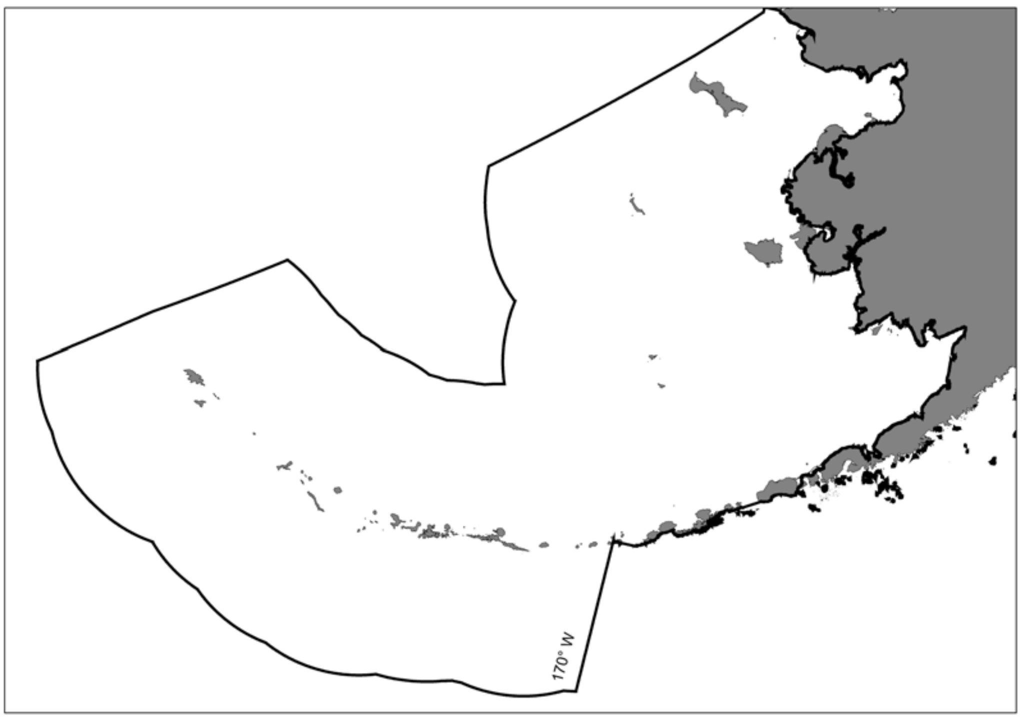
# FISHERY MANAGEMENT PLAN

## for Groundfish of the Bering Sea and Aleutian Islands Management Area

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# Executive Summary

This Fishery Management Plan (FMP) governs groundfish fisheries of the Bering Sea and Aleutian Islands Management Area (BSAI). The FMP management area is the United States (U.S.) Exclusive Economic Zone (EEZ) of the Bering Sea and that portion of the North Pacific Ocean adjacent to the Aleutian Islands which is between 170° W. longitude and the U.S.-Russian Convention Line of 1867. The FMP covers fisheries for all stocks of finfish and marine invertebrates except salmonids, shrimps, scallops, snails, king crab, Tanner crab, Dungeness crab, corals, surf clams, horsehair crab, lyre crab, Pacific halibut, and Pacific herring.

The FMP was implemented on January 1, 1982. As of April 2004, it has been amended over seventy times, and its focus has changed from the regulation of mainly foreign fisheries to the management of fully domestic groundfish fisheries. This version of the FMP has been revised to remove or update obsolete references, as well as outdated catch data and other scientific information. The FMP has also been reorganized to provide readers with a clear understanding of the BSAI groundfish fishery and conservation and management measures promulgated by the FMP.

## ES.1 Management Policy

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) is the primary domestic legislation governing management of the nation's marine fisheries. In 1996, the United States Congress reauthorized the Magnuson-Stevens Act to include, among other things, a new emphasis on the precautionary approach in U.S. fishery management policy. The Magnuson-Stevens Act contains ten national standards, with which all FMPs must conform and which guide fishery management. Besides the Magnuson-Stevens Act, U.S. fisheries management must be consistent with the requirements of other regulations including the Marine Mammal Protection Act, the Endangered Species Act, the Migratory Bird Treaty Act, and several other Federal laws.

Under the Magnuson-Stevens Act, the North Pacific Fishery Management Council (Council) is authorized to prepare and submit to the Secretary of Commerce for approval, disapproval or partial approval, a FMP and any necessary amendments, for each fishery under its authority that requires conservation and management. The Council conducts public hearings so as to allow all interested persons an opportunity to be heard in the development of FMPs and amendments, and reviews and revises, as appropriate, the assessments and specifications with respect to the optimum yield from each fishery (16 U.S.C. 1852(h)).

The Council has developed a management policy and objectives to guide its development of management recommendations to the Secretary of Commerce. This management approach is described in Table ES-1.

