shrimp fishermen can impact groundfish trawlers because some portion of the trawler's market is usurped by groundfish landings from shrimp vessels. If the trawler is placed on landing limits by the processor, then the potential discard from the trawl fishery could be greater than the groundfish landing from the shrimp fishery. Social aspects of landing limits, or lack of, are difficult to evaluate since a limit acceptable to one individual or group may not be acceptable to others.

Table 36. Landings (mt) of rockfish in the shrimp fishery compared to trawl rockfish landings during the Oregon shrimp season in 1978[a].

Trawl landings, mt		Groundfish landings by Shrimp fishermen, mt	Groundfish landings by shrimp fishermen as % of trawl landings	
Apr.-Sept.	Annual	April-September	Apr.-Sept.	Annual
2,633	4,876	884	33.6	18.1

[a] Rockfish includes Pacific ocean perch.

Options presented below include the extremes of no incidental catch to no limit on the incidental catch.

Option 1 - No groundfish landing restrictions.

This option eliminates waste of marketable groundfish caught by shrimp trawlers and allows the operation of vessels with both bottomfish and shrimp nets. It would allow anyone to fish on groundfish with a small mesh net provided they said they were fishing for shrimp. This would increase the chance to catch small groundfish.

This option provides maximum flexibility for the shrimp fleet to operate, minimizes enforcement of the shrimp fishery and administrative

[1] Adjustments for the two weeks in October were not possible with catch summaries available.

costs, virtually eliminates discards of marketable foodfish in the shrimp fishery and minimizes regulation. This option does provide opportunity for social conflict with trawl fishermen if target fishing on groundfish, particularly rockfish, does occur with shrimp gear. Conflict might be most severe in years of poor shrimp fishing since the groundfish catch could offset costs for the shrimp fishermen. Conflict would also occur if market restraints are imposed on trawl vessels. This option effectively removes mesh size as a controlling mechanism in the groundfish fishery during the shrimp season.

Option 2 - Allow groundfish landing per trip of _____ pounds or ____% of the weight of shrimp landed, whichever is greater.

This limit would reduce incentive to target on bottomfish with small mesh shrimp nets but would allow most fish caught incidentally to shrimp fishing to be marketed. Some waste would still occur in the shrimp fishery if exceptionally large catches of groundfish are made. Table 37 lists the discards that would have occurred in 1979 under alternative poundage and percentage trip limits.

Table 37. Discard that could have occurred under two management strategies which imposed limits of poundage and/or a percentage of shrimp catch on the amount of incidentally caught groundfish in the 1979 Oregon pink shrimp fishery. Discard expressed in thousands of pounds, metric tons (mt) and percent of total groundfish landed (1,277 mt)1/.

Poundage Limit	Discard, 1,000 lbs, mt, % — Percentage Allowance 0	5	10	15	20	25
1,000						
1,000 lbs	1,361	1,297	1,044	797	620	496
mt	617	588	473	392	281	225
%	48	46	37	28	22	18
2,000						
1,000 lbs	763	758	698	601	507	423
mt	346	344	316	272	230	192
%	27	27	25	21	18	15
3,000						
1,000 lbs	437	437	423	393	362	321
mt	198	198	192	178	164	146
%	16	16	15	14	13	11
4,000						
1,000 lbs	255	255	252	246	237	225
mt	116	116	114	112	108	102
%	9	9	9	9	8	8
5,000						
1,000 lbs	165	165	165	164	162	157
mt	75	75	75	74	74	71
%	6	6	6	6	6	6

1/ Represents 95% of the total groundfish landed in Oregon by shrimp fishermen in 1979 (Golden, 1980).

Spot and Ridgeback Prawn - The ridgeback prawn (Eusicyonia ingentus), a relatively shallow water inshore species, occur in depths of about 20 to 100 fathoms. The majority of the catch occurs in 60 to 90 fathom depths. The spot prawn (Pandalus platyceros) occur in deeper water and are concentrated in depths of 80 to 150 fathoms. They have a maximum depth range of 300 fathoms. The prawn fishery is a year-round fishery. Most of the prawn catches occur from April to December.

In the Santa Barbara Channel area, Conception area, both the ridgeback and spot prawn, are taken in 1.5 -inch trawls under California Fish and Game Commission regulations that require a permit and logbook records and allow incidental catches of not more than 500 lb of fish and 500 lb of sharks.

Annual landings of spot prawn and ridgeback prawns in the Santa Barbara area are relatively small. The highest spot prawn landings were 190,106 lb in 1970. Landings declined thereafter; in 1979, 28,661 lb were landed. Ridgeback prawn landings have been under 50,000 lb up to 1979. Landings in 1979 were 106,984 lb.

Eleven vessels fished spot and ridgeback prawns during 336 trips in 1979. Spot prawns were caught in 174 trips. Catches ranged from 2 to 2,318 lb and averaged 165 lb. Most of the trips, 89 of 174 (51%), had spot prawn catches of 100 lb or less. Catches ranged from 101 to 500 lb for 78 trips (45%) and 7 trips (4%) contained more than 500 lb of spot prawn (Table 38). Ridgeback prawns landed during 213 trips ranged from 2 to 1,958 lb and averaged 502 lb. Trips with 500 lb or less and those above 500 lb were nearly equal, 51% compared to 49%. Seven trips (7%) had more than 1,000 lb of ridgeback prawn (Table 38). Spot and ridgeback prawns were landed together during 80 trips; the average landing was 443 lb (Table 38).

Fish are associates of both prawns. When trawling for prawns, fish catches are generally high. Most of the fish caught are of species or sizes that are unmarketable. In deep water, small rockfish, midshipmen, slender sole, English sole, and Pacific whiting occur commonly with prawns. In shallow areas, sanddabs, tongue sole, pink surf perch, and small rockfish, occur in prawn catches.

Incidental catch ceilings of 500 lb of fish and 500 lb of sharks were implemented by the State of California to discourage targetted fishing on groundfish when using nets with meshes of less than 4.5 inches.

Table 38. Number of landings by weight intervals of spot prawn and ridgeback prawn in 127 trips in the Santa Barbara area in 1979.

Lbs. of Prawns Landed	Spot Prawn	Ridgeback Prawn	Spot Prawn & Ridgeback Prawn Combined
1-100	89	295	
101-200	39	182	
201-300	23	2516	
301-400	11	1315	
401-500	5	247	
501-600		2912	
601-700	2	176	
701-800	1.	196	
801-900		156	
901-1,000	2	91	
1,001-1,100		32	
1,101-1,200		4	
1,301-1,400		61	
1,401-1,500		1	
1,501-1,600	1		
1,601-1,700		1	
1,901-2,000		1	
2,301-2,400	1		
Total Trips	174	21380	
Total Pounds	28,661	106,98435,446	
Ave. Lb/Trip	165	502443	

Fish landings during the 336 prawn trips ranged from none to over 500 lb. Twenty-two prawn landings (7%) were made without fish landings. Fish catches exceeded prawn catches in 56 trips. Sixty-five trips (19%) had fish landings of 1 to 100 lb. Prawn trips with up to 400 lb of fish comprised 78% of the total (265 trips). The trips where discards occurred to meet the 500 lb maximum were probably among the 71 trips (21%) that contained 400 or more lb of fish. The total fish catch in the Santa Barbara prawn fishery was 80,524 lb (Table 39).

Table 39. Fish landings with spot prawn or ridgeback prawns in the Santa Barbara area of 127 landings in 1979.

Lbs. of Fish	No. of Landings	% of Landings
0	22	7
1-100	65	19
101-200	85	25
201-300	48	14
301-400	45	13
401-500	54	16
over 500	17	5
Totals	336	99
Total lbs. fish	80,524	
Ave. lb. trip	240	

Rockfish was the major species landed. In 283 trips, 44,127 lb, an average of 156 lb per trip, were landed. English sole landings were 19,305 lb in 227 trips averaged 85 lb per trip. Petrale sole landings of 6,856 lb were taken in 139 trips, an average 49 lb per trip. Other fish landed were sanddab, rex sole, Dover sole, California halibut, and shark. Sharks were a minor part of the landings; only 416 lb occurred in 22 trips.

Proposed landing restrictions for groundfish caught in the spot and ridgeback prawn fisheries are given below. These incidental catch levels apply only to vessels employing trawls to catch prawns which are illegal for groundfish. The use of small mesh nets in the Conception area for groundfish is biologically unsound.

Option 1. No fish may be landed if the prawn catch is below 100 lb. When prawn catches are 100 lb or above, fish landings of three times the prawn catches will be allowed up to a maximum of 1,000 lb.

This option will allow landing of marketable fish caught in the prawn fishery. A minimum landing of prawn to qualify a fish landing may be necessary so that fishermen will target on prawns and the amount of allowable fish will not provide an incentive to catch fish with small mesh trawls.

Option 2. Fish catches of 3 times the prawn catch will be allowed up to a maximum of 1,000 lb.

This option will allow landing of marketable fish without a prawn minimum. Catches of fish with small catches of prawn can be landed. The 1,000 lb ceiling provides a disincentive to target on fish.

Option 3. Fish catches of 3 times the prawn catch will be allowed.

This option allows fish landings when small prawn catches are taken and also allows larger fish landings when larger amounts of prawn are taken. The landing of allowable fish is dependent upon the prawn catch; the data available indicate that few fish landings would exceed 2,000 lb or more.

Option 4. A maximum of 1,000 lbs of fish per trip will be allowed.

This option allows a landing of up to 1,000 lb without a qualifying amount of prawn. The 1,000 lb maximum is low enough that together with the high price of prawns compared to groundfish there is little incentive to target on groundfish with small mesh trawls. Wastage of fish would be prevented and enforcement costs would be less than other options because weights of prawns and fish and percentages need not be determined.

12.3.4 Joint Ventures

The Fishery Conservation and Management Act as amended by P.L. 95-354 allows domestic fishing vessels to deliver underutilized species to foreign processing vessels within the FCZ. Foreign fishing will be reduced or eliminated as the U.S. harvests an increased share of the OY. U.S. processors have the first option to purchase underutilized species harvested by U.S. fishing vessels. U.S. fishermen may sell to foreign processors if U.S. markets are insufficient. The priorities are:

1. U.S. harvesting and processing

2. U.S. harvesting and foreign processing

3. Foreign harvesting and processing

Management Alternatives

A management regime must be developed for joint venture (JV) fisheries, which permits the U.S. harvest of portions of optimum yields for which U.S. processors do not have a market or processing capability. Periodic assessments of expected domestic annual harvest (DAH) and the estimated portion of the DAH which will be used by U.S. processors (DAP) are required. Thus JVP = DAH - DAP.

Option 1 - Joint venture fisheries will be managed as per the foreign fishery on Pacific whiting (see Section 12.3.5).

This option would be the most restrictive and offer the least flexibility because season, area, and mesh size would be the same as for the foreign fishery, and thorough justification would be required. This option would result in lessened opportunity for the U.S. harvesting sector to compete against foreign fishing. This option would also result in reduced opportunity for the joint venture company to compete in world markets because of seasons, area closures etc.

Regulation of joint venture fisheries would be as outlined in Section 12.3.5.

Administration of regulations would be most efficient and least costly under this option.

Joint Venture Option 1 was included at the request of the Advisory Subpanel to stimulate public comment.

Option 2 - Joint venture fisheries will be managed independently of foreign fisheries. The second priority status of the fishery would be considered in each regulatory option.

Under this option, the U.S. harvesting sector could gain access to a greater proportion of an underutilized resource than that which could be delivered to domestic processors. This option would provide for fleet expansion as well as economic and social gain to the harvesting sector. This option may hinder development of shoreside processing.

Regulatory suboptions under option 2:

A. Areal Division by INPFC area

No areal apportionment is proposed for Pacific whiting. Other species that qualify for joint ventures will be considered on a case-by-case basis.

B. Species

To be determined by annual surveys of domestic annual harvest, domestic annual processing, and joint venture processing capabilities. Only those species which can be harvested with minimal bycatches of fully utilized species will be considered.

C. Season

Suboption 1 - No seasonal restrictions.

Suboption 2 - 0800 hrs GMT May 1 until 0800 hrs GMT December 1 each year.

The migratory path of whiting, after spawning in winter off Baja California, Mexico, and southern California is northerly to feeding grounds in the northern Eureka area and the Columbia and Vancouver areas. Fish remain in the feeding area through the summer and fall. In late fall and early winter adult whiting become unavailable as they return to their southern spawning area.

D. Gear . See Section 12.3.1.2.

Suboption 1 - As per foreign gear (p. 177-178).

Suboption 2 - As per domestic gear (p. 161-162).

E. Incidental Catch Restrictions

Suboption 1 - Unavoidable incidental catches of fish covered by this plan other than the target species which are retained by processing vessels shall be limited to:

Rockfish (including P.O.P.)	0.8%	of target species allocation
P.O.P.	0.062%	" " " "
Sablefish	0.1%	" " " "
Flatfish	0.1%	" " " "
Other Species (in total)	0.5%	" " " "

The term "other species" includes all species except prohibited species. All sets (tows) will be only for target species at all times.

Limitations on retention by foreign processors of non-target species which are fully utilized by domestic harvesters and processors provide for adherence to the principles of the MFCMA.

Suboption 2 - Unavoidable incidental catches of fish covered by this plan other than the target species which are retained by processing vessels shall be limited to 2% of the target species allocation, but no more than 0.062% may be Pacific ocean perch. This suboption combines the species incidental catch levels of Suboption 1.

Suboption 3 - Unavoidable incidental catches of fish covered by this plan other than the target species which are retained by processing vessels shall be limited to 2% of whiting allocation.

Suboption 4 - Incidental catches which are retained by processing vessels will be determined annually based on previous observer results.

F. Area Closures

Suboption 1 - No area closures.

Suboption 2 - As per foreign fishing closed areas (Section 12.3.5). In 1978 processing vessels were required to stay seaward of 12 miles. In 1979 processing vessels were allowed seaward of 9 miles. Allowing processing vessels in the 3-12 mile zone could increase crowding on the grounds and social conflicts created by their high visibility. This could also cause an imbalance of economic advantage by making it easier to deliver to floating processors than shore-based processors.

Suboption 3 - Other area closures as may be determined by the Council.

Whiting distribution is highly variable, changing within season as well as between seasons depending on prevailing temperature regimes and food availability. Requiring processing vessels to stay seaward of the main whiting distribution mandates economic inefficiency

because catcher vessels must tow codends to the processing vessels with attendent loss in fish quality. Allowing JV processing vessels to accompany the catcher vessels would tend to maximize profits. Allowing processing vessels up to the territorial limit (3 n. miles) may result in social conflict between JV fisheries and other fisheries.

Suboption 4 - (1) 0-6 mile area; and (2) south of 39°N.

G. Number of Processing Vessels

Suboption 1 - No restrictions on the number of processing vessels.

Suboption 2 - The number of processing vessels permitted to receive and process whiting under joint venture fisheries should not be more than is necessary to adequately service the domestic catcher vessels. In 1978 this was a ratio of 1:1 (3 catchers and 3 processing vessels) and in 1979 was 1:2 (7 catchers and 14 processing vessels) but only 5 processing vessels were allowed to receive whiting inside the 12-mile zone.

The Council considered means of maintaining the number of foreign processors at a level no greater than that required to process deliveries. Excess numbers of vessels are of concern because they produce crowding and pre-emption on small grounds, requiring increased observer effort, and create additional enforcement burdens.

H. Size and Sex Restrictions

None.

I. Fishery Termination

The joint venture fisheries will terminate when one (1) of the following conditions has been met:

a. The quota of the target species has been delivered.

b. The incidental catch retention allowance has been exceeded.

Conditions a and b above will be determined on the basis of NMFS observer data.

J. Observers

Some or all foreign processing vessels engaged in receiving fish should have NMFS observers aboard. This would apply to standby vessels when engaged in receiving fish.

Suboption 1 - One hundred percent observer coverage of all processing vessels (i.e. coverage of all vessel-days).

Suboption 2 - Less than 100% observer coverage of all processing vessels, the exact percentage to be determined by the Council.

K. Reporting Requirements

As per foreign fishery (Section 13.2.2).

Other management measures which have been discussed and for which the Council solicits public comment are: 1) limitation on entry of foreign processing vessels into the 3-12 mile zone; 2) the creation of buffer zones around shore-based processors within which no foreign support operations would be allowed; and 3) other area closures applicable to foreign processors for the purpose of promoting the domestic processor preference amendment.

12.3.5 Foreign (Non-Joint Venture)

Option 1 - Foreign regulations as per 1979 Preliminary Fishery Management Plan.

A. Areal Division of TALFF

Inasmuch as most species of groundfish in the California-Washington region are presently being harvested near or at MSY or EY, there is no surplus of any species except Pacific whiting. Those few species which are currently being harvested below MSY (e.g., arrowtooth flounder, shortspine thornyheads) cannot be harvested without substantial incidental bycatches of other important species which are fully utilized by U.S. fishermen. The incidental bycatch could severely impact the U.S. fishery and thus is not permitted.

The TALFF of Pacific whiting in the California-Washington region will be set annually after OY and Domestic Annual Harvest (DAH) are determined. There is no areal apportionment of catch within the open fishing areas of the California-Washington region.

B. Seasonal Division of TALFF

Foreign fishing in the California-Washington area will be permitted only from 0800 GMT 1 June until 0800 GMT 1 November each year. There are no catch allocations within the above season.

During the first years of the foreign whiting fishery fishing occurred primarily in the Vancouver and Columbia areas during May-October. In subsequent years fishing occurred as early as March off northern California where catches contained a significant proportion of immature whiting. Through bilateral agreements, a June 1 - October 31 season was established east of 125°40'W; a period when it had been demonstrated that the TALFF could be harvested and was comprised mainly of mature whiting.

C. Gear Restrictions

1. No foreign vessel fishing for Pacific whiting shall use any gear other than a pelagic trawl with a minimum mesh size of 100 mm (3.94 in), stretched measure. No liners will be permitted in the codend of the trawls.

2. It shall be unlawful for any foreign fishing vessel fishing to attach any protective device to pelagic fishing gear or to employ any means that would, in effect, make it possible to fish for demersal species or any device or method which would, or otherwise, have the effect of diminishing the size of the meshes.

   A "pelagic"trawl is one in which the headrope and the footrope are of equal length and does not incorporate rollers, bobbins or any other feature which would facilitate its use on the bottom. The net-sonde readout shall clearly indicate that during no more than 10 percent of any tow was the footrope of the net in contact with the bottom.

The first gear restriction applied to foreign fisheries was a mesh size restriction of 110 mm imposed in 1977 to reduce the catch of small whiting and rockfish. The 110 mm mesh size was reduced to 100 mm in 1978 to reduce the loss of adult whiting from the codend prior to being brought aboard the catcher vessel.

D. Catch Restrictions

1. Unavoidable incidental catches of fish covered by the plan other than whiting shall be limited to:

Rockfish (including P.O.P.)	0.8%	of whiting TALFF
P.O.P.	0.062%	" " "
Sablefish	0.1%	" " "
Flatfish	0.1%	" " "
Other species (in total)	0.5%	" " "

   The term "other species" includes all species except prohibited species. All sets (tows) will be only for whiting at all times.

Because of large removals of rockfish in 1967-68 and subsequent adverse impacts on the resource and the domestic fishery, foreign countries engaged in the whiting fishery agreed through bilateral agreement to discontinue directed rockfish fishing and minimize by catch of other species as well. As a result of observer data obtained in 1976 by-catch limits were imposed in 1977. These were:

Rockfish	1.3% of whiting catch
Flounders	0.1% " " "
Sablefish	0.2% " " "
Jack mackerel	4,000 mt
Other species	0.5% of whiting catch

These catch limits were further modifed based on fishery performance in 1977-79. Catch limits imposed in 1979 are shown in Section 4.3.1.2, page 56.

E. Time/Area Closures

Due to U.S. concerns over diminished rockfish stocks, preemption of fishing grounds, fixed gear conflicts and conflicts with recreational fishermen, agreement was reached through bilateral negotiation to close the following areas to foreign fishing:

1. 47°30'N to U.S.-Canada boundary--closed year round to all foreign fishing (to prevent high incidental catch of rockfish, to prevent foreign preemption of and gear conflicts on traditionally important U.S. trawl grounds).

2. U.S.-Mexico boundary to 39°N--closed year round to all foreign fishing (to prevent high incidental catch of rockfish, to prevent exploitation of juvenile Pacific whiting).

3. "Columbia River Pot and Recreational Fishery Sanctuary" closed year round to all foreign fishing (to prevent conflict with U.S. sablefish pot gear and with concentrations of small recreational boats).

4. "Klamath River Pot Sanctuary" closed year round to all foreign fishing (to prevent conflict with U.S. sablefish pot gear).

5. 39°N to 47°30'N in the FCZ closed to foreign fishing for the remainder of the calendar year when either a nation's allocation or incidental catch allowance is reached. (The intent of this provision is to discourage foreign fishermen from targeting on depleted species/stocks and to prevent any further by-catches after the allotted catch has been taken. This provision places the burden of responsibility on the foreign fleets to avoid targeting on such species/stocks and to develop fishing gear and fishing practices which will minimize or eliminate their incidental capture).

6. Area landward of 12 miles closed to foreign fishing year round.

F. Other Restrictions

No dumping of gear, other material.

G. Number of Vessels

No restriction.

H. Size and Sex Restrictions

None.

Option 2 - Same as option 1 with a selection of the following suboptions.

A. Number of Vessels

The number of fishing vessels in the fishery may not exceed at any time the number computed by the following formula:

$$\text{Number of vessels by nation} = \frac{\text{national allocation (mt)}}{\text{number of fishing days x average catch (mt) per vessel day}}$$

Average catch would be estimated on the basis of each nation's past years performance and forecasted whiting availability.

Limitations on the number of foreign fishing vessels may be desirable in view of the following factors:

1. Crowding on the fishing grounds is adverse to U.S. production.

2. A limited number of observers.

3. Gear conflicts between set gear and foreign trawl vessels have been increasing.

4. A limited number of vessels aids enforcement.

5. The proposed limitation formula is consistent with records of foreign effort. Therefore it should not impose a hardship on foreign fisheries.

B. Observers

Observers shall be placed on foreign fishing and processing vessels to collect scientific data and to expedite management, surveillance and enforcement activites.