**Table ES-1 BSAI Groundfish Fisheries Management Approach**

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| The Council's policy is to apply judicious and responsible fisheries management practices, based on sound scientific research and analysis, proactively rather than reactively, to ensure the sustainability of fishery resources and associated ecosystems for the benefit of future, as well as current generations. The productivity of the North Pacific ecosystem is acknowledged to be among the highest in the world. For the past 25 years, the Council management approach has incorporated forward looking conservation measures that address differing levels of uncertainty. This management approach has in recent years been labeled the precautionary approach. Recognizing that potential changes in productivity may be caused by fluctuations in natural oceanographic conditions, fisheries, and other, non-fishing activities, the Council intends to continue to take appropriate measures to insure the continued sustainability of the managed species. It will carry out this objective by considering reasonable, adaptive management measures, as described in the Magnuson-Stevens Act and in conformance with the National Standards, the Endangered Species Act, the National Environmental Policy Act, and other applicable law. This management approach takes into account the National Academy of Science's recommendations on Sustainable Fisheries Policy.<br><br>As part of its policy, the Council intends to consider and adopt, as appropriate, measures that accelerate the Council's precautionary, adaptive management approach through community-based or rights-based management, ecosystem-based management principles that protect managed species from overfishing, and where appropriate and practicable, increase habitat protection and bycatch constraints. All management measures will be based on the best scientific information available. Given this intent, the fishery management goal is to provide sound conservation of the living marine resources; provide socially and economically viable fisheries for the well-being of fishing communities; minimize human-caused threats to protected species; maintain a healthy marine resource habitat; and incorporate ecosystem-based considerations into management decisions.<br><br>This management approach recognizes the need to balance many competing uses of marine resources and different social and economic goals for sustainable fishery management, including protection of the long-term health of the resource and the optimization of yield. This policy will use and improve upon the Council's existing open and transparent process of public involvement in decision-making. |

## ES.2 Summary of Management Measures

The management measures that govern the Bering Sea and Aleutian Islands groundfish fishery are summarized in Table ES-2.

Pursuant to Title II of the Magnuson-Stevens Act, there is no allowable level of foreign fishing for the groundfish fisheries covered by this FMP. Fishing vessels and fish processors of the U.S. have the capacity to harvest and process up to the level of optimum yield of all species subject to this FMP.

### Table ES-2 Summary of Management Measures for the BSAI Groundfish Fishery

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| **Management Area** | U.S. Exclusive Economic Zone (EEZ) of the eastern Bering Sea and that portion of the North Pacific Ocean adjacent to the Aleutian Islands which is west of 170° W. up to the U.S.-Russian Convention Line of 1867.<br><br>**Subareas:** The area is divided into two subareas, the Bering Sea and the Aleutian Islands. |
| **Stocks** | All stocks of finfish and marine invertebrates in the management area except salmonids, shrimps, scallops, snails, king crab, Tanner crab, Dungeness crab, corals, surf clams, horsehair crab, lyre crab, Pacific halibut, and Pacific herring.<br><br>Those stocks and stock complexes that are commercially important and for which an annual TAC is established include: walleye pollock, Pacific cod, sablefish, yellowfin sole, Greenland turbot, arrowtooth flounder, rock sole, flathead sole, Alaska plaice, “other flatfish”, Pacific ocean perch, northern rockfish, shortraker and rougheye rockfish, “other rockfish”, Atka mackerel, and squid. |
| **Maximum Sustainable Yield (MSY)** | The historical estimate of MSY for the BSAI groundfish complex is in the range of 1.7 to 2.4 million mt. |
| **Optimum Yield (OY)** | The OY of the BSAI groundfish complex (consisting of stocks listed in the ‘target species’ and ‘other species’ categories, as listed in Table 3-1) is 85% of the historical estimate of MSY, or 1.4 to 2.0 million mt, plus the incidental harvest of nonspecified species. |
| **Procedure to set Total Allowable Catch (TAC)** | Based on the annual Stock Assessment and Fishery Evaluation (SAFE) report, the Council will recommend to the Secretary of Commerce TACs and apportionments thereof for each target species and the “other species” category. The Secretary will implement annual TACs which may cover up to 2 fishing years, following public comment and Council recommendations at the December Council meeting.<br><br>**Reserve**: 15% of the TAC for each target species (except pollock and fixed-gear sablefish) and the “other species” category is set aside to form the reserve, used for correcting operational problems of the fleets, adjusting species TACs for conservation, or apportionments. The reserve is not designated by species or species groups. |
| **Apportionment of TAC** | **Pollock**: the amount of pollock that may be taken with non-pelagic trawls may be limited; pollock TAC shall be divided into roe-bearing (“A” season) and non roe-bearing (“B” season) allowances.<br><br>**Sablefish**: vessels using fixed gear may harvest no more than 50% of the TAC in the Bering Sea and 75% of the TAC in the Aleutian Islands; vessels using trawl gear may harvest no more than 50% of the TAC in the Bering Sea and 25% of the TAC in the Aleutian Islands.<br><br>**Pacific cod**: TAC shall be allocated 2% to vessels using jig gear, 47% to vessels using trawl gear, and 51% to vessels using hook-and-line or pot gear. The trawl gear allocation is allocated 50% to catcher/processor vessels and 50% to catcher vessels. The allocation to hook-and-line and pot gear is apportioned 80% to hook-and-line catcher/processor vessels, 0.3% to hook-and-line catcher vessels, 3.3% to pot catcher/processor vessels, 15% to pot catcher vessels, and 1.4% to catcher vessels less than 60' LOA. Allocations may be seasonally apportioned.<br><br>**Atka mackerel**: up to 2% of the eastern Aleutian Islands and Bering Sea TACs will be allocated to vessels using jig gear.<br><br>**Shortraker and rougheye rockfish**: after subtraction of reserves, the Aleutian Islands TAC will be allocated 70% to vessels using trawl gear and 30% to vessels using non-trawl gear. |
| **Attainment of TAC** | The attainment of a TAC for a species will result in the closure of the target fishery for that species. Further retention of that species will be prohibited. |
| **Permit** | All vessels participating in the BSAI groundfish fisheries, other than fixed gear sablefish, require a Federal groundfish license, except for: vessels fishing in State of Alaska waters; vessels less than 32' LOA; and jig gear vessels less than 60' LOA that meet specific effort restrictions. Licenses are endorsed with area, gear, and vessel type and length designations. Fixed gear vessels engaged in directed fishing for Pacific cod must qualify for a Pacific cod endorsement.<br><br>Fishing permits may be authorized, for limited experimental purposes, for the target or incidental harvest of groundfish that would otherwise be prohibited. |
| **Authorized Gear** | Gear types authorized by the FMP are trawls, hook-and-line, pots, jigs, and other gear as defined in regulations.<br><br>**Pollock**: The use of non-pelagic trawl gear in the directed fishery for pollock is prohibited. |

### Table ES-2 Summary of Management Measures for the BSAI Groundfish Fishery

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| **Time and Area Restrictions** | **All trawl**: Fishing with trawl vessels is not permitted year-round in the Crab and Halibut Protection Zone and the Pribilof Islands Habitat Conservation Area. The Nearshore Bristol Bay Trawl Closure area is also closed year-round except for a subarea that remains open between April 1 and June 15 each year. The Chum Salmon Savings Area is closed to trawling from August 1 through August 31.<br><br>**Non-pelagic trawl**: The Red King Crab Savings Area is closed to non-pelagic trawling year-round, except for a subarea that may be opened at the discretion of the Council and NMFS when a guideline harvest level for Bristol Bay red king crab has been established.<br><br>**Directed pollock fishery**: Catcher/processor vessels identified in the American Fisheries Act are prohibited from engaging in directed fishing for pollock in the Catcher Vessel Operational Area during the non-roe ("B") season unless they are participating in a community development quota fishery.<br><br>**Marine mammal measures**: Regulations implementing the FMP may include conservation measures that temporally and spatially limit fishing effort around areas important to marine mammals.<br><br>**Gear test area exemption**: Specific gear test areas for use when the fishing grounds are closed to that gear type, are established in regulations that implement the FMP. |
| **Prohibited Species** | Pacific halibut, Pacific herring, Pacific salmon and steelhead, king crab, and Tanner crab are prohibited species and must be returned to the sea with a minimum of injury except when their retention is authorized by other applicable law.<br><br>Groundfish species and species under this FMP for which TAC has been achieved shall be treated in the same manner as prohibited species. |
| **Prohibited Species Catch (PSC) Limits** | When a target fishery attains a PSC limit apportionment or seasonal allocation, the bycatch zone or management area to which the PSC limit applies will be closed to that target fishery for the remainder of the year or season.<br><br>**Red king crab**: Based on the size of the spawning biomass of red king crab, the PSC limit in Zone 1 for trawl fisheries is either 23,000, 97,000 or 197,000 red king crab; attainment closes Zone 1.<br><br>***C. bairdi* crab**: Established in regulation for trawl fisheries based on population abundance; attainment closes Zone 1 or Zone 2.<br><br>***C. opilio* crab**: Established in regulation for trawl fisheries in the C. opilio Bycatch Limitation Zone based on population abundance, with minimum and maximum limits; attainment closes zone.<br><br>**Pacific halibut**: Halibut mortality limits established in regulation for trawl and non-trawl fisheries.<br><br>**Pacific herring**: 1% of the annual biomass of eastern Bering Sea herring, for trawl fisheries; attainment may close the Herring Savings Areas.<br><br>**Chum salmon**: Attainment of 42,000 fish limit in the Catcher Vessel Operational Area between August 15 and October 14 closes the Chum Salmon Savings Area for the rest of that time period.<br><br>**Chinook salmon**: Attainment of chinook PSC limit established in regulation for the Bering Sea or the Aleutian Islands subarea closes the Bering Sea or Aleutian Island Chinook Salmon Savings Area to directed pollock trawl fishing.<br><br>**Apportionment**: For trawl fisheries, may be apportioned by target fishery and season; for non-trawl fisheries, may be apportioned by target fishery, gear type, area, and season. |
| **Retention and Utilization Requirements** | **Pollock**: Roe-stripping is prohibited; see also below.<br><br>**Improved Retention/Improved Utilization Program**: All pollock and Pacific cod must be retained and processed. |
| **Fixed Gear Sablefish Fishery** | The directed fixed gear sablefish fisheries are managed under an Individual Fishing Quota program. The FMP specifies requirements for the initial allocation of quota share in 1995, as well as transfer, use, ownership, and general provisions.<br><br>**Annual Allocation**: The ratio of a person's quota share to the quota share pool is multiplied by the fixed gear TAC (adjusted for the community development quota allocation - see below), to arrive at the annual individual fishing quota. |