Observers may be assigned to any foreign fishing and processing vessels operating within the FCZ. Further the average percentage observer coverage for the foreign fishing fleet, distributed proportionately among participating nations, shall be:

1. One hundred percent observer coverage of all fishing vessels (i.e. coverage of all vessel-days).

2. Less than 100% observer coverage of all fishing vessels, the exact percentage to be determined by the Council.

C. Incidental Catch

1. Incidental catch limits will be determined annually but based on previous observer results.

2. Limit incidental catch of Pacific ocean perch to 0.062% of whiting allocation as proposed by the Council for the 1979 PMP.

12.3.6 Permit and License Requirements

Foreign -- As per 1980 PMP.

Domestic -- Licenses are required by each state to participate in groundfish fisheries. No change in current status.

Chapter 13 - Implementation Requirements

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Summary

Implementation of this FMP will require enforcement, data collection and processing, continued research and certain "in-season" decisions. This chapter sets out the Council's desire for such implementation function. The Secretary of Commerce is responsible for implementation of the FMP, but the coastal states will have to take cooperative and compatible action as well.

This chapter points out that:

Enforcement

- Cooperative enforcement efforts between state and federal enforcement systems will be necessary. While the NMFS and Coast Guard will assume at-sea enforcement duties in the FCZ, domestic gear and catch restrictions may be enforced through state landing laws.

Data Collection

- A data collection and compilation system is needed which provides preliminary catch and effort data in time for in-season management decisions. A system is proposed which would provide such data (see Figure 11, page 13-5).

Research

- Research needs are indicated. They include studies of OY determination, bio-economic modeling, socio-economic information, mesh size management, and multi-stage stock modeling. At-sea surveys of stocks are also needed.

Administration

- Systems are provided for experimental fisheries through permit issuance and for meeting unforeseen circumstances in management of the fishery through the use of emergency regulations.

- Adjustments to the optimum yield are provided for in Chapter 9.

Management and Enforcement Costs

- Total costs of management and enforcement after plan implementation should not differ significantly from those presently incurred.

13.0 IMPLEMENTATION REQUIREMENTS

13.1 Enforcement Requirements

Each state can enforce most domestic gear regulations and many catch restrictions via landing laws. U.S.C.G. - NMFS aerial and surface patrols are necessary to supplement state enforcement, to enforce time-area closures and for enforcement of foreign fishery and joint venture regulations.

13.2 Data Collection and Reporting Requirements

13.2.1 Domestic

The states of Washington, Oregon and California have for years had their own fisheries data collection and reporting systems in support of state management of the domestic fisheries. These systems have improved in recent years as the fisheries have expanded and the need for more complex management decisions has become apparent.

It is the intent of this plan to utilize and build upon these existing state data systems. No additional federal data reporting requirements will be imposed on domestic groundfish fishermen or processors as long as the data-collection and reporting systems operated by state agencies continue to provide the Council and the Secretary of Commerce with statistical information adequate for the in-season and between-season management provisions of this plan. It is, therefore, anticipated that data which Section 303(a)(5) of the MFCMA requires to be submitted to the Secretary will be gathered by the states, including, but not limited to:

1) type and quantity of gear used;
2) catch by species in weight of fish;
3) areas of and times of fishing;
4) number of hauls.

The estimated processing capacity of, and the actual processing capacity utilized by U.S. fish processors will be collected by survey pursuant to Section 10.2.1.4.

The Council recommends that the states of Washington, Oregon, and California implement mandatory, consistent logbook programs for the trawl (including joint venture), longline, and pot fisheries for groundfish. It is understood that a state would require logbook data on fish caught anywhere in the FCZ, as well as in state waters, by any commercial fisherman registered in that state. It is also understood that the states may require logbooks on other groundfish fisheries in addition to those mentioned above.

Steps have already been taken by the three states, NMFS, and the Pacific Council to improve timeliness and quality of the groundfish data and to develop and implement a coastwide data network of compiling, storing and sharing the data. Using this system, summaries of preliminary and final fishery data will be submitted on a scheduled basis to a central data

compiler. Data from the three states will be combined and presented to the Council, the Regional Director (NMFS), and state agencies. The Council will provide copies to the Groundfish Management Team for review and management recommendations. Preliminary data reported for the domestic commercial fishery will include catch by species, by vessel class, by gear type, and by major statistical area. Data will be reported monthly, no later than one week after the end of the month of record. Annual summary reports of final fishery statistics will be available to the Council by July of the following year. Figure 11 shows the proposed data flow.

It was concluded by the Council that only aggregated data would be shared through the coastwide data network to meet the data submission requirements of Section 303(a)(5) of the Magnuson Act for this FMP. Since no unaggregated data would be available through the system, confidentiality requirements of Section 303(d) of the Magnuson Act are insured. Furthermore, as aggregated data are not useful for law enforcement purposes, aggregated data shared through the coastwide data network for purposes of meeting the data submission requirements of this FMP will not be used for enforcement.

Data collected should include:

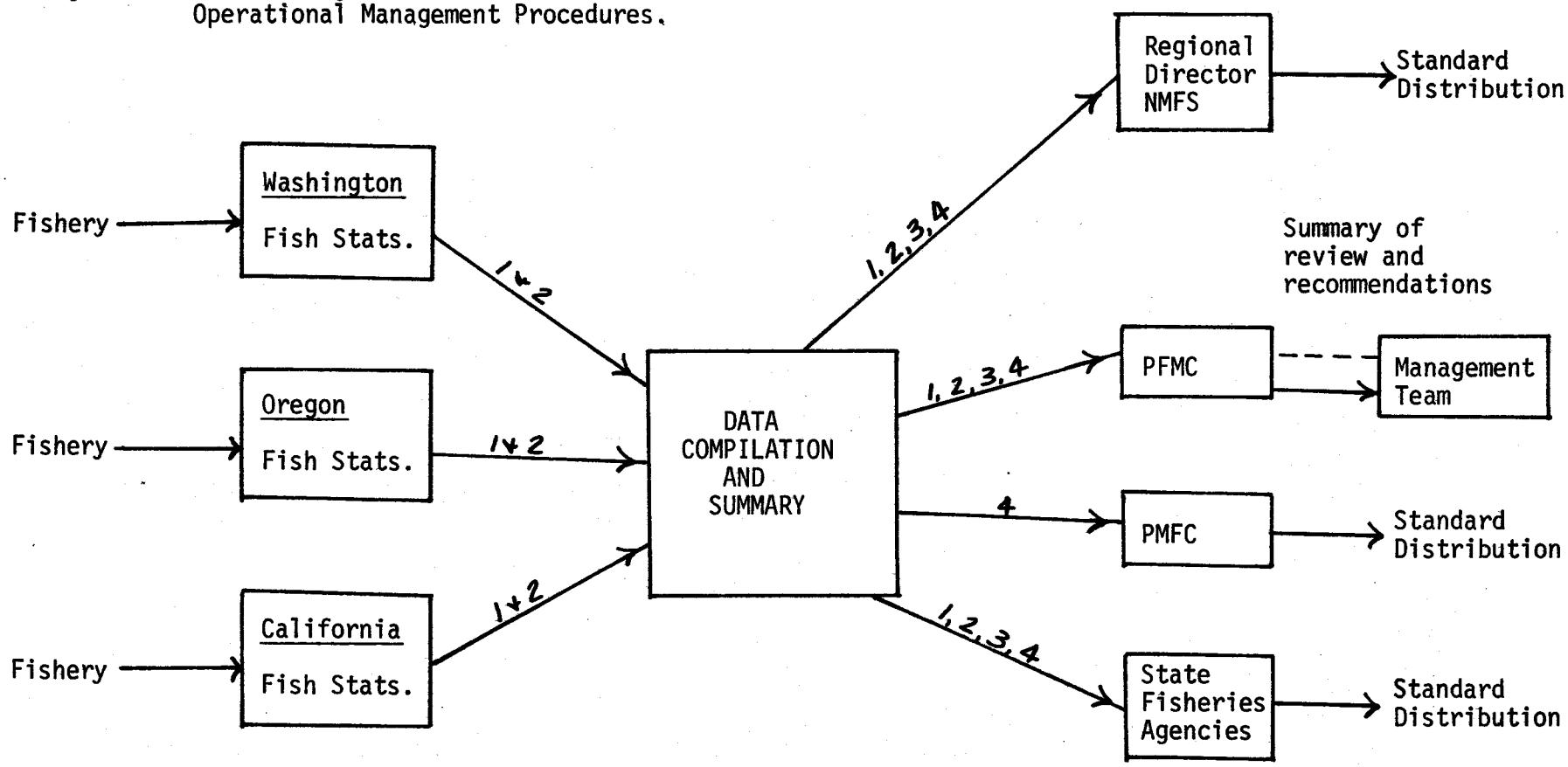
(1) Commercial fishermen

- vessel name
- captain
- port of landing
- date of landing
- duration of trip
- days fished
- gear description
- vessel identification number
- estimated weight of species by area of catch
- number of drags and hours fished by area of catch
- depth fished by area
- discarded species by area (including discards by shrimp fishermen)

At present, all rockfish except POP and *Sebastolobus* spp. are reported in a general rockfish category. Species composition estimates of the species within the general "other rockfish" category are currently collected by state management agencies. This procedure should continue to obtain estimates of the following species:

- Blue rockfish
- Black rockfish
- Bocaccio
- Canary rockfish
- Chilipepper
- Copper rockfish
- Olive rockfish
- Pacific ocean perch
- Shortbelly rockfish
- Shortspine thornyhead

Figure 11. Pacific Region Groundfish Fisheries Data Flow and Operational Management Procedures.



1. Preliminary Stats.
   (a) monthly
   (b) weekly option for real time management

2. Final Statistics Monthly - 6 month lag

1. Monthly preliminary data

2. Annual preliminary data

3. Monthly final statistics (6 month lag)

4. Annual final statistics

Silvergray rockfish
Splitnose rockfish
Widow rockfish
Yellowtail rockfish

(2) Processors

Fish-receiving ticket information should include:

- date
- ticket number
- dealer or buyer
- captain
- boat name
- state license plate number
- species and pounds
- value of catch by species
- total (lbs and $)

Biological data such as age, length and sex also will continue to be collected and will be reported quarterly, within six weeks after the end of the quarter. Design of a sampling program to improve biological data collection is underway.

Required recreational fishery data are similar to those collected for the commercial fishery. Statistics on fishing effort, species composition of the catch, and magnitude of the catch by fishery, area, and time period are important. An annual survey of the recreational fishery currently funded by NMFS will provide a great deal of necessary information.

13.2.2 Foreign

Fishery effort and catch information is submitted to the NMFS in a daily cumulative catch log and additional reports.

Logbook

The daily cumulative catchlog, supplied by NMFS, allows duplicate entry of the data. The original page may be removed by NMFS or Coast Guard personnel and the remainder must be submitted to NMFS at the end of the season; the duplicate page remains with the vessel. The following information is included in the logbook:

- Vessel name and permit number;
- Radio call sign;
- Date, time and location:
  - of each tow or receipt of U.S. harvested fish,
  - of each transfer of fish or fish products (between foreign vessels);
- Average bottom depth during a tow (does not apply to joint venture);
- Average depth of gear during a tow (does not apply to joint venture);

Round weight and factory weight of fish caught in a tow or received from another vessel for each allocated and incidental species;
Number of prohibited species caught in a tow or received from another vessel (including Pacific halibut, salmon, marine mammals, and other prohibited species);
Disposition of fish (such as discard, fish meal, human consumption);
Weight of transfers of fish or fish products between foreign vessels.

Reports

Additional reports are required to assure timely notificaton of foreign activities.

(1) Weekly Reports

Each foreign nation shall submit a weekly report stating, on a vessel-by-vessel basis, the catch (for vessels that trawled) or receipt of fish (for joint venture processors) of the species allocated to the nation, for the weekly period Sunday through Saturday, Greenwich Mean Time. This report shall contain the following information:

Name of vessel;
Permit number;
Month and day;
Number of days trawled during the seven day period (does not apply to joint venture);
Fishing areas and area code numbers;
Species caught during the week by name and species code number;
Weight of catch by fishing area and species;
Number of prohibited species caught or received.

(2) Daily Reports

From the time the NMFS estimates that 90 per cent of the annual catch allocation of any species (directed or incidental) has been reached and so notifies that nation, the reports which woulc otherwise be required on a weekly basis must be made on a daily basis and must reach the Regional Director not later than three days after the reported fishing day.

(3) Annual Reports

Each country whose vessels trawled in the area shall report, by May 30 of the following year, annual catch and effort statistics as follows:

Catch in mt and effort in hours trawled, by vessel-class, by gear-type, by month, by 1/2 degree latitude by 1 degree

longitude statistical area, by allocated and incidental species, and by numbers of individuals of prohibited species.

(4) Report of Fish on Board when Entering Fishery

Each foreign vessel with fish on board shall report the species and amounts of fish on board which were harvested in any other fishery.

(5) Vessel Report

Positions shall be reported for each vessel that enters, departs, or changes statistical area in the FCZ.

(6) Weekly Report of Marine Mammal Incidental Catch

NMFS shall be notified of the date, vessel position, disposition and species if any marine mammal is taken incidentally in foreign operations. This report may be included with the weekly report of catch or receipt of U.S.-harvested fish, but need not be sent if no marine mammals are taken.

Improvements to Data Reporting Requirements

Since data gathering methods are continually being improved, specific submission procedures, format, and data requirements may be changed without plan amendment as long as the above data categories are readily available to NMFS or the Coast Guard.

13.3 Research Needs

13.3.1 General Research Needs

Groundfish research is currently carried out by state agencies, NMFS, and university groups. The emphasis by states and NMFS has been on stock assessments of groundfish. Stock identification, estimations of biological statistics of abundance, mortalities, growth, reproduction, and determinations of rates of surplus production have been and are being carried out through a variety of studies. Attention has been focused on the species that have comprised the bulk of domestic or foreign groundfish catches. The end results of research and fishery monitoring activities are to define MSY and with social and economic information to define OY.

Research needs have been identified in preceding sections of the plan and are summarized here together with recommended research. Allocation data needs are addressed in Section 8.6.

1. Determination of OY

A rational method of OY determination that is consistent for all groundfish stocks of concern is required to avoid social and

economic problems associated with determining OY on an ad hoc basis. Annual evaluations of biological, social and economic information within formal prescribed guidelines is proposed.

2. Analyses of Data and Biological and Economic Modeling

It is recommended that cohort analyses (Gulland, 1965; Pope, 1972), yield and economic modeling be carried out on stocks of concern on an annual basis. It is implicit that satisfactory age composition, catch, discards, CPUE and economic data are available from domestic and foreign sources for analyses. The required data are:

a. Catch data by commercial and recreational vessels

(1) Total lengths of trip and number of fishermen

(2) Catch, including discards, by species, time and area for all gears that take groundfish (e.g. shrimp trawlers and salmon trollers as well as the conventional groundfish gears).

During a normal fishing operation incidentally caught unmarketable fish are discarded at sea. Fishermen rarely keep accurate records on discarded catches although management agencies solicit this information and space is provided in vessel logbooks.

These data can be obtained two ways. Through an expensive on-board domestic observer program or through cooperation of fishermen. Since funding is not available for an observer program, the management agencies in California, Oregon and Washington will intensify their efforts to encourage the cooperation of fishermen to record these valuable data in their vessel logbooks.

(3) Effort in standardized units by gear, time and area

b. Landings by port-vessel, landings by species, size category, condition and value

c. Size and age composition by species in the catch (including discards) from fishery sampling or from at-sea surveys

d. Stock distributions and interrelationships

The above information can be produced from shoreside sampling programs as well as from at-sea observer programs. Although costly, an observer program provides information not normally available including biological data on discards, and greater detail on distribution and interrelationships of species. In addition, relationships of catch and various gears and environmental factors can be provided.

3. Mesh Studies

Stock assessments of flatfish (Lenarz, unpublished) for Columbia area stocks indicate that at current levels of fishing, increases in size at entry through increased mesh sizes would provide significant long-term increases in landings per recruit of petrale sole. If fishing effort increases significantly for Dover and English sole, increases in landings per recruit for these species would also result from an increased size at entry.

4. At-Sea Surveys Including Deep Water Surveys

Biomass estimates and determinations of biological characteristics of both fully exploited and underutilized stocks, are objective end results from at-sea surveys. To date few surveys have extended beyond the continental shelf. Appraisal of past surveys is needed along with design and execution of future surveys to provide specific information for management.

5. Multi-Stage Modeling

The groundfish fishery is one where, for the most part, several or many species are taken together and only in rare cases is a single species taken. Any population of any single groundfish species must interact with its food supply, its competitors, its predators, and its environment. As any groundfish stock is not an isolated stock, fishing effort is also not an isolated process but depends on economic and social activity of the country and other countries, and is influenced by other possible vessel uses, investment policies, product demand for groundfish and for competing products, and management regulations. Current modeling that treats a stock as a single entity will have to be upgraded to consider multiple stocks and socio-economic influences to provide appropriate management guidelines.

6. Social and Economic Studies

There are a variety of social and economic studies that need to be accomplished. These are:

a. Product quantities - total output by type

b. Market margins - price in vs. price out

c. Trade channels

d. Historic price trends

e. Costs and earnings of the fleet

f. Identification of key factors in the international frozen fish block market

g. Demographics of fishing communities

h. Impact of regulatory changes on price, quality and supply

i. Social and economic concerns, dependence and trends of the recreational fishery. (See Section 5.4.1.)

j. Follow-up studies depending on results from items a-h

13.3.2 Cooperative Research Needs

Whiting egg and larval surveys need to be continued. Participation may be required for foreign nations holding permits that allow foreign fishing inside the FCZ. Research deemed necessary by the Council on stocks utilized by U.S. nationals will be coordinated by the affected agencies.

13.4 Management and Enforcement Costs

Implementation of the Groundfish Fishery Management Plan will involve costs incurred by the States of Washington, Oregon and California, the National Marine Fisheries Service, the U.S. Coast Guard, and the Pacific Fishery Management Council. Much of the costs are presently borne by state management of domestic fisheries and federal management of foreign fisheries under the trawl preliminary management plan (PMP). An estimated $750,000 is being spent each year by the three states in management and enforcement of the domestic groundfish fishery. NMFS estimates about $100,000 per year expended for enforcement and administration of the foreign fishery under the PMP. These are direct costs only and do not include indirect costs or management related research costs. Direct costs incurred by the Coast Guard specifically attributed to the foreign fishery are roughly $1,250,000 per year (150 vessel days and 200 hours of aircraft time). These costs are difficult to estimate, since the Coast Guard equipment and personnel are often deployed for more than one purpose at any one time (i.e. enforcement and surveillance of other fisheries, search and rescue missions, searching for illicit drug activities, etc. are sometimes conducted in conjunction with foreign fishery patrols).

Direct costs incurred by the Pacific Council for the development of the FMP has averaged about $75,000 per year since work on the FMP was initiated in 1978.

It is not expected that total costs of management and enforcement after the FMP is approved and implemented will greatly differ from those incurred or expected under present management. There could be some increase in the federal (Coast Guard and NMFS) enforcement costs attributed to groundfish since the federal agencies have not here-to-fore been involved in enforcing domestic groundfish regulations. It is not likely, however, that NMFS or the Coast Guard will get increased funds specifically for groundfish enforcement by the time the plan is implemented. Consequently, existing federal resources will have additional enforcement responsibilities associated with the domestic groundfish fisheries. Both agencies, have indicated that spreading limited manpower, equipment, and operating funds over more and more

fisheries eventually weakens their fishery enforcement effectiveness. However, there is some possibility that federal enforcement costs associated with the foreign fishery will decline in the future as the foreign fishery is displaced by domestic industry.

Some small increase in administrative costs of management of groundfish likely will occur as a result of the more detailed monitoring required to implement the in-season management measures in this plan (i.e. points of concern, harvest guidelines, etc.). These activities will be conducted by the Management Team and other agency personnel, and include the collection, analysis and reporting of biological, catch and effort information on a timely basis. Much of the costs of these activities is already being borne by the states. An additional estimated $100K will be needed to fund activities of the Management Team. This assumes that present grant-in-aid funding of state programs will continue at sufficient levels. This cost estimate may need to be revised at a later date if experience with the monitoring activity warrants a change. These measures, however, provide for improved safeguards against overfishing and are probably well worth the $100K or so that could be involved. Costs of improving the quality and timeliness of groundfish data are discussed below. Costs of the additional research needs addressed in Section 13.3. have not been addressed.

13.4.1 Data Collection and Compilation Costs

Section 13.2.1 states that existing state fisheries data systems will continue to be relied upon to provide the data required to implement this groundfish FMP. As stated in Section 13.4 an estimated $750,000 is being spent per year by the three states combined for management and enforcement of the domestic groundfish fishery. This includes the costs of data collection and compilation, but the exact amount is unknown.

Section 13.2.1 also states that certain improvements have been funded by NMFS and the Pacific Council to improve the quality and timeliness of the data and to implement a coastwide system for compiling and distributing the data. About $200-300 thousand in interim funding have been provided to the states for each of the last two years by the Southwest and Northwest Regional Offices of NMFS and by the Pacific Council for the purposes of improving groundfish data. If permanent funding of about this magnitude can be found to replace these interim funds it is felt that minimum data requirements for management under this FMP will be met. This is not to say, however, that additional improvement and expansion of the data system will not be needed at a later date as additional statistics (such as economic and social data) are made a part of the system, and as the fishery continues to grow.

13.5 Emergency Regulations

This FMP has projected stock, harvest and processing levels for 1982. It is impossible to foresee every circumstance or eventuality that could occur then at this stage of the planning process. Therefore it is recognized that emergency Section 305(e) regulations may be necessary to address unforeseen problems in the fishery.

Should such circumstances arise, the states, the Council, or the Plan Development Team through the Council may notify the Secretary of Commerce or his delegatee of the need for emergency action. If the Secretary determines that immediate action is required which cannot be implemented under existing regulations, emergency regulations should be promulgated.

13.6 Experimental Fisheries

Among the objectives of this FMP is to provide for the orderly development of the domestic groundfish fisheries, including promotion of new domestic fisheries, or otherwise contribute to effective management of the stock. In order to accomplish this objective, it is desirable to permit limited domestic experimental fishing (recreational or commercial) for groundfish species covered by this plan. This provision is intended to promote increased utilization of underutilized species, realize the expansion potential of the domestic groundfish fishery, and increase the harvest efficiency of the fishery consistent with the MFCMA and the management goals of this FMP. Experimental fishing will be conducted under Experimental Fishing Permits (EFPs) issued under Section 303(b)(1) of the MFCMA. The EFPs will authorize the direct or incidental harvest of groundfish covered by this FMP which would otherwise be prohibited by the regulations. The implementing regulations will contain a system for issuance of non-transferable EFPs by the Northwest Regional Director (RD) of the National Marine Fisheries Service (NMFS) consistent with the criteria and procedures set out below. An EFP will be granted for no longer than one year and may be renewed only by complete reapplication. No fees will be charged to the applicant for an EFP.

It is recognized that it may be necessary to limit the number of EFPs issued in order to avoid harm to an individual species/species complex under this FMP, as well as non-groundfish species. Some EFPs may, therefore, be denied to avoid over-participation in the experimental fishery.

Criteria and procedures for the issuance of EFPs are:

1. Applicants must submit a completed application in writing to the RD at least 60 days prior to the proposed effective date of the permit. The application must include, but is not limited to, the following information:

    a. The date of the application;

    b. The applicant's name, mailing address, and telephone number;

    c. A statement of the purposes and goals of the experiment for which an EFP is needed, including a general description of the arrangements for disposition of all species harvested under the EFP;

    d. A statement of whether the proposed experimental fishing has broader significance than the applicant's individual goals;

e. For each vessel to be covered by the EFP:
   (1) vessel name;
   (2) name, address, and telephone number of owner and master;
   (3) Coast Guard documentation, state license, or registration number;
   (4) home port;
   (5) length of vessel;
   (6) net tonnage;
   (7) gross tonnage;

f. A description of the species (target and incidental) to be harvested under the EFP and the amount(s) of such harvest necessary to conduct the experiment; and

g. For each vessel covered by the EFP, the approximate time(s) and place(s) fishing will take place, and the type, size and amount of gear to be used.

2. The RD will determine whether the application contains all of the required information and, if so, shall publish a notice of receipt of the application in the Federal Register with a brief description of the proposal. He shall also forward copies of the application to the Pacific Fishery Management Council, the United States Coast Guard, and the fishery management agencies of Oregon, Washington, California, and Idaho, accompanied by the following information:

   a. The current utilization of domestic annual harvesting and processing capacity (including existing experimental harvesting, if any) of the target and incidental species;

   b. A citation of the regulation or regulations which, absent the EFP, would prohibit the proposed activity; and

   c. Biological information relevant to the proposal.

   The applicant will be notified of an incomplete application within 10 working days of receipt of the application and that it will not be considered further until corrected in writing. The RD may also request from the applicant any additional information necessary to the determinations the RD will make under this section.

3. At a Council meeting following receipt of a complete application, the RD shall consult with the Pacific Fishery Management Council, its Groundfish Management Team, and the Directors of the state fishery management agencies concerning the permit application. The Council shall notify the applicant in advance of the meeting at which the application will be considered and invite the applicant to appear in support of the application if the applicant desires.

4. Within 5 working days after the consultation in paragraph 3, the RD shall notify the applicant in writing of his decision to grant or deny the EFP, and, if denied, the reasons for the denial. Grounds to deny issuance of an EFP include, but are not limited to, the following:

a. The applicant has failed to disclose material information required, or has made false statements as to any material fact, in connection with his application; or

b. According to the best scientific information available, the harvest to be conducted under the permit would detrimentally affect any species of fish in a significant way; or

c. Issuance of the EFP would inequitably allocate fishing privileges among domestic fishermen or would have economic allocation as its sole purpose; or

d. Activities to be conducted under the EFP would be inconsistent with the intent of this section or the management objectives of this FMP; or

e. The applicant has failed to demonstrate a valid justification for the permit; or

f. The activity proposed under the EFP could create a significant enforcement problem.

5. If the permit is granted, the RD will publish a notice in the Federal Register describing the experimental fishing to be conducted under the EFP. The RD may attach terms and conditions to the EFP consistent with the purpose of the experiment, including, but not limited to:

a. The maximum amount of each species which can be harvested and landed during the term of the EFP, including trip limitations, where appropriate;

b. The number, size, names, and identification numbers of the vessels authorized to conduct fishing acitivities under the EFP;

c. The time(s) and place(s) where experimental fishing may be conducted;

d. The type, size, and amount of gear which may be used by each vessel operated under the EFP;

e. The condition that observers be allowed aboard vessels operated under an EFP;

f. Reasonable data reporting requirements; and

g. Such other conditions as may be necessary to assure compliance with the purposes of the EFP consistent with the objectives of this FMP.

6. Failure of a permittee to comply with the terms and conditions of an EFP shall be grounds for revocation, suspension, or modification of

the EFP with respect to all vessels conducting activities under that EFP. Any action taken to revoke, suspend, or modify an EFP shall be governed by 50 C.F.R. Part 621, Subpart D.

13.7 OY Adjustment

OY adjustments, both in-season and annual, as described in Section 9.3 are actions necessary to ensure effective implementation of this FMP. The National Marine Fisheries Service should prescribe regulations to allow for adequate participation of the Council and the public in the process.

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APPENDIX A

OTHER RELEVANT FEDERAL LAWS

1. Rivers and Harbors Act of 1899 (33 U.S.C. 407). This Act prohibits the alteration of any navigable water of the United States unless the work is authorized by the Secretary of a permit issued by the Army Corps of Engineers which must relate its permitting review to other significant federal laws.

2. Fish and Wildlife Act of 1958 (16 U.S.C. 742a-742j) declares that fish, shellfish, and wildlife resources of the nation make a material contribution to the health, recreation and well being of U.S. citizens. This Act authorizes programs and investigations that may be required for the development, management, conservation and protection of the fishery resources of the U.S.

3. Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661-668c) stipulates that the U.S. Fish and Wildlife Service, and the state agency having responsibility for fish and wildlife, evaluate the effects on fish and wildlife of dredge and fill activities which require Corps of Engineers permits. The district engineer cannot issue a permit in the face of unresolved objections based on fish and wildlife considerations. In such cases, the matter must be referred to the respective Secretary for final decision.

4. Commercial Fisheries Research and Development Act of 1964 as amended (16 U.S.C. 779-779f). Authorizes the Secretary of Commerce to cooperate with the states, through their respective state agencies which regulate commercial fisheries, in conducting studies of fishery resources. Funds made available are used to supplement, and to the extent possible, increase the amounts of state funds that would be available for commercial fisheries research and development in the absence of these federal funds.

5. Ports and Waterways Safety Act of 1972 (33 U.S.C. 1221). Deals with transportation and pollution problems resulting from operation and casualties of vessels carrying oil or other hazardous substances. It is designed to protect the living resources, recreational resources, and scenic values of coastal waters.

6. Federal Water Pollution Act, and Amendments of 1972 (33 U.S.C. 1451). Requires, among other things, that states, and regions engage in land use planning to control the location of new sources of pollution, including sources which pollute runoff waters and underground aquifers, and restrain the dredging and filling of wetlands or other waters without a permit from the Army Corps of Engineers. Discharge of effluents is regulated by the Environmental Protection Agency.

7. Marine Protection, Research and Sanctuaries Act of 1972 commonly referred to as the "Ocean Dumping Act" (33 U.S.C. 1401-1444). This Act regulates the transportation from the United States of material from any source into waters over which the United States has jurisdiction. Title III of this Act authorizes the Secretary of

Commerce, with Presidential approval, to designate ocean waters as marine sanctuaries for the purpose of preserving or restoring their conservation, recreational, ecological, or aesthetic values.

8. Deepwater Port Act of 1974 (33 U.S.C. 1501-1524). Establishes procedures for the location, construction, and operation of deepwater ports off the coasts of the U.S.

APPENDIX B

SANCTUARY COORDINATES

1. The "Columbia River Pot and Recreational Fishery Sanctuary" is that area between 46°N and 47°N latitude landward of straight lines connecting the

47°00'	125°20'
46°20'	124°40'
46°00'	124°55'

2. The "Klamath River Pot Sanctuary" is that area lying between 41°20'N and 41°37'N latitude and landward of a line drawn between 41°20'N latitude - 124°32'W longitude and 41°37'N latitude - 124°34'W longitude.

APPENDIX C

FINAL

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

on the

Fishery Management Plan

for the

Washington, Oregon and California Groundfish Fishery

Prepared jointly by:

Pacific Fishery Management Council
526 S.W. Mill Street
Portland, Oregon 97201

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northwest Region
1700 Westlake Avenue, North
Seattle, Washington 98109

March, 1981

Cover Sheet

( ) Draft

(X) Final Supplemental Environmental Impact Statement

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Title of Proposed Action:

Fishery Management Plan for the Washington, Oregon and California Groundfish Fishery.

Abstract:

The proposed action is to implement a fishery management plan for the groundfish fisheries off the coast of Washington, Oregon and California under the provisions of the Fishery Conservation and Management Act of 1976 as amended. A description of the affected marine, coastal and human environments is included. There will be few if any adverse impacts of the plan when implemented. The proposed action is designed to protect the long-term productivity of the groundfish resources and will involve no irreversible or irretrievable commitments of these resources.

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Summary

Description of the Action:

The proposed action is to adopt and implement a fishery management plan for the Washington, Oregon and California groundfish fishery under the provisions of the Fishery Conservation and Management Act of 1976 as amended. This Act extends jurisdiction over fishery resources and establishes a program for their management. The plan has been written to achieve the following objectives:

- Promote the availability of quality seafood to the consumer.
- Promote rational and optimal use, in the biological, social and economic senses, of the region's fishery resources as a whole.
- Provide a favorable climate for existing commercial and recreational groundfish fisheries within the limitations of other objectives and guidelines.
- Provide for the orderly development of domestic groundfish fisheries, including new fisheries, consistent with the above objectives and at the expense of foreign participation.
- Provide for foreign participation in the fishery consistent with the above to take that portion of the optimum yield not utilized by domestic fisheries.
- Prevent overfishing of stocks which can be managed as a unit, including rebuilding those stocks which are now depleted.
- Minimize gear conflicts among users.
- Recognizing the multispecies nature of the fishery, establish a concept of managing by species and by gear, or by groups of interrelated species.
- Attain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.

Specifically, the proposed management alternative establishes a non-numerical optimum yield (no quotas) for most of the species in the groundfish management unit. In this case, optimum yield is defined as all the groundfish that can be harvested given the regulations adopted. Only five species, Pacific whiting, sablefish, Pacific ocean perch, shortbelly rockfish and widow rockfish have numerical optimum yields. Instead of quotas the management regime relies on an intensive stock monitoring program, the "Points of Concern" mechanism, to prevent overfishing.

Environmental Impacts:

1. Biological

The proposed action will achieve the first national standard in the Fishery Conservation and Management Act by preventing overfishing while achieving, on a continuing basis, the optimum yield from the fishery. A system of in-season management will be implemented, which will provide a conservation safeguard.

2. Environmental

Little change to the environment is expected. Some impact results from waste discharges at sea and from trawl gear disturbing the bottom, but the extent of the impact is unknown. This would occur with or without the plan.

3. Social and Economic

The proposed action may have a beneficial economic impact through increased production and employment. However, the economic impact on the nation as a whole will be slight. Replacing the foreign fishery for whiting with domestic production will have a positive economic impact.

4. Short-Term Uses vs Long-Term Productivity

Long-term productivity of the resources should be maintained or enhanced as long as biologically acceptable levels of catches are not consistently exceeded.

Alternatives:

Two quota management alternatives are presented. The first is the most protective of the resource but will cause the greatest disruption of the fishery. Under this option optimum yields are specified for as many species as is realistically possible. The second establishes group quotas thereby increasing fishery flexibility. At the other end of the extreme is the proposed action which defines optimum yield as all the fish which can be taken with legal gear. It provides the most flexibility and the least disruption, but relies most heavily on a monitoring system to ensure conservation. The proposed action appears preferable given the fact that quotas are often based on incomplete information and are therefore not realistic estimates of the harvestable surplus. Conservation is safeguarded with the in-season monitoring system inherent in the proposed action.

The no-action alternative would leave management of the domestic fishery in the hands of the States of Washington, Oregon and California, and the foreign fishery in the hands of the National Marine Fisheries Service. This alternative appears unrealistic given recent dramatic increases in domestic yields and the likelihood that the three states would not provide a regionally consistent management program.

1.0 STATEMENT OF PURPOSE AND NEED

The proposed action is to implement a fishery management plan (FMP) for the purpose of establishing a regional management regime for the groundfish resources in the fishery conservation zone off the coasts of Washington, Oregon and California. The action is authorized by the Fishery Conservation and Management Act of 1976 (P.L. 94-265).

This document is a final supplemental environmental impact statement (SEIS) which has revisions and updates of the two drafts that underwent review from November 29, 1979 to February 4, 1980, and from January 3, 1981 to February 17, 1981. Descriptions and analyses of the proposed alternative and comparisons to other alternatives are contained in this SEIS.

This document has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1969. The basic purpose of NEPA is to insure that Federal officials weigh and give appropriate consideration to environmental values, in addition to technical, economic and other management considerations, in policy formulation, decision making, and administrative actions. Section 102(2)(C) of NEPA requires preparation of a detailed environmental impact statement in the case of major federal actions that may significantly affect the quality of the human environment.

An EIS is required for significant Federal actions to give appropriate consideration to environmental values and to prevent harm to the environment. In the case of development or construction of facilities such as oil refineries or nuclear power plants, it is often necessary for a government agency to delay approval until full environmental protection is assured. In this case, delay is in the best interest of the environment and the public. Delay of a FMP will usually have the opposite result. Conservation is defeated rather than served.

The Fishery Conservation and Management Act of 1976 (P.L. 94-265) provides for the conservation and management of fishery resources of the United States by establishing a fishery conservation zone of 197 nautical miles beyond the territorial sea, within which the United States has exclusive management authority over all fishery resources except highly migratory species which are identified as tuna. The Act calls for the preparation and implementation of fishery management plans.

The fishery management plans include a determination of optimum yields predicated on scientific information and involving the needs of the states, the fishing industry, recreational groups, consumers, environmental organizations, and other interested parties. The allowable harvest of the fishery resource will be based on the optimum yield determination.

An FMP for groundfish is considered necessary in order to provide a coastwide conservation and management effort for a regional resource and a highly mobile fleet. Entry of vessels from other fisheries, addition of newly-built vessels and new technology have resulted in significant effort increases in this fishery. Landings of groundfish in 1979 represented an increase of 25% over 1978, and for some species/species

groups landings may be approaching or exceeding recommended harvest levels. A coordinated conservation and management effort for the region requires an FMP.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

The proposed action, in most general terms, is to achieve the objectives for management of the Pacific Coast groundfish fishery enumerated in Chapter 2 of the FMP (see below). Alternatives are specified in Chapter 9 which provide an assortment of strategies for determining the amount of groundfish to be harvested, i.e. the optimum yield. The optimum yield which has been selected will provide a basis for determining whether fishing by foreign vessels will be permitted (Chapters 10 and 11) and ultimately for selecting management measures for U.S. and foreign harvesters (Chapter 12) which are designed to achieve the optimum yield.

2.1 Objectives of the FMP

The goals and objectives of this FMP reflect the desire to achieve optimum utilization of these fish resources within the constraints discussed above. The objectives of the FMP are:

- Promote the availability of quality seafood to the consumer.
- Promote rational and optimal use, in the biological, social and economic senses, of the region's fishery resources as a whole.
- Provide a favorable climate for existing domestic commercial and recreational groundfish fisheries within the limitations of other objectives and guidelines. When change is necessary, institute the regulation which accomplishes the change while minimizing disruption of current domestic fishing practices, marketing procedures and environment.
- Provide for the orderly development of domestic groundfish fisheries, including new fisheries, consistent with the above objectives and at the expense of foreign participation.
- Provide for foreign participation in the fishery consistent with the above, to take that portion of the optimum yield not utilized by domestic fisheries.
- Prevent overfishing of stocks which can be managed as a unit, including rebuilding those stocks which are now depleted.
- Minimize gear conflicts among users.
- Recognizing the multispecies nature of the fishery, establish a concept of managing by species and by gear, or by groups of interrelated species.
- Attain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.

2.2 The Proposed Action

The Pacific Fishery Management Council's preferred course of action is outlined in detail in Chapter 1 of the attached FMP. In summary form this management regime is as follows:

Optimum Yield

The recommended optimum yield (OY) for most groundfish species is defined as all that are landed under regulations adopted by the Council. Thus there is no numerical OY or quota for these species. Numerical OYs have been recommended for only five species and are given in the following table in metric tons by management area.

Species	Vancouver	Columbia	Eureka	Monterey	Conception	Total
Whiting					175,500	
Sablefish			2,500		13,400	
Pacific ocean perch	600	950				1,550
Shortbelly rockfish					10,000	
Widow rockfish						17,500
Lingcod						
Pacific cod						
Other rockfish	All that are landed under regulations adopted by the Council.					
Dover sole						
English/Petrale sole						
Other flatfish						
Other fish						

Points of Concern

A conservation safeguard entitled the "Points of Concern Mechanism" is proposed in order to prevent undesirably high catches. A management team will conduct a continuing review of the status of each species/species complex and determine if a point of concern has been reached. A point of concern is reached when:

1. Exploitable biomass or spawning biomass is below a level expected to produce MSY for the species/species complex under consideration;

2. Recruitment is substantially below replacement level;

3. Fishing mortality rate exceeds that required to take ABC for the calendar year;

4. Catch for the calendar year is projected to exceed the best current estimate of ABC; or

5. Any other abnormality in the biological characteristics of the species/species complex is discovered, such as changes in age composition, size composition, and age at maturity.

Once a point of concern is identified, the Team will evaluate data to determine if there are signs of stress. If stress is occurring, the Team will report to the Council, and the Council will make management recommendations to the Regional Director of the National Marine Fisheries Service to alleviate the problem. The potential measures can be of almost any form, including time/area closures, gear limitations, trip limits, quotas, etc. Action is designed to be taken in-season and in a timely manner to avoid overfishing.

Adjustments to Numerical OYs and/or ABCs

Under this system, increases to numerical OYs and/or ABCs not to exceed 30% annually may be made when warranted by new information about the fishery as it becomes available. Downward adjustments of any size can be accommodated for resource conservation on a case-by-case basis through the "Points of Concern" mechanism. (Note: The intent here is to allow more than one increase per year if appropriate, but the sum of the increases cannot exceed 30%).

Increases may be made in-season or between-seasons. Increases larger than 30% must be implemented by the standard plan amendment process (250-300 days).

Domestic Gear Measures

a) Trawl minimum mesh size restrictions are designed to protect immature fish and increase yield per recruit. Recommended mesh sizes (in inches) by area are:

Trawl Type		Vancouver	Columbia	Eureka	Monterey	Conception
Flatfish	4.5	4.5	4.5	4.5	4.5	
Roller/Bobbin		3.0	3.0	3.0	4.5	4.5
Pelagic	3.0	3.0	3.0	3.0	3.0	

b) Set nets (trammel nets and gill nets) are prohibited in the fishery conservation zone north of 38°N latitude (Pt. Reyes, California).

c) Commercial hook-and-line gear are not restricted.

d) Legal recreational gears are hook-and-line and spear.

Domestic Species Measures

a) Lingcod - Commercial harvest of lingcod is managed by legal gear regulations. There is no numerical OY or quota for lingcod. Recreational fishermen may take 3 lingcod per day.

b) Sablefish - A sablefish trip limit will be implemented in a management area (i.e. Monterey Bay area or the Washington-California area) whenever 95% of the OY is reached in that management area. When area OYs are reached all landings in that area will be prohibited.

The trip percent limit will be established as the percentage of sablefish in all trawl landings which contains sablefish landed in that management area up to the time of attainment of 95% of OY. Trip limits will in no case exceed 30% of the landing weight. The Regional Director will follow the above criteria and implement the trip limit by field order.

Additional sablefish measures are: (1) fixed gear cannot be left unattended longer than seven days, (2) fixed gear shall be marked, and (3) traps must have biodegradable escape panels.

c) Pacific ocean perch - A maximum of 10,000 lb. of Pacific ocean perch or 10% of the trip weight, whichever is greater, may be landed per trip.

d) Shortbelly rockfish - This species will be managed by experimental gear permit in cases where the gear proposed is not legal.

e) Widow rockfish - This species will be managed by quota because harvest is by midwater trawls in a highly directed fishery.

f) Other rockfish - Commercial harvest of rockfish is managed by legal gear regulations. There is no commercial OY or quota for rockfish. Recreational fishermen may take 15 rockfish per day.

g) Dover, English and petrale soles - These species have a non-numerical OY and therefore there is no quota. They will be managed by the Point of Concern mechanism and legal gear regulations.

Restriction on Other Domestic Fisheries

a) Troll salmon - no restrictions.

b) Pink shrimp - The incidental landings of groundfish in the shrimp fishery are limited to 1,500 pounds per day accumulated over the length of each trip.

c) Spot and ridgeback prawn - The incidental landings of groundfish in the spot and ridgeback prawn fishery are limited to 1,000 pounds per trip.

Foreign Measures

a) Species - Pacific whiting only.

b) Season - June 1 to October 31.

c) Gear - Pelagic trawls only; 100 mm minimum mesh size.

d) Incidental catch allowances - To be determined annually based on the past season's fishery and current estimates of abundance.

e) Area closures - (1) 47°30'N to U.S./Canada boundary; (2) 39°N to U.S./Mexico boundary; (3) Columbia River Pot and Recreational Sanctuary; (4) Klamath River Pot Sanctuary; (5) 0-12 mile area.

f) Number of vessels - No restriction.

g) Observer coverage - Observers shall be present on all foreign fishing vessels at all times consistent with S.2163.

Joint Venture Measures

These measures apply to foreign processors which accept U.S.-caught fish at sea. Domestic fishermen participating in such ventures are managed in the same manner as other domestic fishermen (see domestic measures above).

a) Target Species - Species will be determined by annual assessments of DAH, DAP, JVP.

b) Season - On a species-by-species basis; none for whiting.

c) Gear - not applicable.

d) Fish other than the target species - Retention of fish by foreign processors covered by the plan other than the target speices shall be limited to expressed percentages of the target species catch which will be determined numerically based on observer data and continuing stock assessment. Limits will be based on the amount of fish retained by the foreign vessel.

e) Area closures - (a) 39°N to U.S./Mexico boundary
(b) 0-6 mile area.

f) Number of foreign processing vessels - No limit recommended.

g) Observer coverage - Observers shall be present on all foreign processing vessels at all times consistent with S.2163.