## Table ES-2 Summary of Management Measures for the BSAI Groundfish Fishery

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| **Bering Sea Pollock Fishery** | Subtitle II of the American Fisheries Act (AFA), incorporated by reference in the FMP, implemented a cooperative program for the pollock fishery.<br><br>**Access**: Limits pollock fishery access to named vessels and processors; included a buyout of 9 catcher/processor vessels.<br><br>**Allocation**: After adjustment for the community development quota allocation (see below) and incidental catch of pollock in other fisheries, the pollock TAC is apportioned 50% to vessels harvesting pollock for inshore processing, 40% to vessels harvesting pollock for catcher/processor processing, and 10% to vessels harvesting pollock for mothership processing.<br><br>**Cooperatives**: Creates standards and limitations for the creation and operation of cooperatives.<br><br>**Sideboards**: Establishes harvesting and processing restrictions on AFA pollock participants to protect other fisheries.<br><br>**Catch monitoring**: Increases observer coverage and scale requirements for catcher/processors. |
| **Aleutian Islands Pollock Fishery** | The non-CDQ directed pollock fishery in the Aleutian Islands is fully allocated to the Aleut Corporation for the purpose of economic development in Adak, Alaska.<br><br>**Allocation**: To be funded, to the extent possible in whole or in part, from the difference between the sum of all BSAI groundfish fishery TACs and the 2 million mt OY cap, if the difference is large enough to do so. The remainder of the funding comes from a reduction in the Bering Sea pollock recommended TAC. A mechanism for determining “A” and “B” season allowances is specified. |
| **Community Development Quota (CDQ) Multispecies Fishery** | Eligible fishery-dependent communities in western Alaska will receive a percentage of all groundfish species or species group TACs, except squid, and a pro-rata share of PSC species.<br><br>**Sablefish**: 20% of the fixed gear TAC<br><br>**Pollock**: 10% of the TAC<br><br>**Other groundfish species**: 7.5% of the TAC, to come out of the groundfish reserve |
| **Flexible Authority** | The Regional Administrator of NMFS is authorized to make inseason adjustments through gear modifications, closures, or fishing area/quota restrictions, for conservation reasons, to protect identified habitat problems, or to increase vessel safety. |
| **Recordkeeping and Reporting** | Recordkeeping that is necessary and appropriate to determine catch, production, effort, price, and other information necessary for conservation and management may be required. May include the use of catch and/or product logs, product transfer logs, effort logs, or other records as specified in regulations.<br><br>**Processors**: Shall report necessary information for the management of the groundfish fisheries as specified in regulations.<br><br>**At-sea processor vessels**: Must submit a weekly catch/receipt and product transfer report and record cargo transfer and off-loading information in a separate transfer log. Catcher/processors are also required to check in and check out of any fishing area for which TAC is established, as specified in regulations. |
| **Observer Program** | U.S. fishing vessels that catch groundfish in the EEZ, or receive groundfish caught in the EEZ, and shoreside processors that receive groundfish caught in the EEZ, are required to accommodate NMFS-certified observers as specified in regulations, in order to verify catch composition and quantity, including at-sea discards, and collect biological information on marine resources. |
| **Evaluation and Review of the FMP** | The Council will maintain a continuing review of the fisheries managed under this FMP, and all critical components of the FMP will be reviewed periodically.<br><br>**Management Policy**: Objectives in the management policy statement will be reviewed annually.<br><br>**Essential Fish Habitat (EFH)**: The Council will conduct a complete review of EFH once every 5 years, and in between will solicit proposals on Habitat Areas of Particular Concern and/or conservation and enhancement measures to minimize potential adverse effects from fishing. Annually, EFH information will be reviewed in the “Ecosystems Considerations” chapter of the SAFE report. |

## ES.3 Organization of the FMP

The FMP is organized into six chapters. Chapter 1 contains an introduction to the FMP, and Chapter 2 describes the policy and management objectives of the FMP.

Chapter 3 contains the conservation and management measures that regulate the BSAI groundfish fisheries. Section 3.1 denotes the area and stocks governed by the FMP, and describes the five categories of species or species groups likely to be taken in the groundfish fishery. Section 3.2 specifies the procedures for determining harvest levels for the groundfish species, and includes the maximum sustainable yield and optimum yield of the groundfish complex. Sections 3.3 to 3.6 contain permit and participation, gear, time and area, and catch restrictions for the groundfish fisheries, respectively. Section 3.7 describes the specific management measures for the quota share programs in place in the fixed gear sablefish fishery, the pollock fishery, and the community development quota multispecies fishery. Measures that allow flexible management authority are addressed in Section 3.8, and Section 3.9 designates monitoring and reporting requirements for the fisheries. Section 3.10 describes the schedule and procedures for review of the FMP or FMP components.

Chapter 4 contains a description of the stocks and their habitat (including essential fish habitat definitions), fishing activities, the economic and socioeconomic characteristics of the fisheries and communities, and ecosystem characteristics. Additional descriptive information is also contained in the appendices. Chapter 5 specifies the relationship of the FMP with applicable law and other fisheries. Chapter 6 references additional sources of material about the groundfish fisheries, and includes the bibliography.

Appendices to the FMP include supplemental information. Appendix A contains a summary of its amendments. Appendix B describes the geographical coordinates for the areas specified in the FMP. Appendix C incorporates sections of the American Fisheries Act that are referenced in the BSAI groundfish fishery management measures. Appendices D, E, and F include, respectively, habitat information by life stage for managed species, maps of essential fish habitat, and a discussion of adverse effects on essential fish habitat. Appendix G summarizes FMP impacts on fishery participants and fishing communities. Appendix H examines research needs in the BSAI groundfish fisheries. Appendix I includes information about marine mammals and seabirds interacting with the BSAI groundfish fisheries, including species listed under the Endangered Species Act.

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# Acronyms and Abbreviations Used in the FMP

| | |
|---|---|
| **’** | minutes |
| **%** | percent |
| **ABC** | acceptable biological catch |
| **ADF&G** | Alaska Department of Fish and Game |
| **AFA** | American Fisheries Act |
| **AFSC** | Alaska Fisheries Science Center (of the National Marine Fisheries Service) |
| **AI** | Aleutian Islands |
| **ALT** | Alaska Local Time |
| **AP** | North Pacific Fishery Management Council’s Advisory Panel |
| ***B*** | biomass |
| **BSAI** | Bering Sea and Aleutian Islands |
| $B_{x\%}$ | biomass that results from a fishing mortality rate of $F_{x\%}$ |
| **C** | Celsius or Centigrade |
| **C.F.R.** | Code of Federal Regulations |
| **CDP** | community development plan |
| **CDQ** | community development quota |
| **cm** | centimeter(s) |
| **COBLZ** | *C. Opilio* Bycatch Limitation Zone |
| **Council** | North Pacific Fishery Management Council |
| **CVOA** | catcher vessel operational area |
| **DAH** | domestic annual harvest |
| **DAP** | domestic annual processed catch |
| **E.** | East |
| **EEZ** | exclusive economic zone |
| **EFH** | essential fish habitat |
| **ENSO** | El Niño-Southern Oscillation |
| **ESA** | Endangered Species Act |
| ***F*** | fishing mortality rate |
| **FMP** | fishery management plan |
| **FOCI** | Fisheries-Oceanography Coordinated Investigations |
| **ft** | foot/feet |
| $F_{x\%}$ | fishing mortality rate at which the SPR level would be reduced to *X%* of the SPR level in the absence of fishing |
| **GHL** | guideline harvest level |
| **GMT** | Greenwich mean time |
| **HAPC** | habitat area of particular concern |
| **IFQ** | individual fishing quota |
| **IPHC** | International Pacific Halibut Commission |
| **IR/IU** | Improved Retention/Improved Utilization Program |
| **JVP** | joint venture processed catch |
| **kg** | kilogram(s) |
| **km** | kilometer(s) |
| **lb** | pound(s) |
| **LLP** | licence limitation program |
| **LOA** | length overall |
| **m** | meter(s) |
| **M** | natural mortality rate |
| **Magnuson-Stevens Act** | Magnuson-Stevens Fishery Conservation and Management Act |
| **mm** | millimeter(s) |
| **MMPA** | Marine Mammal Protection Act |
| **MSY** | maximum sustainable yield |
| **mt** | metric ton/s |
| **N.** | North |
| **NMFS** | National Marine Fisheries Service |
| **NOAA** | National Oceanic and Atmospheric Administration |
| **NPFMC** | North Pacific Fishery Management Council |
| **OFL** | overfishing level |
| **OY** | optimum yield |
| **PBR** | potential biological removal |
| **pdf** | probablity density function |
| **POP** | Pacific ocean perch |
| **ppm** | part(s) per million |
| **ppt** | part(s) per thousand |
| **PRD** | Protected Resources Division (of the National Marine Fisheries Service) |
| **PSC** | prohibited species catch |
| **QS** | quota share(s) |
| **RKCSA** | Red King Crab Savings Area |
| **S.** | South |
| **SAFE** | Stock Assessment and Fishery Evaluation |
| **SPR** | spawning per recruit |
| **SSC** | North Pacific Fishery Management Council’s Scientific and Statistical Committee |
| **TAC** | total allowable catch |
| **TALFF** | total allowable level of foreign fishing |
| **U.S.** | United States |
| **U.S. GLOBEC** | United States Global Ocean Ecosystems Dynamics |
| **U.S.C.** | United States Code |
| **USFWS** | United States Fish and Wildlife Service |
| **USSR** | United Soviet Socialist Republics |
| **W.** | West |
| **°** | degrees |

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# Chapter 1 Introduction

This Fishery Management Plan (FMP) governs groundfish fisheries of the Bering Sea and Aleutian Islands (BSAI) Management Area. The geographical extent of the FMP management unit is the United States (U.S.) Exclusive Economic Zone (EEZ) of the Bering Sea, including Bristol Bay and Norton Sound, and that portion of the North Pacific Ocean adjacent to the Aleutian Islands which is between 170° W. longitude and the U.S.-Russian Convention Line of 1867 (Figure 1-1).

The FMP covers fisheries for all stocks of finfish and marine invertebrates except salmonids, shrimps, scallops, snails, king crab, Tanner crab, Dungeness crab, corals, surf clams, horsehair crab, lyre crab, Pacific halibut, and Pacific herring. In terms of both the fishery and the groundfish resource, the BSAI groundfish fishery forms a distinct management area. The history of fishery development, target species and species composition of the commercial catch, bathymetry, and oceanography are all much different in the BSAI than in the adjacent Gulf of Alaska. Although many species occur over a broader range than the BSAI management area, with only a few exceptions (e.g., sablefish), stocks of common species in this region are believed to be different from those in the adjacent Gulf of Alaska.

The International Pacific Halibut Commission is responsible for management of the North American Pacific halibut fishery, under the authority of the Convention for the Preservation of the Halibut Fishery of the North Pacific Ocean and the Bering Sea. The potential adverse impact on halibut from the groundfish fisheries is such that it must be taken into account in the management of the groundfish fishery. Therefore, certain pertinent aspects of the halibut resource and the directed fishery it supports are described in this FMP. Throughout this document, the term "groundfish" excludes Pacific halibut.

**Figure 1-1 Management Area for the Bering Sea and Aleutian Islands**

## 1.1 Foreign Fishing

Title II of the Magnuson-Stevens Act establishes the system for the regulation of foreign fishing within the U.S. EEZ. These regulations are published in 50 CFR 600. The regulations provide for the setting of a total allowable level of foreign fishing (TALFF) for species based on the portion of the optimum yield that will not be caught by U.S. vessels. At the present time, no TALFF is available for the fisheries covered by this FMP, because the U.S. has the capacity to harvest up to the level of optimum yield of all species subject to this FMP. Also, U.S. fish processors have the capacity to process all of the optimum yield of BSAI groundfish.