2.3 Alternatives to the Proposed Action

No-Action Alternative (Less Restrictive)
If no FMP were implemented, regulatory action would take the form of the status quo. Domestic groundfish fisheries would continue to be managed by the States of Washington, Oregon and California, and the foreign and joint venture trawl fisheries would be controlled by the existing Preliminary Fishery Management Plan (PMP) implemented by NMFS and amended for each whiting season. Essentially, the PMP establishes a whiting quota and incidental species allowances. Once the quota and/or any of the incidental species allowances are reached by a particular nation that foreign fishery must cease. The 1980 PMP provisions were similar to the foreign provisions proposed in the FMP. In summary form they were:

Foreign
Species: Pacific whiting only
Season: June 1 - October 31
Gear: 100 mm mesh; pelagic trawls only
Incidental catch allowances:
Rockfish - 0.738% of whiting allocation
Pacific ocean perch - 0.062% of whiting allocation
Sablefish - 0.173% of whiting allocation
Flounder - 0.1% of whiting allocation
Jack mackerel - 3.0% of whiting allocation
Others - 0.5% of whiting allocation

Area closures: (1) 47°30'N to U.S./Canada boundary; (2) 39°N to U.S./Mexico boundary; (3) Columbia River Sanctuary; (4) Klamath River Sancturay; (5) 0-12 mile area.

Joint Ventures (foreign processors)
Species: Pacific whiting only

Season: May 17 - December 31
Incidental catch allowances:
same as foreign except based on retention, not catch.
Area closures: (1) 39°N to U.S./Mexico boundary; (2) Klamath River Sanctuary; (3) 0-6 mile area.

State management has traditionally taken the form of bay limits, gear regulations and incidental landing limits. Enforcement normally takes place at the port of landing. A detailed summary of state groundfish regulations is given in Table 11 of the FMP. Synoptically, they are:

Regulation	Washington	Oregon	California
Daily angler bag limits	Aggregate of 15 rockfish, P.cod, pollock & greenling; 3 lingcod.	25 total, except no more than 3 lingcod or 15 rockfish, cabezon or greenling in the aggregate.	20 total, except no more than 15 rockfish or 5 lingcod.
Minimum trawl mesh size	3.0 inches for all species except whiting; 2.5" for whiting.	Whiting-2.5" Other-4.5" No more than 250 Dover, English or petrale sole under 11" may be landed if mesh is smaller than 4.5".	4.5 inches
Trip limits (as of 1981)	P. ocean perch: 10,000 lbs or 10% of total landing.	P. ocean perch: 10,000 lbs. or 10% of total landing.	Not applicable
Ocean area closures	none	none	Trawling prohibited within 3 miles of mainland.
Ocean set nets	Prohibited	Prohibited	Prohibited N. of Pt.Reyes (38°N). Rockfish & lingcod gillnets restricted S. of 38°N from certain areas inside depth contours varying from 40-70 fathoms.

Quota Management Alternative (More Restrictive)

The proposed action establishes numerical optimum yields (OY) or quotas for only five species: Pacific whiting, sablefish, Pacific ocean perch, shortbelly rockfish and widow rockfish. All other species/species groups in the groundfish fishery would have a non-numerical OY, that is, OY for most species is all the fish that can be landed given gear, area and other restrictions adopted.

Two more restrictive quota management options were carefully considered. The first and most restrictive option would have established numerical OYs for the five species above as well as for as many other species and areas as is realistically possible:

	Optimum Yield (metric tons)					
	Vancouver	Columbia	Eureka	Monterey	Conception	Total
Lingcod	1,000	4,000	500	1,100	400	7,000
Pacific cod	----	3,100	----			3,100
Canary/yellowtail rockfish	6,300	3,700	900			10,900
Chilipepper/ bocaccio				5,400	3,000	8,400
Remaining rockfish	2,000	2,500	1,900	4,300	3,300	14,000
Dover sole	1,500	5,000	8,000	7,000	1,500	23,000
English/petrale sole	----	4,300	----			4,300
Other flatfish	700	3,000	3,000	3,500	900	11,100
Other fish	3,000	7,000	2,000	2,000	2,000	16,000

Under this alternative, landings would automatically terminate once the OY was reached by the fishery. The OY could be adjusted upward in-season but only under special circumstances. This alternative would place the maximum restriction on fishermen and would require the most governmental effort to manage the stocks.

The second alternative is more restrictive than the proposed OY but less restrictive than the above alternative. This option would establish numerical OYs for the five special species, as in the other alternative, but would combine the remaining species into broad groupings and establish a numerical OY for those groups:

	Vancouver	Columbia	Eureka	Monterey	Conception	Total
Lingcod						
Pacific cod						
Other rockfish	15,100	22,000	14,300	21,300	9,100	81,800
Dover sole						
English/ petrale soles						
Other flatfish						
Other fish	3,000	7,000	2,000	2,000	2,000	16,000

Under both of these quota management options, as in the proposed action, a "Point of Concern" mechanism is established to provide intensive stock monitoring and to implement in-season conservation measures if required.

2.4 Comparative Analysis of Alternatives

The differences among the proposed action, no action alternative and quota management alternatives are presented in the following table in simplified form to facilitate comparisons.

Measure	Proposed Action	No Action	Quota Management 1	Quota Management 2
Optimum Yield (OY)	7 OYs	No OYs-less restrictive than proposed action.	40 OYs-most restrictive alternative.	18 OYs-more restrictive than proposed action.
Upward OY Adjustment	Included	N.A. since there are no OYs.	Included	Included
"Points of Concern" Mechanism	Included	Not included.	Included, but less reliance on mechanism.	Included, but less reliance on mechanism.
Minimum Trawl Mesh Size	On a fishery-by-fishery & regional basis as much as possible.	Differs by state.	Same as proposed action, but less reliance on mesh size.	Same as proposed action, but less reliance on mesh size.
Angler Bag Limits	15 rockfish 3 lingcod	Differ by state.	Same as proposed action.	Same as proposed action.
POP Trip Limits	10,000 lbs. or 10% of the total landing.	Same as proposed action.	Same as proposed action	Same as proposed action.
Foreign Measures	Season, area, gear & incidental catch restrictions.	Similar to proposed action.	Same as proposed action.	Same as proposed action.

The significant differences fall in the category of optimum yield, "Points of Concern," and minimum trawl mesh size.

Optimum Yield and "Points of Concern"

The fundamental choice concerns management on an individual as compared to an aggregate species basis. The primary concern is which alternative will provide the most effective basis for management. Interference with established fishery practices is less likely to occur when species are grouped into few OYs or when non-numerical OYs are used (proposed action). Trawling accounts for the major portion of the groundfish catch (70-80%). Since there is a close spatial relationship among many groundfish species, trawls may harvest several species in a single tow. For example, trawlers in the Vancouver area may catch sablefish,

petrale sole, Dover sole and Pacific ocean perch at one time. The trawl fishery is therefore multispecies in nature. If there are no OYs or the OYs are assigned to logical groupings of species, then fishermen can try to harvest the maximum yield from the group, even though one species in the group may be fished at slightly higher than its optimum yield or another slightly lower. The yield from the group is optimized, and the fishery is not disrupted because of individual species quotas which would terminate the fishery for the whole group if one species' OY was reached. Therefore the proposed action, where species in the multispecies group have no numerical OY, and the no-action alternative provide the most flexibility. The quota management alternatives, especially the first option with 38 OYs, would provide the greatest disruption of the fishery.

It can be argued that conservation of the stocks, especially individual stocks, is safeguarded the best by the quota management alternative. Special protection is afforded by the fact that fishing must cease when the OYs are exceeded. Long-term productivity of the resource is ensured, but full utilization of the harvestable surplus of the multispecies group will not necessarily occur. As stated in EIS Section 4.3 on Environmental Consequences, the potential for waste is greater with the quota management alternative. The proposed action mitigates concern about conservation by the in-season stock monitoring and management system (Points of Concern). The no-action alternative achieves flexibility but does not ensure conservation because no mechanism (quotas or in-season management) is inherent in this option. The quota management alternatives provide more safeguards on the side of conservation but would maximize disruption of the fishery, and possibly needlessly. An important point to consider is that numerical OYs or quotas are based often on minimal, incomplete, or preliminary data and therefore may be unrealistic. A more flexible and rational approach is to monitor the health of the stocks through the "Points of Concern" mechanism which analyzes fishing mortality, recruitment, biological characteristics, as well as acceptable biological yields. If stress is identified then appropriate action can be taken. Exceeding an OY which is based on incomplete information and which varies because of environmental fluctuations, does not automatically cause stock stress. Furthermore, social and economic impacts are mitigated by choosing an alternative without numerous restrictive OYs and which affords flexibility to the fishery.

Another means of comparing optimum yield under the various alternatives is to evaluate how they achieve or fail to achieve the objectives of the FMP. Four of the objectives are relevant in this case:

(1) Promote rational and optimal use of the resources in the biological, economic and social senses.

(2) When change is necessary, adopt the regulation which minimizes disruption of fishing practices.

(3) Provide for orderly development of domestic fisheries.

(4) Prevent overfishing of stocks.

The proposed action best achieves the first objective because it balances conservation needs of the resource with mitigation of economic impacts by establishing an in-season management system which does not rely heavily on quotas. The second objective might be best served by no regulation at all, yet as noted above and in the Environmental Consequences section, the no-action alternative is the least preferable in the environmental sense. It provides no effective means of controlling domestic harvest. Objective (3) is achieved only by the proposed action. Quota management alternatives may be overly disruptive and the no-action alternative would be too liberal. Orderly development will be realized by allowing growth of the fishery but controlling the amount of growth. This is accomplished in the proposed action by the OY adjustment procedure and the use of a non-numerical OY, in conjunction with the "Points of Concern" system. Preventing overfishing, the fourth objective, is achieved by all alternatives except the no-action alternative. The no-action alternative provides no quotas and no intensive monitoring program.

In summary, the proposed action appears to be superior, in terms of its approach to optimum yield, to any of the alternatives.

Minimum Trawl Mesh Size

The third and final category of significant difference among alternatives is that of restrictions on trawl mesh size. In this case, the differences occur between the proposed action and the no-action alternative. Minimum trawl mesh size regulations are considered necessary to reduce the mortality of immature fish and to delay capture until growth is exceeded by natural mortality. While the status quo (no action) system presently imposes mesh size measures, they are not preferable to the proposed action for the following reasons:

(1) the measures differ by state and therefore hinder mobile fishing vessels and cause enforcement difficulties;
(2) the proposed action designs mesh size restrictions on a regionwide basis as much as possible, consistent with conservation needs;
(3) the proposed measures are also on a fishery-by-fishery basis for consistency and conservation purposes.

The quota management alternatives rely less than the proposed action on mesh size to ensure conservation.

3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Marine Environment

The groundfish species covered in this management plan (Table 1, FMP)are distributed throughout the continental shelf and continental slope areas off the coasts of Washington, Oregon and California. The continental shelf off Washington, Oregon and California is rather narrow, varying in width from less than a mile off the Monterey Peninsula in California to as much as 37 miles over Heceta Bank off southern Oregon.

Most of the groundfish covered in this plan also occur over a wide range of depths. Some species prefer mud or sandy bottoms (flatfish generally) while others prefer rocky bottoms (rockfish). Still other species included within the groundfish complex (Pacific whiting, shortbelly rockfish and widow rockfish) are primarily semipelagic and are harvested by use of mid-water trawls.

Chapter 6 of the FMP provides a detailed description of the fishery resources involved.

Groundfish are predators and are preyed upon by other marine animals including other fish, marine mammals and seabirds. Little is known quantitatively about the roles that individual groundfish species have in the ecosystem. One study has shown that Pacific whiting comprised 74%, 100% (small sample) and 48% of the food of sampled northern fur seals during the spring of 1964 off California, Oregon and Washington, respectively; Fiscus and Kajimura (1965). Later marine mammal stomach content surveys have been done. However, no final analyses of these studies have been published. Table 16 of the FMP lists known or suspected marine mammal predators of groundfish.

Some marine birds consume groundfish (FMP Section 7.2), however it is believed that most rockfish consumed are juveniles. Most adult groundfish are demersal and therefore not available to many birds.

Groundfish species may serve as prey items for other fish species including salmon, albacore and other groundfish species. Size factors make juvenile fish more vulnerable to predation than adults.

Marine ecosystems are discussed in Chapter 7 of the FMP.

3.2 Coastal Environment

The coastal environment is managed by the individual states through coastal zone management programs which have been approved by the Secretary of Commerce under the Coastal Zone Management Act of 1972. The programs of the three coastal states are described in FMP Section 4.6. Although coastal development related to fishing activities is addressed and regulated by state coastal management agencies, direct regulation of coastal fisheries is accomplished by state fishery management agencies. Statements that the FMP is consistent with approved coastal zone programs in the states are appended to this EIS.

Oregon commissioned a study, Oregon Coastal Zone-Fishery Management Analysis which was issued August 22, 1979. It reviews the status of ocean fisheries in Oregon and it discusses some aspects of the Oregon Coastal Zone Management Program vis-a-vis ocean fisheries. A second study on inventory of and demand for boating facilities was prepared by Oregon entitled Commercial and Recreational Boating Facilities in Oregon Estuaries (June 1979).

3.3 Human Environment

A general description of the harvest sector of the groundfish fishery resource is given in Chapter 3 of the FMP.

The predominant gear used to commercially harvest groundfish is the trawl. Approximately 72% of all domestic Pacific coast groundfish landings were trawl-caught in 1979. Domestic trawl landings averaged about 9,070 mt during the 1926-40 period, increased during the war years to an average of 22,222 mt and continued to increase to 67,391 mt by 1979. Rockfish, Dover, English and petrale soles, and sablefish have contributed most to the domestic groundfish landings. Groundfish fishermen have utilized other types of gear to capture groundfish including pots, trammel nets, gill nets, pelagic trawls and hook-and-line gear.

The ex-vessel value of the product in 1978 was estimated to be nearly $30 million. The estimated potential ex-vessel revenue in 1982 is around $70 million (Section 8.5 of the FMP). Unfortunately, information regarding groundfish wholesale and retail markets is not available in a usable form. Nor is there enough information to determine the number of commercial fishermen that are participating either full-time or part-time in the fishery, the number of processors or distributors of groundfish products or the number of people they employ. Some economic aspects of the groundfish fishery are discussed in Chapter 8 of the FMP.

The Fishery Conservation and Management Act, as amended by Public Law 95-354, provides that domestic harvesters and processors have priority to utilize fishery resources within the fishery consevation zone, followed by joint venture operations and lastly, by foreign fishing interests.

In 1977, a U.S.-USSR joint venture fishing company was organized for the purpose of harvesting, processing and marketing Pacific whiting. The joint venture operation on Pacific whiting has partially displaced the foreign fishery and has provided domestic fishermen the opportunity to market their catch. The U.S.-USSR joint venture utilized American trawlers to harvest the fish and Soviet BMRT-type factory trawlers to process the fish. The primary markets for the headed-and-gutted and filleted products are in Eastern Europe and the Soviet Union. In 1978, two U.S. trawlers delivered nearly 900 mt of fish to two Soviet factory trawlers during a six-week experimental fishery.

The 1979 U.S.-USSR joint-venture purchased about 8,800 mt of Pacific whiting delivered by American fishermen to Soviet processing vessels. In 1980 the joint venture was allocated 40,000 mt of whiting with 27,600 mt actually harvested. The joint-venture fishing operations in some respects were similar to those imposed on the foreign fishery. The major exception was that joint venture vessels were allowed in some of the areas closed to foreign vessels. The FMP provides for a specific management regime for joint ventures.

The 1973-77 mean recreational catch of groundfish off Washington, Oregon and California was 3,578 mt. Approximately 93% of the total sport catch occurred in the Conception-Eureka areas. In addition, rockfish accounted for approximately 83% of the total catch. Catches were taken mostly by hook and line, although an unknown, but much smaller catch was taken by scuba and other legal means. Charter and private boat fisheries accounted for most of the sport catch.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Proposed Action

The recommended regime for managing the groundfish resources is described in Section 2.2 of this EIS.

Direct Biological Effects on Groundfish Stocks

Except for the five numerical OY (quota) species of Pacific whiting, sablefish, Pacific ocean perch, shortbelly rockfish and widow rockfish, the proposed action allows harvests of all groundfish in whatever amount can be taken under gear and other regulations proposed. Standing alone, this system could cause concern about conservation of the stocks, because the amount taken is dependent on the variable of fishing effort exerted. This concern is mitigated by two measures: (1) the use of minimum trawl mesh size restrictions which reduce the capture and mortality of fish which are immature and therefore have not contributed reproductively to the population, and increase yield from the fishery by delaying capture of the animals until growth gains start to be exceeded by losses due to natural mortality; and (2) the "Points of Concern" mechanism which establishes an intensive in-season stock monitoring program. If signs of stock stress are identified, rapid in-season action can be taken to reduce fishing pressure on the stock(s) in question and prevent overfishing. Thus, gear restrictions will control the amount of harvest, and the stocks will be monitored for conservation purposes.

Under this system, which does not impose quotas for most species, there is a potential for catches of some species to stray above the acceptable level biologically (the acceptable biological catches are given in Table 14 of the FMP). If this occurred over the long term and was undetected due to shortcomings in the "Points of Concern" monitoring system, the proposed action could result in overfishing of a stock.

This action is similar to historical management of the domestic fishery by the states, because quotas are not used for the most part. The significant difference, however, is that the proposed action establishes an intensive monitoring program. Given recent levels of fishing effort, only Pacific ocean perch has required a restrictive quota.

The proposed action establishes a quota for Pacific ocean perch (POP) at a level which will rebuild the stocks to the abundance producing maximum yield in about 20 years. This will require that domestic fishermen reduce their harvest of POP. Catches cannot be totally eliminated because POP are caught incidentally when fishing for other species. Therefore the proposed action attempts to eliminate target fishing for POP while allowing incidental harvests. This is done by establishing a limit on the amount that can be landed per trip. Foreign harvest of POP will be minimized by the area, season and incidental catch limits imposed on the foreign fishery. Foreign area restrictions will also protect juvenile whiting south of 39°N.

The overall biological effect of the proposed action will be positive because overfishing of the groundfish complex as a whole will be prevented by the intensive stock monitoring program.

Direct Biological Effects on Other Species

Trawls often cannot be used to target on individual species and incidental catches of species such as halibut, salmon and Dungeness crab which are fully utilized are unavoidably taken. Trawling for halibut is prohibited by international agreement, for salmon by federal regulation, and for crab by state laws (except California allows 500 lb. per trip). Nevertheless, these species are taken unintentionally by trawlers, both foreign and doemstic.

In the early 1970's, the International Pacific Halibut Commission estimated that halibut made up 1% of the domestic trawl catch south of Willapa Bay, Washington. Estimates by Hoag (1975) indicate that those fish that are caught and discarded have a mortality of about 50%. The foreign trawl fishery in 1979 took an estimated 40 halibut (French, et. al., 1980).

The catch of salmon in the domestic trawl fishery is unknown, but it is always incidental to other fishing activities. The fish are badly descaled by chafing action of the net, and survival is negligible when returned to the sea. The foreign trawl fishery in 1979 harvested an estimated 7,044 salmon, 93% of which were chinook salmon (French et. al., 1980). For comparative purposes, the domestic ocean troll and sport harvest of chinook salmon off the coasts of Washington, Oregon and California in 1979 was 1,233,000 fish.

The incidental catch of Dungeness crab in the foreign trawl fishery is probably non-existent because the trawls are fished in midwater, and crabs are bottom-dwellers. Crab catch in the domestic bottom trawl fishery is unknown. Only a small fraction of crabs released by trawlers die.

The above discussion indicates that the effect of groundfish trawling on other important species is minimal, and the fact that these species are prohibited (must be released) will discourage trawlers from targetting on them, if targetting were possible.

Indirect Biological Effects

Until more is known about the predator/prey relationship which exists in the marine ecosystem it will be difficult to predict the impact of the proposed action on species other than groundfish. Although efforts have been made toward ecosystem modeling it will be quite some time before such models become reliable management tools. The fishery monitoring system which is being instituted pursuant to the FMP will allow for better observations of the species harvested in the fishery, and therefore for more informed management decisions to protect the stocks than ever before. Regional management of the stocks to replace state-by-state management will provide coordination for the fishery management unit.

Since the passage of the Marine Mammal Protection Act, the National Marine Fisheries Service and the U.S. Fish and Wildlife Service have gained considerable knowledge about populations of marine mammals in the Pacific. The methods used to derive the MSY and ABCs for the groundfish

species indirectly take into consideration the volume of fish needed by marine mammals. Natural mortality of fish stocks is taken into consideration in stock assessment and in its present application, includes the predation component by marine mammals. The Council and NMFS through the National Marine Mammal Laboratory will continue to monitor new information collected on marine mammal-groundfish interactions as it becomes available.

Other Environmental Effects

Little if any change of the environment is expected from implementation of any of the measures proposed in the FMP. As is presently practiced, fishing vessels will continue to discharge effluents into the ocean. The discharge will include sewage, solid wastes and diesel engine wastes. However no significant increase in such discharges is expected as a result of the proposed action.

Lost fishing gear may result in minor unintended capture of fishery resources. The measure prohibiting fishermen from leaving fixed gear unattended will help to minimize the loss of gear.

Roller and bottom trawl gear used by domestic fishermen causes some disturbance to the benthic environment due to physical contact of doors, foot ropes and roller gear. If yield increases, a larger trawl effort will cause a greater disturbance. The environmental impact of this disturbance is unknown.

Other proposed management measures dealing with gear restrictions, trip limits, and time/area closures will have no impact on the environment.

Social and Economic Effects

In general, the proposed action will have a positive economic impact on local or regional activity, even though there will be no significant impact on the national economy. This is demonstrated below with reference to the principal economic variables. The largest economic impact will come from replacing the foreign fishery for whiting with domestic harvesting-processing-marketing.

The FMP will have the following economic impacts:

- Improve current or future production by preventing overharvest of stocks and rebuilding depleted stocks.
- Create a climate for controlled growth and minimal disruption of the domestic fishery.

The proposed action will give greatest flexibility to fishermen because restrictive and often inaccurate quotas will not be used for the most part. It is recognized that OY values are derived from incomplete data and therefore uncertainty exists in the estimates. Further, environmental fluctuations affect abundance and therefore OYs can be variable. The use of fixed quotas beyond which catches are prohibited can result in over-regulation of fishermen. The proposed action also allows upward adjustments of numerical OYs for the five species, within the upper limit of 30% per year and under special circumstances. Use of

the numerical OYs as fixed quotas could lead to less than optimum utilization of a healthy resource. The above measures mitigate any adverse economic impacts which might occur.