# Chapter 2 Management Policy and Objectives

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) is the primary domestic legislation governing management of the nation's marine fisheries. In 1996, the United States Congress reauthorized the Magnuson-Stevens Act to include, among other things, a new emphasis on the precautionary approach in U.S. fishery management policy. The Magnuson-Stevens Act contains ten national standards, with which all fishery management plans (FMPs) must conform and which guide fishery management. The national standards are listed in Section 2.1, and provide the primary guidance for the management of the groundfish fisheries.

Under the Magnuson-Stevens Act, the North Pacific Fishery Management Council (Council) is authorized to prepare and submit to the Secretary of Commerce for approval, disapproval or partial approval, a FMP and any necessary amendments, for each fishery under its authority that requires conservation and management. The Council conducts public hearings so as to allow all interested persons an opportunity to be heard in the development of FMPs and amendments, and reviews and revises, as appropriate, the assessments and specifications with respect to the optimum yield from each fishery (16 U.S.C. 1852(h)).

The Council has developed a management policy and objectives to guide its development of management recommendations to the Secretary of Commerce for the Bering Sea and Aleutian Islands (BSAI) groundfish fisheries. This management approach is described in Section 2.2.

## 2.1 National Standards for Fishery Conservation and Management

The Magnuson-Stevens Act, as amended, sets out ten national standards for fishery conservation and management (16 U.S.C. § 1851), with which all fishery management plans must be consistent.

1. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.
2. Conservation and management measures shall be based upon the best scientific information available.
3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.
4. Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be A) fair and equitable to all such fishermen; B) reasonably calculated to promote conservation; and C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.
5. Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.
6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

7. Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

8. Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to A) provide for the sustained participation of such communities, and B) to the extent practicable, minimize adverse economic impacts on such communities.

9. Conservation and management measures shall, to the extent practicable, A) minimize bycatch and B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

10. Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

## 2.2 Management Approach for the BSAI Groundfish Fisheries

The Council's policy is to apply judicious and responsible fisheries management practices, based on sound scientific research and analysis, proactively rather than reactively, to ensure the sustainability of fishery resources and associated ecosystems for the benefit of future, as well as current generations. The productivity of the North Pacific ecosystem is acknowledged to be among the highest in the world. For the past 25 years, the Council management approach has incorporated forward looking conservation measures that address differing levels of uncertainty. This management approach has in recent years been labeled the precautionary approach. Recognizing that potential changes in productivity may be caused by fluctuations in natural oceanographic conditions, fisheries, and other, non-fishing activities, the Council intends to continue to take appropriate measures to insure the continued sustainability of the managed species. It will carry out this objective by considering reasonable, adaptive management measures, as described in the Magnuson-Stevens Act and in conformance with the National Standards, the Endangered Species Act (ESA), the National Environmental Policy Act, and other applicable law. This management approach takes into account the National Academy of Science's recommendations on Sustainable Fisheries Policy.

As part of its policy, the Council intends to consider and adopt, as appropriate, measures that accelerate the Council's precautionary, adaptive management approach through community-based or rights-based management, ecosystem-based management principles that protect managed species from overfishing, and where appropriate and practicable, increase habitat protection and bycatch constraints. All management measures will be based on the best scientific information available. Given this intent, the fishery management goal is to provide sound conservation of the living marine resources; provide socially and economically viable fisheries for the well-being of fishing communities; minimize human-caused threats to protected species; maintain a healthy marine resource habitat; and incorporate ecosystem-based considerations into management decisions.

This management approach recognizes the need to balance many competing uses of marine resources and different social and economic goals for sustainable fishery management, including protection of the long-term health of the resource and the optimization of yield. This policy will use and improve upon the Council's existing open and transparent process of public involvement in decision-making.

### 2.2.1 Management Objectives

Adaptive management requires regular and periodic review. Objectives identified in this policy statement will be reviewed annually by the Council. The Council will also review, modify, eliminate, or consider new issues, as appropriate, to best carry out the goals and objectives of this management policy.

To meet the goals of this overall management approach, the Council and NMFS will use the Alaska Groundfish Fisheries Programmatic Supplemental Environmental Impact Statement (PSEIS) (NMFS 2004) as a planning document. To help focus consideration of potential management measures, the Council and NMFS will use the following objectives as guideposts, to be re-evaluated, as amendments to the FMP are considered over the life of the PSEIS.

***Prevent Overfishing:***

1. Adopt conservative harvest levels for multi-species and single species fisheries and specify optimum yield.
2. Continue to use the 2 million mt optimum yield cap for the BSAI groundfish fisheries.
3. Provide for adaptive management by continuing to specify optimum yield as a range.
4. Provide for periodic reviews of the adequacy of $F_{40}$ and adopt improvements, as appropriate.
5. Continue to improve the management of species through species categories.

***Promote Sustainable Fisheries and Communities:***

6. Promote conservation while providing for optimum yield in terms of the greatest overall benefit to the nation with particular reference to food production, and sustainable opportunities for recreational, subsistence, and commercial fishing participants and fishing communities.
7. Promote management measures that, while meeting conservation objectives, are also designed to avoid significant disruption of existing social and economic structures.
8. Promote fair and equitable allocation of identified available resources in a manner such that no particular sector, group or entity acquires an excessive share of the privileges.
9. Promote increased safety at sea.

***Preserve Food Web:***

10. Develop indices of ecosystem health as targets for management.
11. Improve the procedure to adjust acceptable biological catch levels as necessary to account for uncertainty and ecosystem factors.
12. Continue to protect the integrity of the food web through limits on harvest of forage species.
13. Incorporate ecosystem-based considerations into fishery management decisions, as appropriate.