The imposition of a trip limit on POP to rebuild the stock may result in some initial adverse economic impact on fishermen, processors and consumers, but in the long-term the stocks will be rebuilt and production will be maximized. Any additional negative impact will be slight since present state measures are identical to the proposed action.

Employment - Eight types of commercial gear plus recreational fishing are used to land these fish but nearly 80 percent of the catch is taken by trawlers. Recreational fishing accounts for about 6 percent of the catch with the major effort concentrated off southern California. During 1976 there were 280 trawl vessels that landed groundfish, which would involve about 1,000 fishermen. Employment in the harvesting sector will increase as new vessels enter the fishery.

During 1976 approximately 75 processing plants produced groundfish with about 15 of these involved either in industrial, non-food production or in secondary processing of food items that do not involve direct purchases from fishermen. Groundfish are typically processed in plants producing other products. There are no data available on the number of people affected by groundfish processing. Some labor is utilized seasonally, other as part time labor, or as shift workers, and often for more than one fishery. Therefore accurate employment figures for groundfish production are difficult to obtain and currently lacking.

The proposed action will likely have some positive impact on employment as yields from these stocks increase and other stocks are utilized more intensively. The change from present production levels will be small and insignificant relative to the national economy.

Markets, Prices, and Supplies - The market situation for frozen groundfish is dominated by world market conditions. The U.S. imported approximately 295,000 mt of processed groundfish products during 1978. The total processed groundfish production from the area covered by the FMP is less than twenty percent of U.S. imports of groundfish. Changes of production in any given year as a result of the FMP will be small in comparison to total U.S. supply of groundfish unless all domestically underutilized species were to be landed. The greatest increase in domestic use has been in the frozen fish blocks, sticks and portions sector. Although some products such as sablefish compete effectively in national and world markets, most of the west coast production is for the fresh market and does not compete with imports of frozen blocks and portions. Production from the area covered by the FMP is sold in local and regional markets with about 80 percent of the production sold in California markets.

Pacific Whiting - Replacement of the foreign fishery on Pacific whiting with domestic production, possibly combined with some additional domestic development of underutilized species, would be the largest single economic impact of the FMP. Pacific whiting comprise

approximately 60 percent of the total acceptable biological catch for all species considered in the FMP. This is the only species with sufficient supply potential to have some impact on national economic conditions.

Whiting can be marketed in three forms: as a headed-and-gutted product, as individual fillets, or as fillets combined into blocks to be processed into breaded portions for institutional use. The U.S. imports a considerable amount of whiting blocks, and imports are expected to increase in the future. Pacific whiting appears to be a reasonable substitute for imported whiting blocks, which in turn are increasingly important as substitutes for other bottomfish species. Whiting blocks are utilized as a substitute for cod, haddock, and pollock and to a lesser degree for rockfish and flatfish. Total imports of all these species in 1987 is projected to be about 162,000 mt (Combs 1979). Some export markets also exist for whiting, but most U.S. production is expected to be marketed domestically. If rapid development of the domestic Pacific whiting fishery occurs, the major impact on the national economy will result from replacing a part of the expected imports.

At present only Poland and the USSR harvest significant quantities of Pacific whiting. Changes in traditional supply patterns for nations that traditionally consume whiting (e.g. U.K., France, Italy, Spain, and Germany) may increase the export potential for headed-and-gutted fish.

Other species currently underutilized include grenadiers, arrowtooth flounder and elasmobranchs. These species may provide more employment and increase economic stability in the groundfish fishery.

Management Costs - The incremental costs of implementing this plan will be minimal compared to the benefits acheived. Most of the costs of management and enforcement are already being borne by the states with regard to domestic fisheries and by the Federal government for foreign fisheries. These costs are likely to increase, whether or not this plan is implemented, as the number of vessels and harvests expand and as more complex problems are encountered. This FMP will require a small increase of about $100,000 per year for administration and monitoring of the fishery and perhaps more for Federal enforcement of domestic regulations (see Section 13.4 of the FMP). It also will require an estimated $200-300,000 for improving the groundfish data system and making it more responsive to management needs (see Section 13.2.1 and 13.4.1 of the FMP). Costs of the additional research recommended by the plan (Section 13.3) have not been estimated.

Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

The optimum yield for groundfish is based on a determination of the biological standards of maximum sustainable yield and acceptable biological catch. If these standards are adhered to, the long-term productivity of each subunit will be maintained, at least insofar as it is affected by the fishery. If MSY and ABC are exceeded, the likelihood of overfishing these stocks is greater, particularly if this is done for a number of years.

Selection of the rebuilding policy for Pacific ocean perch will assure the long-term productivity of those stocks.

Finally, long-term productivity of the stocks is safeguarded by the FMPs "Point of Concern" mechanism which allows for in-season management to react to conservation problems which may arise.

Irreversible or Irretrievable Commitments of Resources

There will be no irreversible or irretrievable commitments of marine resources when the FMP is implemented. The plan is designed to protect the long-term productivity of the renewable groundfish resources. No permanent losses of other marine fauna have been identified. No irreversible or irretrievable commitments of water, air, land or energy resources have been identified. However, short-term commitments of public funds for monitoring the status of the stocks and managing and enforcing the fishery regulations have been identified.

Relation to Land Use Plans, Policies and Controls for the Area Concerned

Existing coastal zone management programs of the three coastal states are discussed in Section 4.6 of the FMP. Only the Oregon Coastal Zone Management Plan makes direct reference to the use of ocean resources (Goal 19). Authority for controlling harvests of fish from state waters rests with the Oregon Department of Fish and Wildlife. The FMP appears consistent with the Oregon Coastal Zone Program as well as the coastal plans of Washington, California and the San Francisco Bay area. Statements which certify that this proposed action is consistent with approved coastal zone management programs have been prepared as required by Section 307 of the Coastal Zone Management Act of 1972 as amended. The statements have been filed with the appropriate coastal zone agencies in the states and the San Francisco Bay area and are available for review at the offices of the responsible agencies.

Development of the fishing fleet and associated shoreside facilities could impact coastal port and fish processor development plans. This however is highly dependent upon market and economic conditions beyond the purview of the FMP. As noted in the FMP, all four coastal zone plans are cognizant and accommodating of the commercial and sport fishing industry.

Energy Requirements and Conservation Potential

The proposed action neither encourages nor discourages the consumption of energy by the fishing fleets. In the short term, measures such as trip limits may decrease the amount of fish harvested per trip and therefore per unit of fuel. To the extent that the proposed action improves long-term yields, catch per effort should be maximized and therefore the amount of fuel consumed per unit of protein obtained should be minimized. Such gains would be offset by increases in the numbers of vessels.

Natural or Depletable Resource Requirement and Conservation Potential

There are no depletable resource impacts created by the FMP. Conservation of renewable natural reources, in the form of the groundfish stocks, is the goal of the FMP and is discussed in detail in previous sectons.

Impacts on Urban Quality and Historic and Cultural Resources
No such impacts are foreseen with any of the proposed measures.

Measures to Mitigate Environmental Impacts of the Proposed Action
The FMP notes the difficulties in making a preseason projection of optimal harvests. To assure that the latest and best information is available to facilitate management decisions and to attempt to mitigate any impacts of preseason miscalculations, two systems which allow for in-season adjustments of these projections are included in the proposed action.

The "Points of Concern" system allows for in-season management based upon information regarding the status of stocks, fishing effort and other factors that become available during the season. This system establishes real-time monitoring of the fishery at a level not before achieved. Close monitoring will provide a sensitivity to the status of the stocks and the fishery which allows for corrective actions if necessary. The system is described in Section 9.3.1 of the FMP.

Upward adjustments of harvest guidelines is allowed under a system provided in Section 9.3.2. This should mitigate adverse social and economic impacts to the fishery due to underestimations of allowable catch. The system allows increases only upon a complete review of indices of the health of the stocks involved.

In addition to the systems provided in the FMP, the Fishery Conservation and Management Act allows for modifications of the basic management scheme by emergency regulations for situations "involving any fishery resources." Such emergency regulations may go beyond the scope of the FMP.

4.2 No-Action Alternative (Less Restrictive)

If no FMP were implemented, management of the groundfish resources would remain with the states for domestic fisheries and with NMFS for foreign and joint venture fisheries.

Environmental Effects
The status quo for foreign fisheries is essentially the same as the proposed action, that is the FMP foreign measures are similar to the existing PMP measures. The impacts therefore of no action with respect to foreign fisheries do not differ appreciably from the impacts of the proposed action.

For the domestic fishery there are significant differences. Most groundfish resources are distributed regionwide, i.e. throughout the Washington-California area. Fishing vessels in pursuit of these resources are highly mobile and capable of fishing off different states which have different management regimes. Management of these resources must be done on a regional or stock-by-stock basis as much as possible in order to ensure conservation. Under the no-action alternative (present system), vessels can fish off one state and deliver to another thereby evading the former state's regulations. The no-action alternative provides no regional system of management and therefore provides no assurance that the stocks will be conserved.

Furthermore, the no-action alternative does not establish an intensive in-season monitoring program necessary to prevent overfishing. New vessels, new technology and new entrants from other fisheries have resulted in substantial increases in landings over the past few years. Landings in 1978 increased 19% over 1977, and in 1979 increased 25% over 1978. Landings of some species are approaching or exceeding acceptable levels in some areas. Effective controls might not be initiated by the states in a consistent fashion to prevent any conservation problems which could arise from this uncontrolled growth. A greater risk of overfishing is inherent in the no-action alternative.

Energy Requirements and Conservation Potential

If this alternative resulted in overfishing the amount of fuel consumed per unit of protein obtained might increase with a decrease in catch per effort.

Natural or Depletable Resource Requirements and Conservation Potential

There are no depletable resource impacts foreseen under the no-action alternative. Conservation of the renewable groundfish resources may be adversely impacted by no action.

Impacts on Urban Quality and Historic and Cultural Resources

No such impacts are foreseen.

4.3 Quota Management (More Restrictive)

Environmental Effects

The first quota option is the most restrictive of all alternatives considered in this EIS and establishes numerical OYs (quotas) for as many species and areas as is realistically possible. This method reflects more of a species-by-species management philosophy.

The FMP notes "If species are grouped, a single stock or species could be overharvested before the problem was detected and remedied. While not completely analogous, severe depletion of several species of Antarctic whales was attributed to a management system which did not account for the status of individual species. Detailed management of the fishery may necessitate increased attention to the status of individual stocks. A considerable amount of effort would be necessary to manage the fishery in the detail proposed under this option. However, risks may be taken in not doing so."

This option is considered to provide the most protection for groundfish stocks because of its individual attention given to each species group. On the other hand, the potential for resource waste is greater than for other alternatives because if the OY on species A is reached, but not on species B and species A and B are caught together, then one of two actions will result. (1) Species A is discarded because species B can still be caught or, (2) the fishery on species B is closed to prevent additional capture of species A.

Item 1 above results in fishing mortality even though the intent is to prevent additional fishing mortality. The economic loss may be minor to

all user groups combined but the loss could be substantial to a particular group. This option has the potential for maximum fishery disruption and economic and social problems, because obtainment of OY in one management unit could result in severe restrictions on fishing for other units that are in no danger of being overfished.

The second quota management option combines major groundfish species into a group for each management area and designates an OY for the group. This is less restrictive than the option above but more restrictive than the proposed action which has a non-numerical OY.

Compared to the option above, this option increases the risk of overharvesting of species within the group. Potential disruption of a fishery, because of the mixed-species nature of the fishery, is less becuase the fishery is allowed to shift among species until such time as the collective OY is reached.

Energy Requirements and Conservation Potential

If quota management caused premature termination of the fishery, total energy consumption would decrease but the harvestable surpluses would go unutilized.

Natural or Depletable Resource Requirements and Conservation Potential

No depletable resource impacts are foreseen. Quota management would tend to quarantee that overfishing does not occur and therefore conservation of the renewable groundfish resources would be served.

Impacts on Urban Quality and Historic and Cultural Resources

No such impacts are foreseen.

5.0 LIST OF PREPARERS

	Name	Education	Experience (yrs.)	Discipline
1.	William Clark Univ. of Wash.	Ph.D.	7	Fishery Biology
2.	Thomas Dark Nat. Mar. Fish. Serv.	B.S.	21	Fishery Biology
3.	Robert Demory Oreg. Dept. of Fish & Wildl.	M.S.	17	Fishery Biology
4.	Edward Evans Mar. Res. Consult.	L.L.B.	5	Law
5.	Donald Gunderson Univ. of Wash.	Ph.D.	14	Fishery Biology
6.	Harvey Hutchings Nat. Mar. Fish. Serv.	Ph.D.	25	Economics

7.	Tom Jow Calif. Dept. of Fish & Game	B.A.	26	Fishery Biology
8.	William Lenarz Nat. Mar. Fish. Serv.	Ph.D.	12	Fishery Biology
9.	Alan Millikan Wash. Dept. of Fish.	M.S.	14	Fishery Biology
10.	Lee Morgan Nat. Mar. Fish. Serv.	M.S.		Resource Management
11.	Lawrence Six Pac. Fish. Mgt. Council	M.S.	5	Fishery Biology
12.	Ed Ueber Nat. Mar. Fish. Serv.	M.S.	4	Resource Economics

6.0 LIST OF AGENCIES, ORGANIZATIONS AND PERSONS RECEIVING STATEMENT

Fisheries and Marine Service of Canada
North Pacific Fishery Management Council
U.S. Army Corps of Engineers
U.S. Coast Guard
Environmental Protection Agency
Department of the Interior
    Bureau of Land Management
    U.S. Fish and Wildlife Service
Department of State
Washington Department of Fisheries
Oregon Department of Fish and Wildlife
California Department of Fish and Game
Idaho Department of Fish and Game
Washington Department of Ecology
Oregon Department of Environmental Quality
Oregon Land Conservation and Development Commission
California Coastal Commission
San Francisco Bay Conservation and Development Commission
Pacific Marine Fisheries Commission
Northwest Indian Fisheries Commission
Conservation Organizations
Sportfishermen's Organizations
Commercial Fishermen's Organizations
Seafood Industry
Commercial Passenger Fishing Vessel Organizations
State Clearinghouses
Marine Mammal Commission
Other Organizations and Individuals

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8.0 COMMENTS ON THE DEIS/FMP

This section summarizes oral and written testimony on the two draft EIS/FMPs submitted for public review. The first draft dated November 9, 1979 was reviewed at six public hearings scheduled during a review period of November 29, 1979 to February 4, 1980. Over 75 letters were sent and attendance at the six hearings sponsored jointly by the Council and NMFS totaled approximately 160.

Because significant changes were made to the EIS/FMP subsequent to the first review, an additional draft was prepared and submitted for further public comment. Four hearings were held on this draft, dated December 17, 1980 during the January 3 to February 17, 1981 review period. Twenty comment letters were submitted and 119 attended the hearings.

Section 8.1 below summarizes comments, oral and written, provided during the two review periods. The Council's response follows each comment. Sections 8.2 and 8.3 list individuals who testified at hearings and those who submitted letters, respectively.

8.1 Summary of Public Comments with Responses

1. Comment: Individual OYs should be established for the following rockfish species:

Black rockfish	Rougheye rockfish
Blue rockfish	Sharpchin rockfish
Bocaccio	Shortbelly rockfish
Canary rockfish	Shortspine thornyhead
Chilipepper	Silvergray rockfish
Cowcod	Splitnose rockfish
Darkblotched rockfish	Stripetail rockfish
Longspine thornyhead	Vermilion rockfish
Olive rockfish	Widow rockfish
Pacific ocean perch (POP)	Yellowmouth rockfish
Redstripe rockfish	Yellowtail rockfish

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: It is not practical to manage rockfish on a species-by-species basis, since even under the best of circumstances all species cannot be distinguished in catch reporting systems. There are more than 60 species of rockfish in the northeastern Pacific. Furthermore, several rockfish species may be captured at the same time making individual species management difficult. The Council agrees that more effort is needed to further break down rockfish species in catch reporting systems and its specific recommendation is stated in Section 13.2.1.

2. Comment: Optimum yield options 2 and 3 are unacceptable since overfishing could occur before management measures are taken.

Commenters: Bountiful Ocean Supply, Department of Interior, numerous commercial hook-and-line fishermen.

Response: Proper implementation of in-season management provisions will prevent overfishing.

3. Comment: Optimum yield option 1 also is unacceptable over the long term because it groups species which are dissimilar in biology and habitat (e.g. yellowtail/canary and bocaccio/chilipepper).

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: The grouping of rockfish species does not group dissimilar rockfish and was necessary because fishing can seldom be directed to a single species.

4. Comment: Optimum yield option 3 is too flexible and may allow overfishing.

Commenters: sport fisherman.

Response: See response to comment number 2.

5. Comment: Lingcod should be added to the list of species requiring individual management (Table 28) because of its importance to the sport fishery.

Commenters: Department of Interior.

Response: Lingcod is a major target species of the recreational fishery but they are also caught by other user groups particularly the trawl and troll fisheries. Individual management is not considered practical for the above reasons.

6. Comment: The plan does not adequately state why trawlers may land blackcod under certain conditions when fixed gear fishermen may not, even though the latter may be targeting on other species.

Commenters: Fishing Vessel Owners' Association.

Response: The FMP has been changed to accommodate an incidental catch for all gears.

7. Comment: It is unclear whether the sablefish management options apply coastwide or to Monterey Bay only.

Commenters: Fishermen's Marketing Association, Coast Draggers Association.

Response: The FMP has been changed to clarify this ambiguity. Sablefish options apply coastwide as well as to the Monterey Bay area.

8. Comment: Sablefish should be managed by a plan separate from the groundfish plan which is basically a trawl plan. Sablefish are better harvested by longlines and pots than trawls. A separate plan would ensure a healthy, developing fishery.

   Commenters: Federation of Independent Seafood Harvesters.

   Response: Sablefish is included in the Groundfish Plan because of the high degree of interaction with other groundfish species and user groups.

9. Comment: Fishermen disagree that pots are selective for larger fish.

   Commenters: Federation of Independent Seafood Harvesters, individual longliner.

   Response: The statement that pots are selective for larger fish (Section 3.3.1) has been deleted.

10. Comment: Pot fishing for sablefish should be prohibited since pots cause gear entanglement problems and continue to fish when lost.

    Commenters: longliner.

    Response: "Ghost" fishing does occur where pots are lost or unattended, but the magnitude of "ghost" fishing is unknown. "Ghost" fishing can be minimized by providing for biodegradable panels in pots.

11. Comment: When 90% of the sablefish OY has been reached, all landings should be stopped until the next season.

    Commenters: Fishing Vessel Owners Association.

    Response: The proposal violates national standard 1, that OY should be achieved. The proposed OY was determined from the best information available. A prohibition of all landings would cause some waste because the by-catch in other fisheries would have to be discarded.

12. Comment: An analysis is needed on the extent of additional landings of sablefish by trawl which would occur if longlining and pot fisheries were halted in mid-season and a trawl trip limit were implemented.

    Commenters: Fishing Vessel Owners Association.

    Response: Agreed. This procedure has been discussed in the plan.

13. Comment: The use of trip limits on sablefish applied to the trawl fleet would have no value; it does nothing more than continue the status quo.

Commenters: Fishing Vessel Owners Association.

Response: Incidental catch limits can be regulated and can achieve predetermined effects. However, in the directed trawl fishery, an incidental catch of sablefish has always occurred.

14. Comment: Is 90% of the sablefish OY a proper cutoff point for harvest in terms of protection of the resource or should some other point be chosen (e.g. 85% or 95%)?

Commenters: Fishing Vessel Owners Association.

Response: The 90% cutoff figure in the original draft of the plan has been changed to 95% in order to provide nearly equal shares to all user groups. Lower cutoff figures would give a disproportionate share of the sablefish OY to trawl fishermen and thus would work to the disadvantage of fixed gear fishermen.

15. Comment: Buffer zones, seasonal restrictions and gear restrictions should be implemented to reduce the incidental catch of salmon by domestic, joint venture and/or foreign trawl fisheries.

Commenters: recreational fisherman.

Response: Such measures were added to the plan as options before hearings to solicit opinions from the public on their need and impact, and the extent to which domestic trawlers capture salmon. The measures were not recommended because it would be difficult to determine appropriate areal restrictions which could reduce incidental salmon catches, and it is believed that trawl capture of salmon is minimal.

16. Comment: Trawlers should be able to retain salmon without restriction as to season, area or size, except that a 1% incidental catch limit should be adopted.

Commenters: Fishermen's Marketing Association of Washington.

Response: The Council's Salmon Plan will manage salmon catches by all gears, including nets. Net fishing for salmon is currently prohibited in the ocean. All salmon and crab incidental catch options have been deleted from the FMP.

17. Comment: Trawls catch too many salmon. Areas containing feeding salmon should be closed to trawling.

Commenters: commercial hook-and-line fisherman.

Response: See response to comment number 15.

18. Comment: Trawlers should be prohibited from fishing inside 15 miles.

Commenters: recreational fisherman.

Response: Area closures to certain user groups, restrictions on certain gear types or other measures proposed that would hinder one user group to the advantage of another are allocation issues, particularly when proponents do not advocate restrictions on themselves. Allocation proposals must be thoroughly evaluated before being implemented in the FMP. Establishment of allocation objectives, collection of the necessary data and analysis of impacts of proposed allocation schemes will require considerable time. The Council has decided that allocation issues will be addressed on a case-by-case basis in a very deliberate manner.

19. Comment: Rockfish and lingcod should be managed as hook-and-line species in areas where this is practical. Hook-and-line gear is highly selective in terms of species and size.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: See response to number 18.

20. Comment: The Council is obligated to protect the commercial and recreational hook-and-line fisheries. Allocation and restricted trawl effort is the only practical way to achieve this.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: See response to number 18.

21. Comment: Proposals by recreational fishermen which would create recreational fishery sanctuaries should be given the status of options in the plan. The Council should select one or more of these options to ensure that recreational fishermen obtain their fair share of the groundfish resources, to prevent overfishing, and to reduce gear conflicts.

Commenters: two recreational fishermen.

Response: See response to comment number 18.

22. Comment: Trawlers should be prohibited from fishing inside 55 fathoms.

Commenters: recreational fisherman.

Response: See response to comment number 18.

23. Comment: Proposals allocating areas for recreational use should not be implemented. Reef areas should be made sanctuaries for the longline and pot fisheries for sablefish.

Commenters: Federation of Independent Seafood Harvesters.

Response: See response to comment number 18.

24. Comment: We request that the following new recreational proposal be adopted for southern California (Morro Bay to Lopez Point):

(a) Require a revocable non-transferable boat permit to use gillnets in waters off California.

(b) Prohibit the use of gillnets to take rockfish in waters of less than 100 fathoms in depth, south of Pt. Buchon.

(c) Prohibit the use of gillnets within 3 miles of Santa Catalina Island, except for the taking of flying fish in specified waters of District 20.

(d) Increase the mesh size to 5 inches on rockfish gillnets, south of Pt. Buchon.

(e) Refinements on net design and flag buoys to carry boat's name and rockfish permit number.

This proposal faithfully follows the agreement between SAC representing the California CPFV fleet, and the California Gillnetter's Association chaired by Director Charles Fullerton on November 28, 1979. Similar regulations will also be introduced to the California legislature.

Commenters: Sportfishing Association of California.

Response: California law, although somewhat different than the above, places area and gear restrictions on rockfish set gillnets. The Council supports state implementation of these restrictions.

25. Comment: I propose the following management options be included for public review and comment:

(a) Lingcod should be taken by hook-and-line gear only for commercial or recreational purposes.

(b) Roller trawls should be prohibited inside of 120 fathoms.

(c) Trawl-free zones should be established over and around major underwater reef areas to depths of 120 fathoms and to a distance of 3 miles offshore.

(d) Directed midwater trawling for rockfish other than shortbelly rockfish and Pacific ocean perch should be prohibited.

(e) 100% of the lingcod OY should be allocated to commercial and recreational hook-and-line fisheries.

(f) 90% of the OYs for inshore rockfish should be allocated to commercial and recreational hook-and-line fisheries.

(g) 60% of the OYs for shelf rockfish should be allocated to commercial and recreational hook-and-line fisheries in areas where hook-and-line fishermen can demonstrate the ability to harvest to that degree (establishing trawl-free zones will create almost immediate favorable market conditions that would encourage large numbers of small and medium sized hook-and-line vessels to enter the fishery).

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: See response to comment number 18.

26. Comment: Sport fisheries should be provided with exclusive zones or quotas lest they be usurped by the more efficient commercial fisheries.

Commenters: Department of Interior.

Response: See response to comment number 18.

27. Comment: The consumer desires the perpetual availability of fresh fish at a reasonable price. Trawling produces an inferior product and also overfishes the resource; whereas hook-and-line gear produces fresh fish inexpensively and harvests selectively. Therefore trawling should be prohibited within 3 miles of all groundfish-producing reefs.

Commenters: consumer.

Response: See response to comment number 18.

28. Comment: I propose the following amendments to the Groundfish Plan:

(1) Establish a "privileged sanctuary" for all offshore reefs out to a minimum depth of 150 fathoms. Such a sanctuary should include the areas surrounding the reefs for a minimum distance of 2,000 yards. These areas should be determined from surveys now in effect, with the reservation to include any new discoveries, accurately plotted in both latitude/longitude and Loran C "fixes," and notice promulgated to the effect that they will be reserved for the exclusive use of sport fishermen, charter boat operators and commercial fishermen operating in those areas with hook-and-line. It should also serve notice that trawl operations in these areas would be terminated and that immediate enforcement of these rules was to be implemented.

(2) Establish a basis for the future prospect of limiting entry into this fishery by the issuance of a permit similar to that now used in salmon trolling. These permits should regulate the size of the boat and the number of fishing machines used thereon for those engaged in commercial fishing. Adequate laws governing sport and charter operations are already in effect.

Commenters: commercial hook-and-line fisherman.

Response: (1) See response to comment number 18. (2) Limited entry schemes have not yet been considered. See Section 12.1.

29. Comment: A recreational sanctuary (to 3 miles or a certain depth) should be established to prevent overexploitation by commercial fishing.

Commenters: recreational fisherman.

Response: See response to comment number 18.

30. Comment: Mid-water and roller trawling should be prohibited in zones around Santa Rosa and San Miguel Islands and from Pt. Conception to Pt. Sur out to 200 fathoms.

Commenters: numerous commercial hook-and-line fishermen.

Response: See response to comment number 18.

31. Comment: The plan does not address adequately the problem of gear conflicts. These conflicts should be minimized.

Commenters: Coast Draggers Association.

Response: We agree conflicts should be addressed and provisions made for minimizing them. Fixed gear regulations and the California gillnet law will alleviate some of these concerns.

32. Comment: Foreign fishermen should be excluded from the FCZ since they are responsible for considerable gear losses and because Americans can harvest the surpluses.

Commenters: longliner.

Response: The MFCMA provides for foreign fishing until domestic fisheries can replace foreign fleets and stocks of fish become fully utilized by domestic fishermen. The domestic fishery has been unable to utilize the entire Pacific whiting OY, the only species available for foreign harvest. Gear losses can be controlled by a number of methods proposed in the plan.

33. Comment: There should be no incidental catch restrictions for joint venture fisheries until a problem is encountered.

Commenters: Fishermen's Marketing Association of Washington.

Response: Limitations on retention by foreign processors of non-whiting species which are fully utilized by domestic harvesters and processors provide for adherence to the principles of the MFCMA.

34. Comment: The incidental catch allowance for sablefish should be set at zero for foreign fisheries and should be minimized by domestic trawlers, especially for small fish.

Commenters: Federation of Independent Seafood Harvesters.

Response: Setting a zero incidental catch on sablefish does not preclude capture of incidental animals. If incidental catch is prohibited then foreign fishing must be prohibited. If the intent is to prevent retention then no incentive exists to minimize incidental catch.

35. Comment: Foreign fishermen should be allowed to retain dead or moribund salmon for immediate personal use only, in order to reduce wastage.

Commenters: U.S. observer.

Response: The Council has considered the incidental catch problem of salmonids by foreign trawlers. The decision has been to prohibit retention of incidental catch of salmonids.

36. Comment: There should be no foreign fishing allowed in the FCZ. The resources should be kept for the American people.

Commenters: consumer.

Response: See response to comment number 32.

37. Comment: The plan should contain information on commercial hook-and-line fisheries and should include provisions for these fisheries.

Commenters: Santa Cruz Commercial Fishermen's Marketing Association, Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: Commercial hook-and-line fisheries are considered in the plan, however, not to the detail that is considered satisfactory. Only catch data by the hook-and-line fishery are readily available. The number of vessels and fishermen, species and area of catch are data that are not available to the Council at this time.

38. Comment: The plan does not discuss how to promote the availability of quality seafood even though that is an objective of the plan.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: While the plan proposes no direct management measures which will promote the availability of quality seafood to the consumer, the Council feels strongly that this is a laudable and important goal. It is hoped that the long-term impact of rational fishery management under the FMP will be increased supplies of quality seafood. This can be done by maximizing harvests, consistent with conservation requirements, and minimizing interference with the fishing industry.

39. Comment: Management options which are conducive to the development of a hook-and-line fishery are precluded. The plan does not adequately address the commercial hook-and-line fishery. Rather, it promotes the expansion of the trawl fishery.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: The OY options, from which management would follow, apply to all user groups. The plan does not preclude development of a hook-and-line fishery. In fact, there are no restrictions placed on this fishery.

40. Comment: Trawling can eliminate rockfish populations and kills vast numbers of juvenile rockfish. Roller trawls also destroy rockfish and lingcod habitat.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: Fishing effort, regardless of method, is responsible for reduction of populations. The magnitude of rockfish discards has not been documented although it does occur. The implication is that only trawls kill juvenile rockfish but any fishing gear will kill juvenile rockfish. Destruction of habitat has not been well documented but some observations indicate that short term effects are conducive to productivity. Long term effects are unknown. Adverse impacts of trawling have not been documented even though trawling on the west coast is over 100 years old.

41. Comment: Rockfish must be managed on a stock-by-stock basis not by INPFC areas, since individual populations could be wiped out without detection. Reporting systems must separate out each species.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: See response to comment number 1.

42. Comment: There is no information in the plan on market trends and price differentials based on the quality of the product. A thorough market analysis is required to correctly determine OY.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: There is no information available on price differences by quality.

43. Comment: Section 3.4.2 should note that large numbers of troll vessels could enter a rockfish fishery as market conditions improve and hook-and-line gear is made available.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: The plan notes that "there is a possibility that large numbers of vesels could enter the groundfish fishery from other fisheries."

44. Comment: The fecundity estimates for bocaccio, canary, chilipepper and yellowtail rockfish are too high. The estimates should be changed and MSYs reduced accordingly.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: Fecundity data of Table 12 are correct. They are fecundity at average size of maturity. Fecundity figures cited in public testimony are from Hart (1973) who cites his source as Phillips (1964). Phillips (1964) provides fecundity at the youngest or smallest fish he examined and in all cases these are younger and smaller than the average size at maturity of Table 12.

Exploitation rates cannot be determined from fecundity. MSYs for rockfish were estimated with survey data, catch data, unfished biomass and natural mortality relationships, and yield-per-recruit modelling (Table 13).

45. Comment: A further discussion of discards is needed in the plan as it has vital bearing on the allowable rate of exploitation and which gear should be used on which species.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: Discussion on discards is incomplete and must remain so until additional data are available. Collection of discard data is addressed in Sections 5.6 and 13.0. Discards are not utilized in OY determinations.

46. Comment: In spite of evidence of declining rockfish abundance, MSYs have been set at or above current levels of exploitation. Rockfish MSYs should be lowered to reflect declining CPUE.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: Shelf rockfish MSYs have been difficult to establish due to the scarcity of data used traditionally to determine MSY. In the worst case, the Team was forced to simply use catch records as indices of stock condition. In general, catches have demonstrated a certain stability in what, until recently, was a rather unchanging fishery and it was concluded that most shelf rockfish fisheries are in a mature state of development with current harvests probably quite close to MSY levels. There was reason to believe that fisheries for a few species in some areas were not yet

fully developed as expansion to new grounds was reported. In the absence of other information MSY was set either at the highest catch of record or, to accommodate the latter case, at 20% greater than recent catches until additional data can be accumulated. Other MSYs were derived from a larger data base which included results of the 1977 rockfish survey and yield-per-recruit analyses.

Public testimony implies that MSYs should be established with the current status of the stock a major consideration. This fails to recognize that MSY is an estimate of the average largest catch which a stock is capable of producing over a reasonable length of time and that immediate stock condition has little to do with that potential. Deviations in stock abundance from the level producing MSY are accommodated through the plan's acceptable biological catch (ABC) concept. ABC can be set at levels above or below MSY depending on stock conditions.

Shelf rockfish stock sizes are considered to be adequate in most instances. While it is true that substantial reductions in CPUE were observed in some INPFC areas during the period when intense foreign fishing occurred, the Team was not greatly alarmed by that observation for the following reasons. First, the adequacy of trawl CPUE as an index of rockfish abundance is seriously questioned due to the difficulty in measuring actual fishing effort. Secondly, substantial reductions in CPUE are expected as populations are fished down to a size where MSY occurs and the fishery becomes fully developed. While "fishing down" may have occurred in some areas on some species, such cannot be determined until the status of stocks can be more precisely described. Lastly, none of the biological indicators normally associated with severe overfishing was reported. Therefore, in the absence of accessory information, the Team was reluctant to conclude on the basis of decreasing CPUE alone, that shelf rockfish stocks are in a depleted state.

47. Comment: Chapter 7 should address the environmental impact of trawls, especially roller trawls.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: See response to comment number 40.

48. Comment: Section 8.5 should include a detailed comparison of revenues from trawl-caught rockfish vs. revenues that would be generated if the same fish were caught by hook-and-line . Revenues of the charterboat industry should also be noted.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: A comparison of revenues from different methods of fishing are not included. Some data do exist especially for the California hook-and-line fishery. Revenues from the charterboat

industry were included where appropriate and available. A detailed analysis would be needed before comparisons could be made.

49. Comment: Data on the average size of currently landed rockfish are not available in the plan. Without these data meaningful OYs cannot be established.

Commenters: Bountiful Ocean Supply, numerous commercial hook-and-line fishermen.

Response: Some data on average weight of the major rockfish species are available. Such data were not used in determining OY because average weight by itself has limited utility.

50. Comment: Observers should be used as enforcement officers as well as for scientific purposes.

Commenters: fisherman.

Response: NMFS policy is that observers do not act as enforcement personnel.

51. Comment: The data on California CPFV catch of inshore rockfish is in error. Most fishing is done outside 100 fathoms. Of the 4 million rockfish reported as caught by CPFV, at least 3.5 million were taken outside 80 fathoms.

Commenters: Sportfishing Association of California.

Response: That paragraph is misleading as it infers that all rockfish catches are made inside of 50 fathoms. A change to indicate that CPFV catches in that paragraph mean catches from all depths will clear it up. However, no data on catches inside or outside of 80 fathoms are available.

52. Comment: Tables 25 and 26 should reflect the amount of license revenue derived from passengers aboard CPFVs (approximately $400,000 per year). This far exceeds any other source of revenue listed.

Commenters: Sportfishing Association of California.

Response: Changes have been made in the plan to reflect this comment.

53. Comment: Restorative regulations are needed for rockfish stocks which have been allowed to decline over the past 30 years.

Commenters: sport fisherman.

Response: Stock size will decine as MSY is achieved. There is no evidence that rockfish stocks other than POP are below levels that produce MSY.

54. Comment: The recreational data are erroneous. Approximately 4,000 mt were caught recreationally in the Conception Area, raising the recreational percentage to 66% of the all-gear catch. The plan should also reflect this 4,000 mt catch.

Commenters: Sportfishing Association of California.

Response: The data provided by the CPFV fleet in California is the best series of recreational data available. A thorough analysis is required to provide conclusions on the status of groundfish resources. The annual data series may be misleading without considering area time stratifications of effort and targetted trip variations among years.

Table 8 was compiled with considerable effort and care. CPFV data of California was used to develop catches of the Conception, Monterey, and Eureka areas. For example, the 3,597,114 rockfish catch of 1977 was apportioned to area. The number of fish was multiplied by average weight of fish determined by sampling the CPFV catch. Other vessel catch was added and this provided 1,363 mt in the Conception area and 1,039 mt in the Monterey area.

The importance of the recreational fishery in California and especially in southern California is masked by area strata of Table 8. The Conception area extends north to 36°00' north latitude, over 70 miles north of Pt. Conception. Were we to consider Pt. Conception south only, the recreational groundfishery exceeds the commercial catch. Trawling carried out in the Santa Barbara channel and from Pt. Conception north account for the catch that has exceeded recreational catch since 1975.

55. Comment: Recreational management consideration number 3 on p. 169 should read: "The recreational experience is a negligible factor whether a catch is made or not." If the CPFV fleet does not make catches commensurate with the cost of going fishing, the fleet does not do business.

Commenters: Sportfishing Association of California.

Response: No survey has shown that the recreational experience is a negligible factor.

56. Comment: The EIS states that the coastwide recreational mean catch for 1973-77 was 3,578 mt. This is at odds with the fact that the CPFV fleet catches 4,000 mt per year south of Morro Bay alone.

Commenters: Sportfishing Association of California.

Response: See response to comment number 54.

57. Comment: Despite recognition that recreational data are inadequate, no recommendations are made concerning data collection for descriptive purposes, allocation purposes, etc.

Commenters: Department of Interior.

Response: Section 5.4 and Chapter 13 address recreational data deficiencies. Data needed for allocation are detailed in Section 8.6.

58. Comment: Trawling must be restricted especially in areas where depletion is possible.

Commenters: commercial hook-and-line fishermen.

Response: See response to comment number 18.

59. Comment: Hook-and-line fishing is superior to trawling because (1) there are no discards, (2) there is no damage to the grounds, (3) product quality is better, and (4) trawling is indiscriminate in terms of species and size.

Commenters: numerous commercial hook-and-line fishermen, Bountiful Ocean Supply.

Response: (1) Discards (or lack of) in the hook-and-line fishery have not been documented. (2) Damage to grounds by trawls has not been documented. (3) Public testimony supports the quality argument and the price structure in the California hook-and-line fishery supports this. (4) Trawling tends to provide mixed species catches, but that alone does not render it inferior. Hook-and-line will also produce mixed species catches.

60. Comment: The plan fails to acknowledge the incidental catch of salmon and other species by foreign fleets. Optimum yield estimates cannot be accurate until the amount taken by foreign fishermen is considered.

Commenters: Pacific Coast Federation of Fishermen's Associations.

Response: See response to comment number 35.

61. Comment: The incidental catch of salmon could be reduced by establishing trawl-free areas along migratory routes.

Commenters: commercial hook-and-line fisherman.

Response: See response to comment number 15.

62. Comment: Trawl and gillnet activity should be prohibited in all reef areas inside 120 fathoms off California. Failure to do this will create serious conflicts and overfishing.

Commenters: Golden Gate Sportfishers.

Response: Where conflicts and overfishing occur, all fishing methods have to be evaluated to implement rational management procedures. See response to comment number 18.

63. Comment: The Council should analyze the experience of countries like Iceland and Norway where trawl-free zones have been necessary to protect fully exploited groundfish stocks.

Commenters: commercial hook-and-line fishermen.

Response: See response to comment number 18.

64. Comment: A fleet of hook-and-line vessels would reduce energy consumption as well as provide a large shore-based work force (6,000 California fishermen provide 96,000 shoreside jobs).

Commenters: commercial hook-and-line fisherman.

Response: The economics of a fleet of hook-and-line vessels are unknown although trawling is known to be very energy intensive.

65. Comment: Hook-and-line sanctuaries or trawl-free zones should be established to protect important stocks of rockfish and lingcod that cannot withstand continuous trawl effort. This is necessary for purposes of quality, fuel efficiency and resource protection.

Commenters: Washington Trollers Association.

Response: See response to comment number 18.

66. Comment: I propose the following restrictions:

(a) prohibit mid-water and roller trawling south of 39°N (for the same reason that foreign fleets are restricted) and prohibit such trawling inside 100 fathoms between 39°N and 43°N;

(b) require a NMFS representative on each mid-water trawler;

(c) exclude hook-and-line fishermen from all quotas and allocations;

(d) add a hook-and-line fisherman to the Groundfish Advisory Subpanel;

(e) establish limited entry on the trawl, hook-and-line and recreational fisheries.

Commenters: commercial hook-and-line fisherman.

Response: Foreign fleets and joint venture processors are restricted from trawling south of 39°N because of high incidental catch of rockfish during fishing operations for whiting. The high proportion of juvenile whiting in whiting catches was also a factor. Requiring NMFS observers aboard domestic trawlers is not now within the NMFS budget. The Council considers the composition of the Advisory Subpanel to be adequate. There are hook-and-line fishermen on the Panel at this time. Limited entry schemes have not been considered. See Section 12.1.

67. Comment: Certain areas should be closed to groundfish fisheries to avoid interference with another fishery, e.g., closure of the Gulf of Farallons during crab season. Conversely, other areas should be opened to groundfish fishing, such as the area between Pt. Arena and Pt. Ross inside 3 miles.

Commenters: Pacific Coast Federation of Fishermen's Associations.

Response: See response to comment number 18.

68. Comment: The plan fails to minimize gear conflicts as mandated by the MFCMA. A viable solution is to limit trawl effort in areas of most abundant hook-and-line effort.

Commenters: Pacific Coast Federation of Fishermen's Associations.

Response: See response to comment number 18.

69. Comment: There is a severe problem of sport-caught groundfish being sold for profit. Thus, the definitions of sport and commercial fishermen must clearly differentiate the two users.

Commenters: Pacific Coast Federation of Fishermen's Associations.

Response: The sale of sport-caught fish is illegal in all three states. A change in definition will not stop this activity, only enforcement will.

70. Comment: Each species of fish must be managed to ensure its continued existence in abundance.

Commenters: commercial hook-and-line fisherman.

Response: Groundfish fisheries are in large part multispecies fisheries. Fisheries are managed for conservation of all species but often several species must be managed as a group. Abundance could be a management objective but this would mean a reduction in fishing effort regardless of gear used. As MSY is approached abundance will decline.

71. Comment: Implementation of the plan as drafted may lead to the destruction of a way of life characterized by independent fishermen and small boats. Actions which would favor the hook-and-line fishery would protect smallness, diversity and individual freedom.

Commenters: commercial hook-and-line fishermen.

Response: See response to comment number 18.

72. Comment: Area or season closures (November 15 to February or March 15) are needed to protect bottomfish spawning grounds from over-exploitation by large, modern trawl vessels.

Commenters: commercial vessel owner.

Response: The plan protects stocks against over-exploitation through gear regulations and, if necessary, catch restrictions. There is no biological reason for preventing the harvest of spawning fish.

73. Comment: There is an influx of inexpensive trawl-caught rockfish in the California market which is imperiling the hook-and-line industry as well as creating a serious resource and economic problem.

Commenters: commercial hook-and-line fisherman.

Response: The FMP does not attempt to regulate markets for groundfish. No resource problem has been identified because of this influx.

74. Comment: One purpose of the plan is to attain an information flow which allows for informed management but no positive steps are stated in the plan toward achieving this purpose.

Commenters: commercial hook-and-line fishermen.

Response: Data requirements for implementation of the FMP are detailed in Section 13.0. Research needs that will improve the data base are detailed in Section 13.3.

75. Comment: Objective D of the plan is to provide for the orderly development of the fishery, including new fisheries, but no attempt is made to help domestic fishermen develop and expand the bottomfish market.

Commenters: commercial hook-and-line fishermen.

Response: The FMP does not attempt to regulate markets and is not an active fishery development plan, since this function belongs to NMFS. The FMP does attempt to provide a favorable climate for fishery development by minimizing regulatory impacts, maximizing management flexibility and allowing justifiable increases in OY.

76. Comment: Regarding entry from other fisheries, the government is making large sums of money available at low interest for loan guarantees to encourage king crabbers to enter the trawl fishery. Hook-and-liners cannot compete with them.

Commenters: commercial hook-and-line fishermen.

Response: The FMP does not regulate government loan policies, and loans are not limited to large vessels only.

77. Comment: The Council should help institute marine sanctuaries to help protect reef and breeding ground areas.

Commenters: commercial hook-and-line fishermen.

Response: The Council can establish areas closed to fishing for conservation and management reasons in a fishery management plan without resorting to the Marine Sanctuary process. This process is outside the jurisdiction of the Council and involves many marine activities not just fishing. Any individual or group who wishes to pursue the sanctuary process may do so by contacting the Office of the Coastal Zone Management, Sanctuary Program Office, NOAA, Washington, D.C.

78. Comment: The plan is supposed to prevent overfishing but I feel that it will allow almost total extinction of bottomfish off Oregon.

Commenters: commercial hook-and-line fisherman.