***Manage Incidental Catch and Reduce Bycatch and Waste:***

14. Continue and improve current incidental catch and bycatch management program.
15. Develop incentive programs for bycatch reduction including the development of mechanisms to facilitate the formation of bycatch pools, vessel bycatch allowances, or other bycatch incentive systems.

16. Encourage research programs to evaluate current population estimates for non-target species with a view to setting appropriate bycatch limits, as information becomes available.
17. Continue program to reduce discards by developing management measures that encourage the use of gear and fishing techniques that reduce bycatch which includes economic discards.
18. Continue to manage incidental catch and bycatch through seasonal distribution of total allowable catch and geographical gear restrictions.
19. Continue to account for bycatch mortality in total allowable catch accounting and improve the accuracy of mortality assessments for target, prohibited species catch, and non-commercial species.
20. Control the bycatch of prohibited species through prohibited species catch limits or other appropriate measures.
21. Reduce waste to biologically and socially acceptable levels.

***Avoid Impacts to Seabirds and Marine Mammals:***

22. Continue to cooperate with U.S. Fish and Wildlife Service (USFWS) to protect ESA-listed species, and if appropriate and practicable, other seabird species.
23. Maintain or adjust current protection measures as appropriate to avoid jeopardy of extinction or adverse modification to critical habitat for ESA-listed Steller sea lions.
24. Encourage programs to review status of endangered or threatened marine mammal stocks and fishing interactions and develop fishery management measures as appropriate.
25. Continue to cooperate with NMFS and USFWS to protect ESA-listed marine mammal species, and if appropriate and practicable, other marine mammal species.

***Reduce and Avoid Impacts to Habitat:***

26. Review and evaluate efficacy of existing habitat protection measures for managed species.
27. Identify and designate essential fish habitat and habitat areas of particular concern pursuant to Magnuson-Stevens Act rules, and mitigate fishery impacts as necessary and practicable to continue the sustainability of managed species.
28. Develop a Marine Protected Area policy in coordination with national and state policies.
29. Encourage development of a research program to identify regional baseline habitat information and mapping, subject to funding and staff availability.
30. Develop goals, objectives and criteria to evaluate the efficacy and suitable design of marine protected areas and no-take marine reserves as tools to maintain abundance, diversity, and productivity. Implement marine protected areas if and where appropriate.

***Promote Equitable and Efficient Use of Fishery Resources:***

31. Provide economic and community stability to harvesting and processing sectors through fair allocation of fishery resources.
32. Maintain the license limitation program, modified as necessary, and further decrease excess fishing capacity and overcapitalization by eliminating latent licences and extending programs such as community or rights-based management to some or all groundfish fisheries.

33. Provide for adaptive management by periodically evaluating the effectiveness of rationalization programs and the allocation of access rights based on performance.

34. Develop management measures that, when practicable, consider the efficient use of fishery resources taking into account the interest of harvesters, processors, and communities.

***Increase Alaska Native Consultation:***

35. Continue to incorporate local and traditional knowledge in fishery management.

36. Consider ways to enhance collection of local and traditional knowledge from communities, and incorporate such knowledge in fishery management where appropriate.

37. Increase Alaska Native participation and consultation in fishery management.

***Improve Data Quality, Monitoring and Enforcement:***

38. Increase the utility of groundfish fishery observer data for the conservation and management of living marine resources.

39. Develop funding mechanisms that achieve equitable costs to the industry for implementation of the North Pacific Groundfish Observer Program.

40. Improve community and regional economic impact costs and benefits through increased data reporting requirements.

41. Increase the quality of monitoring and enforcement data through improved technology.

42. Encourage a coordinated, long-term ecosystem monitoring program to collect baseline information and compile existing information from a variety of ongoing research initiatives, subject to funding and staff availability.

43. Cooperate with research institutions such as the North Pacific Research Board in identifying research needs to address pressing fishery issues.

44. Promote enhanced enforceability.

45. Continue to cooperate and coordinate management and enforcement programs with the Alaska Board of Fish, Alaska Department of Fish and Game, and Alaska Fish and Wildlife Protection, the U.S. Coast Guard, NMFS Enforcement, International Pacific Halibut Commission, Federal agencies, and other organizations to meet conservation requirements; promote economically healthy and sustainable fisheries and fishing communities; and maximize efficiencies in management and enforcement programs through continued consultation, coordination, and cooperation.

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# Chapter 3 Conservation and Management Measures

The Fishery Management Plan (FMP) for Groundfish of the Bering Sea and Aleutian Islands (BSAI) Management Area authorizes the commercial harvest of species listed in Section 3.1 of this FMP. Commercial fishing is authorized during the fishing year unless otherwise specified in the FMP. Section 3.2 describes the procedures for determining harvest levels for the groundfish species. Sections 3.3 to 3.6 address permit and participation, authorized gear, time and area, and catch restrictions, respectively. Section 3.7 describes the specific management measures for the fixed gear sablefish quota share program. Measures that allow flexible management authority are addressed in Section 3.8. Section 3.9 designates monitoring and reporting requirements for the fisheries. Section 3.10 describes the schedule and procedures for review of the FMP or FMP components.

The groundfish resources off Alaska have been harvested and processed entirely by U.S.-flagged vessels since 1991. Conservation and management measures contained in this FMP apply exclusively to domestic fishing activities. No portion of the annual optimum yield is allocated to foreign harvesters or foreign processors.