Response: See response to comment number 2.

79. Comment: We advocate prohibition of gillnetting, midwater and roller trawling for the harvest of rockfish inside 200 fathoms in California, including Cordell Banks and Farallon Islands.

Commenters: Morro Bay Commercial Fishermen's Association.

Response: See response to comment number 18.

80. Comment: Trawling (all methods) on and around reefs to a distance of 2,000 yards should be prohibited.

Commenters: commercial hook-and-line fishermen.

Response: See response to comment number 18.

81. Comment: Section 13 does not specify the data needed to resolve the plan's admitted problem of a paucity of recreational data. Also, there should be a positive statement on the need for an annual recreational fishery statistics program such as the one being conducted currently by NMFS.

Commenters: Sport Fishing Institute.

Response: Recreational fishery data required is similar to that required of the commercial fishery. Statistics on fishing effort, species and time period are important. An annual survey of the recreational fishery of the type currently implemented by NMFS would provide a great deal of useful information.

82. Comment: The Plan should include an endorsement of the voluntary fixed gear location reporting system currently in use to encourage increased participation by fishermen.

Commenters: U.S. Coast Guard

Response: The FMP has been altered to recommend voluntary reporting of fixed gear.

83. Comment: The sablefish management measure should read "when 100% of the OY is harvested, all landings shall cease." The preferred measure of establishing a trip limit at 95% of OY is inadequate because
(1) it is difficult to enforce,
(2) more wastage (discarding) would occur,
(3) the trip limit is too high, and
(4) it discriminates against high sablefish producers (fixed gear).

Commenters: Fishing Vessel Owners' Association

Response: This option was included in the FMP and considered by the Council. It was rejected because the 95% cutoff provides nearly equal shares to all user groups and allows sablefish caught incidentally with any gear to be landed until the OYs are reached.

84. Comment: An ocean set net fishery for groundfish should be permitted (in northern waters), because
(1) processors require a coastal set net fishery to provide an adequate flow of dogfish acceptable to the world market;
(2) set netting has no adverse environmental effects, has no effect on immature fish, and can be directed at certain species; and
(3) set netting is a passive fishing method which minimizes fuel consumption.

The Plan should be disapproved because it would eliminate set netting north of 38°N and because it includes dogfish which is a member of the shark family. The Plan overlooks the long-range advantages of set netting and concentrates on the emotional and inadequately documented issue of incidental salmon catch.

Commenters: Washington set net fisherman

Response: To allow or not to allow set netting north of 38°N latitude received substantial discussion by the Council. The rationale in the FMP on p. 1-10 explains thoroughly why set netting is not allowed. Dogfish is included in the management unit addressed by the FMP because of its demersal habitat and because it is caught with groundfish gear.

85. Comment: The Soviet Union should be granted a small quota of Pacific whiting to allow its joint venture processing vessels to keep operating during periods when U.S. catcher vessels have left the grounds to change crews or resupply. This would also help the catcher vessels locate fish.

Commenters: Fishermen's Marketing Assoc., joint venture trawler (U.S.)

Response: In 1980, the USSR was denied fishing permits as a matter of national foreign policy. Whether or not this policy will be extended in 1981 or 1982 is unknown at this time and is not within the jurisdiction of the Council.

86. Comment: The Plan states that trawl meshes will be measured two at a time. It is unclear whether this means that a double wedge should be used or that the meshes are to be doubled over.

Commenters: U.S. Coast Guard

Response: The FMP has been clarified to reflect this comment.

87. Comment: Trip limits recommended by the Plan cannot be effectively enforced at sea, since most vessels boarded are not fully loaded.

Commenters: U.S. Coast Guard

Response: It is understood and intended that trip limits will be enforced only at the port of landing.

88. Comment: Presently fisheries enforcement officers in Oregon and Washington are not authorized to enforce MFCMA regulations. Memoranda of understanding with NMFS, the Coast Guard and the state would be necessary to accomplish this.

Commenters: U.S. Coast Guard

Response: Memoranda of understanding are being pursued.

89. Comments: The measure prohibiting unattended fixed gear (longer than seven days) would double enforcement costs, since it assumes a constant presence of enforcement units, and therefore should be discarded as a valid option. A preferred measure would be to issue permits to fixed gear fishermen that would limit them to participating only in the fixed gear fishery while in the fixed gear area.

Commenters: U.S. Coast Guard

Response: Without this measure there would not be a mechanism to remove abandoned fixed gear. The intent of this measure is not to constantly monitor fixed gear since most fixed gear fishermen do not leave their gear unattended.

90. Comment: It is recommended that a single method of gear and vessel identification be adopted in the FMP. The number could be the Official Number, state registration number or state fishing license number, as long as current lists of licensed vessels are made available to the Coast Guard and NMFS and marking of vessels is done with large, legible figures. We suggest that numbers be displayed similarly to that required by the Atlantic groundfish regulations (50 CFR 651.6).

Commenters: U.S. Coast Guard

Response: This recommendation was adopted by the Council (see Section 1.4.6).

91. Comment: The Plan states that "complete observer coverage, paid for by other countries, could actually reduce costs to the United States by reducing the number of boardings and inspections needed." While observers may increase compliance, they do not have enforcement powers, including the ability to enforce sanctions immediately. Surveillance of the foreign fleets is still necessary to conduct exhaustive audits of the vessels' log and hold contents.

Commenters: U.S. Coast Guard

Response: Surveillance of foreign fleets will be necessary but mere observer presence will increase compliance with foreign fishery regulations.

92. Comment: The Plan should more completely address the current status of interactions between trawl fishermen and Dungeness crab fishermen (gear conflicts plus mortality in trawl fishery), and the impact of trawling on the crab resources should be recognized as a research need.

Commenters: Washington Department of Fisheries

Response: The FMP has been modified to reflect the interaction of trawl fishermen and crab fishermen.

93. Comment: Prohibiting double-walled codends on pelagic trawls shortens the life of such nets and causes waste when the webbing breaks. Most joint venture vessels use double-walled codends and have several in stock at a cost of $4,000-$5,000 each.

Commenters: Two domestic trawlers

Response: The question of double-walled codends on pelagic trawls was addressed by a gear task force appointed by the Council. It was the concensus of the fishermen on the task force that double-walled codends were not necessary nor desirable because knot for knot alignment would be difficult or impossible to achieve on pelagic trawl codends.

94. Comment: The Council and the states should use the same mesh measuring technique, and the method should be made available to fishermen who want to check their own nets.

Commenters: Trawler

Response: Mesh measurement will be consistent coastwide and is the method used by California. The wedge device could be easily and cheaply made by fishermen for their own use.

95. Comment: Commercial hook-and-line fisheries should not be unrestricted. Certain near-shore areas are fully utilized by established recreational fisheries, and the Council should investigate reserving limited areas to recreational use.

Commenters: Charterboat operator

Response: This is essentially an allocation issue. The only allocation issue discussed by the Council involved the southern California gillnet-recreational fishery conflict. The Council action was to let management of this conflict reside with the State of California.

96. Comment: Joint venture processing vessels should not be prohibited from operating inside 12 miles and north of 47°30'N, because:
(1) quality of the catch suffers when the codend is towed considerable distances,
(2) whiting schools are more concentrated inside 12 miles and therefore more available to smaller U.S. trawls,
(3) incidental salmon catches are about the same inside and outside 12 miles,
(4) incidental catches of POP are not a problem in the northern area because the whiting vessels fish in water shallower than POP concentrations,
(5) whiting may not be available elsewhere,
(6) the area closures are discriminatory.

Commenters: Joint venture fishermen; Oregon Otter Trawl Commission; Fishermen's Marketing Assoc.

Response: The Council considered this and other testimony and adopted the following management scheme: open area from 39°N latitude to U.S./Canada line and seaward of six miles.

97. Comment: The proposed 10,000 lb. or 10% trip limit for POP is too low and will result in discarding. A weekly limit of 50,000 lbs. would prevent waste and still achieve the effort reduction sought.

Commenters: Numerous individuals (signing a statement)

Response: At the Council meeting in May 1980, the Council voted to rebuild stocks of Pacific ocean perch (*Sebastes alutus*) in the Columbia and Vancouver areas. At a subsequent Council meeting in August 1980, the Council voted to adopt a 20-year rebuilding rate. Since catches of Pacific ocean perch in 1979 were at equilibrium levels rebuilding could only occur if catch was reduced. The trip limit proposed, 10,000 lbs or 10% of the trip weight, was the recommendation of a task force appointed by the Council. The states of Oregon and Washington have subsequently adopted the trip limit accepted by the Council.

The suggestion that the 10,000 lb./10% trip limit be replaced by a 50,000 lb. weekly limit will result in directed fishing and is directly opposed to the intent of the proposed regulation which is

to discourage directed fishing but allow for an incidental catch while fishing for other species, particularly Dover sole.

It is anticipated that some discard will result from the 10,000 lb./10% trip limit. Fishermen on the task force were of the opinion that discards would be minimal. Logbooks provided to fishermen have a column for recording discard. To fully evaluate discards which might occur, fishermen are encouraged to provide data on discards.

98. Comment: Sablefish traps preempt fishing grounds and are hazardous to trawl, troll and longline operations. Sablefish can be more efficiently harvested by trawls and longlines.

Commenter: Trawler

Response: Any fishing gear will preempt fishing grounds when in use but sablefish traps are unique because they are left on the grounds when fishermen depart to port. Other gear, trawls and longlines, are taken aboard at departure from the grounds. Regulations have been proposed that prohibit unattended fixed gear and require marking on both ends of the gear as well as at every mile on fixed gear groundlines in excess of one mile. The question of efficiency is arguable. Longline gear is more selective to large, more valuable fish than either trawls or traps.

99. Comment: Quality of the fish, and therefore revenue to fishermen, decreases when codends must be towed several miles.

Commenter: Foreign fishery observer

Response: See response to comment number 96.

100. Comment: Pot sanctuaries in limited areas should be established in which domestic trawl gear would be prohibited, in order to avoid gear conflicts.

Commenter: Pot fisherman

Response: The establishment of pot sanctuaries is an allocation issue since the sanctuary would result in exclusive use thus a defacto property right. The Council is not addressing allocation at this time. Management measures for fixed gear that call for marking and routine attendance and recommended reporting of fixed gear locations will alleviate conflicts.

101. Comment: Trawl gear regulations proposed for the Monterey and Conception areas would prevent the use of a midwater trawl and a bottom trawl on the same trip, because fishermen would have to comply with the 500 lb. or 5% incidental catch restriction. This provision should be changed to allow both trawls while still protecting bocaccio and chilipepper rockfishes.

Commenter: Fishermen's Marketing Assoc.

Response: A provision to allow both trawls on the same trip in the Monterey and Conception areas was adopted by the Council.

102. Comment: The incidental landings of groundfish by shrimpers should be limited to 2,000 lbs. or 10% per trip.

Commenter: Fishermen's Marketing Assoc., fisherman/processor.

Response: The incidental landing of groundfish by shrimp fishermen was addressed by the Council. Testimony received by the Council claimed discrimination under a trip limit of 2,000 or 3,000 lbs. because many boats now make longer trips because of new processing technology. A vessel making one or two day trips would have a theoretical advantage over a vessel making a five day trip. Council action was to approve a 1,500 lb. daily limit, accumulated over the length of the trip, on incidental groundfish landings.

103. Comment: Allowing joint venture operations inside 12 miles poses hardships on U.S. fishermen and increases crowding on the grounds.

Commenter: Fisherman/processor, trawler

Response: Joint venture catcher vessels are U.S. vessels and are allowed to fish wherever other domestic vessels may fish. The number of processor vessels is less than the number of foreign vessels in earlier years. Crowding has largely been due to more U.S. vessles.

104. Comment: Pot sanctuaries are opposed since they might be established in good midwater trawling areas, and midwater gear does not disturb fixed gear to the extent bottom trawls do.

Commenters: Fisherman/processor

Response: See response to comment number 100.

105. Comment: Discards of incidental species in the joint venture fishery should be recorded because they could be in excess of the incidental allowance.

Commenters: Trawler

Response: Incidental species catches including discards have been recorded under the PMP in past years and will also be recorded under this FMP.

106. Comment: Multiday bag limits for multiday recreational fishing trips should be allowed (as in California regulations).

Commenters: Sportfishing Assoc. of California

Response: The California regulation which allows possession of more than the daily bag limit for segments of the California recreational fishery is now recognized by the FMP.

107. Comment: Test areas, in which trawling would be prohibited, should be established for a finite period to determine the effects of trawling on rockfish stocks in traditional hook-and-line areas.

Commenters: Commercial hook-and-line fisherman

Response: Test areas and/or test fishing projects to determine intra gear effects would be difficult and costly. Short term effects could be claimed by either user group but the effects of recruitment of strong or weak year classes would have a major effect on both user groups. Exclusive use areas is an allocation issue and allocation will be handled on a case-by-case basis.

108. Comment: Test areas are opposed since roller trawls cannot fish everywhere that hook-and-line gear can.

Commenters: Trawler

Response: See response to comment number 107.

109. Comment: Fishery and economic data in the Plan are not up-to-date and do not reflect current fleet size and capacity. Limited entry should be considered. The habitat section is inadequate and should include information on the spawning cycles of the fish, where they spawn and potential impacts on habitat due to current or proposed activities.

Commenters: Pacific Coast Federation of Fishermen's Assns.

Response: The groundfish fishery in recent years has indeed been dynamic. No recent annual data will accurately reflect the situation of the past year or the next or ensuing one. Recommendations to update biological, economic, and social data are contained in the plan. The implementation of a limited entry scheme requires considerably more effort, data, and analyses than can be undertaken at this time. Shortcomings in current knowledge of marine ecosystems which include groundfish populations and communities are acknowledged in the plan. A considerable body of knowledge on the biology of groundfish exists and are contained or cited in the plan.

110. Comment: There should be no restriction on the incidental landing of groundfish by shrimpers because:
(1) there is no groundfish targetting with shrimp nets occurring,
(2) juvenile rockfish are not caught to any extent in shrimp nets,
(3) flatfish are generally avoided,
(4) the restriction would hamper individuals wanting to trawl for groundfish and shrimp on the same trip.

Commenters: Shrimp fishermen

Response: Incidental catch of groundfish by the shrimp fishery has always occurred but has been most noticeable since 1978. Targetting on groundfish with shrimp trawls is of both biological and economic concern. In addition shrimp gear is an illegal gear for groundfish and as such cannot be ignored.

111. Comment: Limiting joint venture operations only to Pacific whiting is inconsistent with the MFCMA. The determination should be made on species-by-species assessment of OY, DAH and DAP.

Commenters: Marine Resources Company

Response: The FMP has been modified to achieve this intent.

112. Comment: There is no conservation or management reason for establishing a season for joint venture operations. There is no season for other domestic fishermen.

Commenters: Marine Resources Company

Response: See response to comment number 111.

113. Comment: There is no conservation or management reason for joint venture area closures. If such reasons exist then the domestic fishery should be closed.

Commenters: Marine Resources Company

Response: Areas south of 39°N latitude remained closed to joint venture processing vessels because of concern for juvenile whiting that reside in this area. This fishery is now a volume fishery exerting considerable mortality on the whiting population and effects on juveniles must be considered. A developing shoreside fishery south of 39°N latitude would have little impact on juveniles because growth overpowers fishery removals. A fully developed shoreside fishery on whiting would have to be regulated to protect juveniles.

114. Comment: The Plan's proposal for a 3,000 lb./15% groundfish trip limit for shrimpers would cause significant discarding on shrimp boats that have the capability of fishing multiday trips. A trip limit is needed which would allow utilization of incidentally caught fish while discouraging targetting. The limit should not apply to whiting, turbot and shortbelly rockfish, which are underutilized.

Commenters: shrimp fishermen

Response: See response to comment number 102.

115. Comment: While the Plan admits that effort and catches are increasing rapidly and that quota management is the best safeguard, it proposes quotas for only four species.

Commenters: Oregon Division of State Lands

Response: By Council action, widow rockfish was identified as a species for quota management. Quota management is not a viable management option in a multispecies fishery since fish cannot be captured on a single species basis when they associate with each other.

116. Comment: A plan and timeframe to develop quotas and/or time and area closures to protect the sport fisheries could have been included. In order to safeguard the stocks the best course would be to adopt separate OYs, and future stock assessment may provide the needed data to do this. Increasing conflicts between trawlers and anglers are noted as well as a lack of data to resolve them, but no data collection plan is included.

Commenters: U.S. Department of Interior

Response: A relative timeframe with data requirements is shown in Section 8.6. Development of separate OYs for species in the multispecies fishery is not feasible as noted above.

117. Comment: The Plan unfairly states that the joint venture fishery violated incidental catch provisions to a greater extent than the Polish fishery in 1980.

Commenters: joint venture fisherman

Response: The alleged discriminatory statements have been changed.

118. Comment: The "points of concern" mechanism gives no assurance that serious overfishing will not occur, therefore additional precautions should be taken:
(1) Prohibit trawling, and other efficient, high volume fisheries, in shallow water areas that are used by immature and spawning fish.
(2) Prohibit commercial fishing during the spawning periods of the principal species when they are aggregated and highly vulnerable to trawls.

Commenters: sport fisherman

Response: Curtailment of commercial fisheries to protect another user group is an allocation issue and the data base required to address the issue analytically is not available particularly north of southern California. A relative timetable that addresses these data needs is presented in the FMP, but a goal oriented timetable is not. It is not clear what is meant by restricting volume commercial fisheries in shallow water. Flatfish juveniles of some species do overlap with some adult flatfish species. Minimum mesh size requirements allow for escapement of juveniles. If the concern is for juvenile rockfish, the issue is less well defined because juvenile rockfish distribution is not well known. Some

impact on juvenile Pacific ocean perch occurs by the trawl fishery but this species is not utilized by the recreational fishery.

The Team was unable to document that any marine fishery during the spawning period had an impact on the subsequent population size. The capture of fish at any state of maturity removes it from the spawning population. For many groundfish species removals during spawning periods are no higher and for some species are lower than removals during other periods of the year.

Establishment of trawl-free zones is an allocation issue since the stated intent is to displace one user group in favor of another. The State of California has done so with the 0-3 mile closure for nearly all trawl fishing.

119. Comment: Trawling should be prohibited in waters less than 200 fathoms from Pt. Sur to Mexico, in order to keep rockfish stocks healthy for hook-and-liners and to protect the hook-and-line non-red rockfish market.

Commenters: commercial hook-and-line fisherman

Response: Regulations relating to gill netting have been and are being developed by the State of California. Council action on this matter was to let the State of California regulate this fishery since it is a local problem and the state has managed the fishery. Regulation to curtail gill netting or establish trawl-free zones are essentially allocation issues since no mention of curtailing hook-and-line fishing is proposed. The Council has not identified a conservation problem. Control of markets or prohibiting the sale of fish by street vendors is not within the purview of the FMP.

8.2 Individuals Testifying at Hearings

Astoria, Oregon
Date: December 14, 1979
Attendance: 32
Individuals Testifying:
- Finzer, Robert, trawler, Astoria, OR
- Fisher, R.B., Fishermen's Marketing Assoc., South Beach OR
- Grotting, Dennis, Fishermen's Marketing Assoc., Eureka, CA
- Killian, E.K., D.S.K. Fish Company, Inc., Waldport, OR
- Prest, Jackie, Federation of Independent Seafood Harvesters, Ilwaco, OR

Monterey, California
Date: December 14, 1979
Attendance: 40
Individuals Testifying:
- DeForge, Bert, Santa Cruz Commercial Fishermen's Marketing Assoc., Milpitas, CA

DeForge, Robert, Santa Cruz Commercial Fishermen's Marketing Assoc., Santa Cruz, CA
Kildow, F.L., Santa Cruz Commercial Fishermen's Marketing Assoc., Santa Cru, CA
Leipzig, Peter, Fishermen's Marketing Assoc., Eureka, CA
Oliveira, John J., Santa Cruz Commercial Fishermen's Marketing Assoc., Capitola, CA
Posey, Brad, Santa Cruz Commercial Fishermen's Marketing Assoc., Santa Cruz, CA
Wickum, Ronald J., Santa Cruz Commercial Fishermen's Marketing Assoc., Santa Cruz, CA

North Bend, Oregon
Date: December 15, 1979
Attendance: 31
Individuals Testifying:
Easley, Joe, Fishermen's Marketing Assoc., Charleston, OR
Grotting, Dennis, Fishermen's Marketing Assoc., Eureka, CA
O'Sullivan, William, recreational fisherman, Port Orford, OR
Wisner, Roanld A., Pot fisherman, Port Orford, OR

Long Beach, California
Date: December 15, 1979
Attendance: 13
Individuals Testifying:
Nott, Bill, Sportfishing Assoc. of California, Long Beach, CA

Eureka, California
Date: December 17, 1979
Attendance: 18
Individuals Testifying:
Grotting, Dennis, Fishermen's Marketing Assoc., Eureka, CA
Hokman, Judith, Humboldt Fishermen's Marketing Assoc., Eureka, CA
Thomsen, David, trawler, Fortuna, CA

Seattle, Washington
Date: January 5, 1980
Attendance: 27
Individuals Testifying:
Alverson, Robert, Fishing Vessel Owners Assoc., Seattle, WA
Figueiredo, John, longliner, Basin View, CA
Hallam, J.K., Coast Draggers Assoc., Aberdeen, WA
Haugen, Henry, Fishermen's Marketing Assoc. of Washington, Seattle, WA
Jardstrom, Arnold, longliner, Mendocino, CA
Pereyra, Wally, processor, Redmond, WA
Rowley, Jon, Bountiful Ocean Supply, Seattle, WA
Tow, Dave, Coast Dragger's Assoc., Westport, WA
Verberkinos, John, longliner, Oakland, OR

Westport, Washington
Date: January 29, 1981
Attendance: 36

Individuals Testifying:
Cedergreen, Mark, Washington Charterboat Assoc., Westport, WA
Drage, Steve, trawler, Westport, WA
Edwards, John, trawler, Westport, WA
Fraser, David, Cape Flattery Fisheries, Pt. Townsend, WA

Newport, Oregon
Date: January 30, 1981
Attendance: 41
Individuals Testifying:
Brenton, Beverly, NMFS observer
Downing, Don, Newport, OR
Easley, Joe, Oregon Otter Trawl Comm., Astoria, OR
Fisher, R. Barry, trawler, South Beach, OR
Hall, Clifford, trawler/processor, Newport, OR
Walters, Fred, trawler, Coos Bay, OR

Eureka, California
Date: January 30, 1981
Attendance: 15
Individuals Testifying:
Adkins, Roger, pot fisherman, Eureka, CA
Hunter, Gilbert, processor, Eureka, CA
Leipzig, Pete, trawler, Eureka, CA

Santa Barbara, California
Date: January 31, 1981
Attendance: 27
Individuals Testifying:
Baker, Ron, hook-and-liner, Los Osos, CA
Benko, Fred, Sportfishing Assoc. of California, Santa Barbara, CA
Brewer, Robert, trawler, Santa Barbara, CA
Ewing, Ed, hook-and-liner, Morro Bay, CA
Grader, Zeke, Pacific Coast Federation of Fishermen's Assoc., Sausalito, CA
LaVine, Norman, hook-and-liner, Los Osos, CA
McCorkle, Mike, prawn fisherman, Montecito, CA
Wagner, Michael, Seafood Specialties, Santa Barbara, CA

8.3 Individuals and Organizations Submitting Written Comments

Adkins, Roger, sablefish fisherman, Eureka, CA
Alverson, Robert D., Fishing Vessel Owners Assoc., Seattle, WA
Athens, Tim, hook-and-liner, Port Hueneme, CA
Beck, Vern, United Fishermen's Organization of Southern California, Terminal Island, CA
Beetham, Darby R., hook-and-line fisherman, San Rafael, CA
Bergerson, Darryl D., vessel owner, Astoria, OR
Black, Ralph, recreational fisherman, Albany, OR
Bloom, Greg, Washington Trollers Assoc., Seattle, WA
Bountiful Ocean Supply, Seattle, WA
Brebes, Russell, Brebes Ocean House, Inc., Morro Bay, CA

Brown, Ralph H., trawler
Brown, Stephen H., trawler
Brownfield, Mike, shrimper, Warrenton, OR
Carlson, Larry, trawler, Brookings, OR
Coast Draggers Assoc., Westport, WA
Collins, Leon, hook-and-line fisherman, Morro Bay, CA
Cresci, Joseph, hook-and-line fisherman, Fort Bragg, CA
Davenport, Glendon G., recreational fisherman, Milwaukie, OR
Decker, Leslie, Horizon Trawlers, Inc., Corte Madera, CA
Donlon, James A., recreational fisherman, Camarillo, CA
Dupee, Pam, student, Corvallis, OR
Easley, Joe, Oregon Otter Trawl Commission, Astoria, OR
Everest, Fred H., Oregon Chapter-American Fisheries Society, Corvallis, OR
Fisher, R. Barry, trawler, South Beach, OR
Fisherman's Marketing Assoc., Eureka, CA
Fort Bragg longline fishermen, Fort Bragg, CA
Geiser, Albert, joint venture trawler, Newport, OR
Ghio, Tom, hook-and-line fisherman, Santa Cruz, CA
Gierga, Joe, Oregon Coast Charterboat Assoc., Garibaldi, OR
Grader, Zeke, Pacific Coast Federation of Fishermen's Assoc., Sausalito, CA
Grotting, Dennis, Fishermen's Marketing Assoc., Eureka, CA
Hamann, Rod, hook-and-line fisherman, Garibaldi, OR
Haworth, Ron, hook-and-line fisherman, Carmichael, CA
Henry, Robert J., attorney, Seattle, WA
Herrell, Keith, Westport Charterboat Assoc., Westport, WA
Hickel, Rusty, Wildlife Forever, Hammond, OR
Howey, Walter P., consumer, El Segundo, CA
Irons, Lyle, commercial fisherman, Brookings, OR
Johnson, Michael W., hook-and-line fisherman, Port Orchard, WA
Kildow, Ferrenlee, Santa Cruz Commercial Fishermen's Marketing Assoc., Santa Cruz, CA
Kirsten, Lynne, Kirsten Pipe Company, Seattle, WA
Klopfenstein, Don, correspondent, Pinehurst, ID
Lamb, Brent, consumer, Sherman Oaks, CA
Landstrom, Larry, commercial fisherman, Camano Island, WA
Leavitt, Bruce B., hook-and-line fisherman, Stockton, CA
Logan, William H., hook-and-line fisherman, Clinton, WA
Loughney, Carolyn, hook-and-line fisherman, Seattle, WA
Lowdermilk, Dale, Santa Barbara Sportfishing Club, Santa Barbara, CA
McClure, Robert E., foreign fishery observer, Corvallis, OR
Meuret, Forrest L., recreational fisherman, Oregon
Mize, Ronald, commercial fisherman, Bodega Bay, CA
Morro Bay hook-and-line fishermen, Morro Bay, CA
Murray, Harry R., set net fisherman, Bremerton, WA
Nedrow, Monte, hook-and-line fisherman, Port Orford, OR
Nelson, Buck, commercial fisherman
Nott, Bill, Sportfishing Assoc. of California, Long Beach, CA
Pavlevsky, Nick, hook-and-line fisherman, Aberdeen, WA
Pavlevsky, Sylvia, hook-and-line fisherman, Aberdeen, WA
Pavelek, Henry J., recreational fisherman, Albany, OR
Pereyra, Walter, Marine Resources Co., Seattle, WA
Plummer, Jay, hook-and-line fisherman, Tillamook, OR

Prehn, Richmond P., commercial fisherman, Oregon
Prest, Jackie, Federation of Independent Seafood Harverters, Ilwaco, OR
Radonski, Gilbert C., Sport Fishing Institute, Washington, D.C.
Rancourt, Ranny, Save Oregon's Resources Today, Inc., Portland, OR
Renner, Mary Ann, recreational fisherman, Tacoma, WA
Renner, Richard R., recreational fisherman, Tacoma, WA
Restoule, Mike, shrimper, Newport, OR
Rosellini, Robert, Rosellini's Restaurants, Seattle, WA
Rowley, Jon, Bountiful Ocean Supply, Seattle, WA
Salmon Trollers Marketing Assoc., Fort Bragg, CA
Schnaubelt, Edward B., Schnaubelt Fisheries, Fort Bragg, CA
Schock, Lawrence, shrimper, Newport, OR
Setzer, George, Salmon Trollers Marketing Assoc., Fort Bragg, CA
Shepard, Clint, commercial fisherman, Whidbey Island, WA
Shepard, Janet, commercial fisherman, Whidbey Island, WA
Sondquist, Gerald K., hook-and-line fisherman, Port Townsend, WA
Spellman, Russell L., hook-and-line fisherman, Spokane, WA
Spidle, H. E., Albany, OR
Stocks, Stephen, recreational fisherman, Albany, OR
Taylor, Don, trawler
Thomas, Roger, Golden Gate Sportfishers, San Jose, CA
Thompson, Terry, shrimper, Newport, OR
Urbani, Rudolph J., trawler, Eureka, CA
Vining, Howard, shrimper, Grayland, WA
Werden, Gene, hook-and-line fisherman, San Leandro, CA

EIS APPENDIX A

COASTAL ZONE PROGRAM/FMP CONSISTENCY STATEMENTS

CONSISTENCY OF THE FISHERY MANAGEMENT PLAN FOR GROUNDFISH WITH THE WASHINGTON COASTAL ZONE MANAGEMENT PROGRAM

Proposed Activity

Approval and implementation by the Secretary of Commerce of a Fishery Management Plan for groundfish off the coast of California, Oregon, and Washington prepared by the Pacific Fishery Management Council (copy attached).

Description of the Proposed Activity

The proposed activity is to adopt and implement a fishery management plan for the California, Oregon, and Washington groundfish resource under the provisions of the Fishery Conservation and Management Act of 1976, as amended. This Act extends jurisdiction over fishery resources and establishes a program for their management. The plan has been written to achieve the following objectives:

- Promote rational and optimal use in both the biological and socioeconomic sense of the region's fishery resources as a whole.
- Provide a favorable climate for existing commercial and recreational groundfish fisheries within the limitations of other objectives and guidelines.
- Adopt a management regime which will result in, as much as possible, little or no disruption in current domestic fishing practices, marketing procedures, and environment.
- Provide for the orderly development of domestic groundfish fisheries, including new fisheries, consistent with the above objectives and at the expense of foreign participation.
- Provide for foreign participation in the fishery consistent with the above to take that portion of the optimum yield not utilized by domestic fisheries.
- To prevent overfishing of stocks which are capable of management as a unit, including rebuilding those stocks which are now depleted due to overfishing.
- To minimize gear conflicts among users.
- Recognizing the multispecies nature of the fishery, to establish a concept of managing by species and by gear, or by groups of interrelated species.

- To attain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.

- Promote the availability of quality seafoods to the consumer.

Applicability of the Coastal Zone Program

The Federal Coastal Zone Management Act calls for federal activities directly affecting the coastal zone of a state to be consistent to the maximum extent practicable with approved coastal zone programs.

The Washington Coastal Zone Management Program (WCZMP) provides a consistency review mechanism for federal activities directly affecting the state's coastal zone, which includes the state waters of the Pacific Ocean, all marine waters of the state, and lands within 200 feet of the ordinary high-water mark of such waters. The Shoreline Management Act is the basis for the Washington Program. The Department of Ecology (DOE) is the lead state agency for coastal zone management. Local shoreline master programs are prepared for state review; and when approved by the DOE, become part of the Washington Coastal Zone Management Program.

The Washington ocean waters and shoreline from Cape Disappointment on the south to Cape Flattery on the north, including harbors, bays, estuaries and inlets, are designated "shorelines of state significance." This is the area most directly affected by the proposed fishery management plan. Although the WCZMP makes no direct reference to fisheries management or the fishing industry, the following points are noted:

Priorities for use of shorelines of statewide significance listed in order of preference are:

a. Recognize and protect the statewide interest over local interest.

b. Preserve the natural character of the shoreline.

c. Result in long-term over short-term benefit.

d. Protect the resources and ecology of the shoreline.

e. Increase public access to publicly owned areas of the shoreline.

f. Increase recreational opportunities for the public in the shoreline.

Three Department of Ecology guidelines (State Regulation WAC 173-16) may have relevance to the activities regulated through the FMP.

Ports and Water-related Industry: Industry which requires frontage on navigable waters should be given priority over other industrial uses. Prior to allocating shorelines for port uses, regional and state-wide needs for such uses should be considered.

Recreation: Priority will be given to developments which provide recreational uses and other improvements facilitating public access to shorelines. Water-oriented recreation is a preferred use along the shorelines, but it should be located and conducted in a way which is compatible with the environment.

Commercial Development: New commercial development should be encouraged to locate in those areas where commercial uses currently exist.

Effect of Federal Activity

The Fishery Management Plan, if approved by the Secretary of Commerce, will provide the basis for federal regulations controlling the harvest of groundfish off the coasts of Washington, Oregon, and California in the Fishery Conservation Zone, 3 to 200 miles offshore. Some of the fishery resources subject to management through the FMP migrate in and through Washington ocean waters. Control of harvests in Washington ocean waters is vested in the Washington Department of Fisehries. State management of fisheries which are predominantly within the Fishery Conservation Zone is subject to federal preemption under the FCMA if state action or inaction substantially and adversely affects the carrying out of a fishery management plan. Therefore, while the FMP directly establishes control over that portion of the groundfish resource found in the FCZ, it serves to limit the discretion of state fishery managers in state ocean waters under particular circumstances.

The FMP encourages the orderly development of the West Coast groundfish fishing industry which may cause consequent pressures for shoreside development and processing facilities. However, even if availability of fishery resources permits increased harvests, economic and market forces are the more powerful determinants of whether the fishery will develop. The FMP poses alternatives which strive in varying degrees to offer informed management decisions within the fishing season, taking into account the latest information about the status of the stocks and the fishery. Alternatives which allow the greatest flexibility are likely to pose the fewest regulatory impediments to fishing development.

Because groundfish are prey for some marine mammals and birds, the FMP could affect these resources. Discussions of this issue are in the FMP and the Environmental Impact Statement.

The objectives and measures for fishery management provided in the FMP must be consistent with the FCMA and its national standards, and are written to conform to those requirements.

A review of the state's coastal plan reveals no inconsistencies between the policies and guidelines set out therein and the Groundfish FMP. Any commercial shoreside development which may result from the FMP objective of "orderly development of the domestic fishery" must conform with approved local shoreline master programs. In particular, the plan is consistent

with Washington's guideline for recreation in that the FCMA recognizes the importance of marine recreational fishing and one of the groundfish plan's objectives is to provide a favorable climate for existing commercial and recreational fisheries.

Consistency Determination

Considering the factors discussed above, it is hereby determined that the activities proposed in the Draft Fishery Management Plan for the Groundfish Fishery are consistent to the maximum extent practicable with the Washington Coastal Zone Program as approved by the Secretary of Commerce on June 1, 1976.

CONSISTENCY OF THE FISHERY MANAGEMENT PLAN FOR GROUNDFISH WITH THE OREGON COASTAL ZONE MANAGEMENT PROGRAM

Approval and implementation by the Secretary of Commerce of a Fishery Management Plan for groundfish off the coast of California, Oregon, and Washington, prepared by the Pacific Fishery Management Council. (Copy attached.)

Proposed Activity

The proposed action is to adopt and implement a fishery management plan for the California, Oregon, and Washington groundfish resource under the provisions of the Fishery Conservation and Management Act of 1976, as amended. This Act extends jurisdiction over fishery resources and establishes a program for their management. The plan has been written to achieve the following objectives:

- Promote rational and optimal use in both the biological and socio-economic sense of the region's fishery resources as a whole.
- Provide a favorable climate for existing commercial and recreational groundfish fisheries within the limitations of other objectives and guidelines.
- Adopt a management regime which will result in, as much as possible, little or no disruption in current domestic fishing practices, marketing procedures, and environment.
- Provide for the orderly development of domestic groundfish fisheries, including new fisheries, consistent with the above objectives and at the expense of foreign participation.
- Provide for foreign participation in the fishery consistent with the above to take that portion of the optimum yield not utilized by domestic fisheries.
- Prevent overfishing of stocks which are capable of management as a unit, including rebuilding those stocks which are now depleted due to overfishing.
- Minimize gear conflicts among users.
- Recognize the multispecies nature of the fishery, to establish a concept of managing by species and by gear, or by groups of interrelated species.

- Recognize the multispecies nature of the fishery, to establish a concept of managing by species and by gear, or by groups of interrelated species.

- To attain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.

- Promote the availability of quality seafoods to the consumer.

Applicability of the Coastal Zone Program

The Federal Coastal Zone Management Act calls for federal activities directly affecting the coastal zone of a state to be consistent to the maximum extent practicable with approved coastal zone programs. The Oregon Program calls for consistency review for activities directly affecting the coastal zone, including air, water, scenic, living, economic, cultural and/or mineral resources of the coastal zone (Oregon Program, p.43).

The basis for the Oregon Program is the 1973 Oregon Land Use Act, ORS 197, requiring the state to develop statewide land and water planning goals and guidelines. (These form the basis of Oregon's Coastal Management Program.) The Land Conservation and Development Commission is the state coastal zone agency. The boundaries are generally defined to extend to the state's seaward limit (three miles offshore) and inland to the crest of the coastal mountain range. Under the Act cities and counties are required to develop coordinated comprehensive plans which are in conformance with the goals of the state plan.

Three of the goals have particular relevance to the Groundfish Fisheries Management Program and will form the basis for this review.

Goal 19, Ocean Resources, is the most pertinent aspect of the Oregon Coastal Zone Program relating to the Groundfish Management Program.

> "To conserve the long-term value, benefits and natural resources of the nearshore ocean and the continental shelf.
>
> All local, state, and federal plans, projects and activities which affect the territorial sea shall be developed, managed and conducted to maintain, and where appropriate, enhance and restore, long-term benefits derived from the nearshore oceanic resources of Oregon. Since renewable ocean resources and uses, such as food production, water purity, navigation, recreation and aesthetic enjoyment will provide greater longterm benefits than will non-renewable resources, such plans and activities shall give clear priority to the proper management and protection of renewable resources."

Guidelines for Goal 19 reflect concerns for awareness for impacts upon fishing resources, biological habitat, navigation and ports, aesthetic uses, recreation and other issues.

Other Oregon goals for coastal use are less directly affected by the FMP. Should development of domestic groundfish fisheries occur, impact on coastal communities through port development or shore-based processing siting, could be an issue.

In such cases, Goals 16, Estuarine Resources; and 17, Coastal Shorelands, would apply. Goal 16 calls for the classification of estuaries and to specify appropriate uses for each class of estuary. This is done in Oregon Administrative Rules, Chapter 660, Division 17. Twenty-one of twenty-two major Oregon estuaries are classified as natural, conservation, shallow-draft or deep-draft estuaries. The level of development for each type of estuary is specified. Any water dependent port and processing which may occur as a consequence of the FMP must be limited to the estuaries having proper classifications for the intended use, and be consistent with the goals of the State Plan, any acknowledged local comprehensive plan, as well as pertinent state regulations.

Goal 17, Coastal Shorelands, may also apply to consequential development of the Groundfish FMP. The goal seeks to control the use of Oregon coastal shorelands by planning for their conservation, protection and development and restoration where appropriate. The goal calls for informed decisions regarding the impact upon shorelands by governments. Until the time the State Coastal Zone agency receives and acknowledges a local government plan, shorelands are considered lands within 200 feet from the shoreline, or 200 feet from the inland extent of tidal marshes. Local jurisdictions however, may designate any justifiable shoreline distance contiguous with the ocean, estuaries, and coastal lakes, based on topography, geology, biological habitat, land-use characteristics and aesthetics.

Effect of Federal Activity

The Fishery Management Plan, if approved by the Secretary of Commerce will provide the basis for federal regulations controlling the harvests of groundfish off the coasts of Washington, Oregon, and California in the Fishery Conservation Zone, 3 to 200 miles offshore. Some of the fishery resources subject to management through the FMP migrate in and through Oregon ocean waters. Control of harvests in Oregon ocean waters is vested in the Oregon Department of Fish and Wildlife. State management of fisheries which are predominately within the Fishery Conservation Zone is subject to federal pre-emption under the FCMA if state action or inaction substantially and adversely affects the carrying out of a fishery management plan. Therefore, while the FMP directly establishes control over that portion of the groundfish resource found in the FCZ, it serves to limit the discretion of state fishery managers in state ocean waters under particular circumstances.

The FMP encourages the orderly development of the West Coast groundfish fishing industry which may cause consequent pressures for shoreside development and processing facilities. However, even if availability of fishery resources permits increased harvests, economic and market forces are the more powerful determinants of whether the fishery will develop.

- To attain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.

- Promote the availability of quality seafoods to the consumer.

Applicability of the Coastal Zone Program

The Federal Coastal Zone Management Act calls for federal activities directly affecting the coastal zone of a state to be consistent to the maximum extent practicable with approved coastal zone programs. The California Coastal Zone Management Program is based upon the California Coastal Act of 1976, Division 20, California Public Resources Code, Sections 30000, et seq.; California Coastal Conservancy Act of 1976, Division 21, CPRC 31000 et seq.; California Urban and Coastal Park Bond Act of 1976, Division 5, CPRC 5096.777 et seq.; and the California Coastal Commission Regulations, California Administrative Code, Title 14.

The California Coastal Act establishes a structure for state approval of a local coastal program. The California Coastal Commission is the state's coastal zone agency. The coastal zone boundaries are generally the seaward limit of state jurisdiction and inland, to 1,000 yards from the mean high tide line. The Coastal Act calls for the use of the marine environment so as to "maintain healthy populations of all species of marine organisms adequate for long-term commercial, rcreational, scientific and educational purposes" (Section 30230). The Act further provides that "facilities serving commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded" (Sections 30234 and 30703). The Act provides that "coastal-dependent industrial facilities shall be encouraged to locate or expand within existing sites and shall be permitted reasonable long-term growth where consistent with the Act" (Section 30260), and that coastal-dependent developments such as fishing support shall have priority over other developments on or near the shoreline. The California Department of Fish and Game Commission are considered to be the principal state agencies for fishery management programs (Section 30411).

Effect of Federal Activity

The Fishery Management Plan, if approved by the Secretary of Commerce, will provide the basis for federal regulations controlling the harvests of groundfish off the coasts of Washington, Oregon and California in the Fishery Conservation Zone, 3 to 200 miles offshore. Some of the fishery resources subject to management through the FMP migrate in and through California ocean waters. Control of harvests in California ocean waters is vested in the California Department of Fish and Game and the Fish and Game Commission. State management of fisheries, which are predominantly within the Fishery Conservation Zone, is subject to federal preemption under the FCMA if state action or inaction substantially and adversely

affects the carrying out of a fishery management plan. Therefore, while the FMP directly establishes control over that portion of the groundfish resource found in the FCZ, it serves to limit the discretion of state fishery managers in state ocean waters under particular circumstances.

The FMP encourages the orderly development of the West Coast groundfish fishing industry which may cause consequent pressures for shoreside development and processing facilities. However, even if availability of fishery resources permits increased harvests, economic and market forces are the more powerful determinants of whether the fishery will develop. The FMP poses alternatives which strive in varying degrees to offer informed management decisions within the fishing season, taking into account the latest information about the status of the stocks and the fishery. Alternatives which allow the greatest flexibility are likely to pose the fewest regulatory impediments to fishery development.

Because groundfish are prey for some marine mammals and birds, the FMP could affect those resources. Discussions of this issue are in the FMP and the Environmental Impact Statement.

The objectives and measures for fishery management provided in the FMP must be consistent with the FCMA and its national standards, and are written to conform to those requirements.

The California Program classifies federal activities into those which would and those which would not need coastal agency permits. Regulation of fishing falls into the latter category. As such, no memorandum of understanding will be sought by the Commission. This consistency review takes into account that federal regulations promulgated pursuant to the Groundfish FMP may directly affect the California Coastal Zone. Any effects will be on those fishery resources subject to management through the FMP and other marine resources which interact with groundfish. The FMP and Environmental Impact Statement take into account the health and stability of the ecosystem as required by federal law and, therefore, appear compatible with the Coastal Act directives. Consequential shoreside development which may occur as a result of the FMP will be subject to the planning strategies of approved local coastal programs, port master plans (for the Ports of Hueneme, Long Beach, Los Angeles, and San Diego), established development permit procedures, and review procedures of the Coastal Commission. The FMP does not, however, propose such development.

Consistency Determination

Considering the factors discussed above, it is hereby determined that the activities proposed in the Draft Fishery Management Plan for Groundfish Fishing are consistent to the maximum extent practicable with the California Coastal Zone Program as approved by the Secretary of Commerce on November 7, 1977 and as amended on September 21, 1979.