## 3.1 Areas and Stocks Involved

The FMP and its management regime governs fishing by United States (U.S.) vessels in the Bering Sea and Aleutian Islands management area described in Section 3.1.1, and for those stocks listed in Section 3.1.2. Fishing for groundfish by foreign vessels is not permitted in the BSAI.

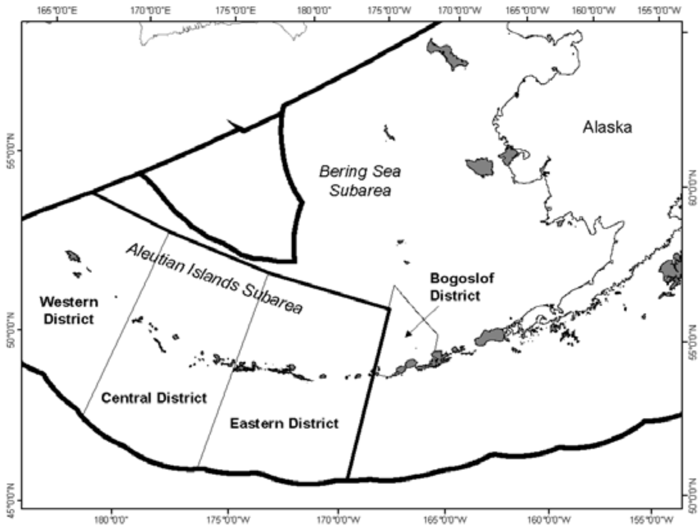
### 3.1.1 Management Area

The BSAI management area encompasses the U.S. Exclusive Economic Zone (EEZ) of the eastern Bering Sea and that portion of the North Pacific Ocean adjacent to the Aleutian Islands west of 170° W. longitude (Figure 1-1). The northern boundary of the Bering Sea is the Bering Strait, defined as a straight line from Cape Prince of Whales to Cape Dezhneva, Russia.

The FMP area is divided into two fishing areas, the Bering Sea subarea and the Aleutian Islands subarea. The Bering Sea subarea includes a defined area known as the Bogoslof District. For the purpose of spatially allocating total allowable catch, the Aleutian Islands subarea is divided into three districts, the eastern district (between 170° W. and 177° W. longitude), the central district (between 177° W. longitude and 177° E. longitude), and the western district (west of 177° E. longitude).

The subareas and districts of the BSAI management area are illustrated in Figure 3-1. Geographical coordinates for these areas are described in Appendix B.

**Figure 3-1 Subareas and districts of the Bering Sea and Aleutian Islands management area.**




### 3.1.2 Stocks

Stocks governed by the FMP are listed in Table 3-1, and include all stocks of finfish and marine invertebrates except salmonids, shrimps, scallops, snails, king crab, Tanner crab, Dungeness crab, corals, surf clams, horsehair crab, lyre crab, Pacific halibut, and Pacific herring, which are distributed or are exploited in the area described in Section 3.1.1.

Five categories of species or species groups are likely to be taken in the groundfish fishery. The optimum yield concept is applied to all except the "prohibited species" category. These categories are tabulated in Table 3-1 and are described as follows:

1. Prohibited Species – are those species and species groups the catch of which must be avoided while fishing for groundfish, and which must be returned to sea with a minimum of injury except when their retention is authorized by other applicable law (see also Prohibited Species Donation Program described in Section 3.6.1.1). Groundfish species and species groups under the FMP for which the quotas have been achieved shall be treated in the same manner as prohibited species.

2. Target species – are those species that support either a single species or mixed species target fishery, are commercially important, and for which a sufficient data base exists that allows each to be managed on its own biological merits. Accordingly, a specific TAC is established annually for each target species. Catch of each species must be recorded and reported. This category includes pollock, Pacific cod, sablefish, yellowfin sole, Greenland turbot, arrowtooth flounder, rock sole, flathead sole, Alaska plaice, "other flatfish", Pacific ocean perch, northern rockfish, shortraker rockfish, rougheye rockfish, "other rockfish", Atka mackerel, and squid.

3. Other Species – are those species or species groups that currently are of slight economic value and not generally targeted upon. This category, however, contains species with economic potential or which are important ecosystem components, but insufficient data exist to allow separate management. Accordingly, a single TAC applies to this category as a whole. Catch of this category as a whole must be recorded and reported. The category includes sculpins, sharks, skates, and octopus.

4. Forage fish species – are those species, listed in Table 3-1, which are a critical food source for many marine mammal, seabird and fish species. The forage fish species category is established to allow for

the management of these species in a manner that prevents the development of a commercial directed fishery for forage fish. Management measures for this species category will be specified in regulations and may include such measures as prohibitions on directed fishing, limitations on allowable bycatch retention amounts, or limitations on the sale, barter, trade or any other commercial exchange, as well as the processing of forage fish in a commercial processing facility.

5. Nonspecified species – are those species and species groups of no current economic value taken by the groundfish fishery only as an incidental catch in the target fisheries. Virtually no data exist which would allow population assessments. No record of catch is necessary. The allowable catch for this category is the amount which is taken incidentally while fishing for target and other species, whether retained or discarded.

**Table 3-1 Species included in the FMP species categories.**

| | Finfish | Marine Invertebrates |
|---|---|---|
| **Prohibited Species[1]** | Pacific halibut<br>Pacific herring<br>Pacific salmon<br>Steelhead | King crab<br>Tanner crab |
| **Target Species[2]** | Walleye pollock<br>Pacific cod<br>Sablefish<br>Yellowfin sole<br>Greenland turbot<br>Arrowtooth flounder<br>Rock sole<br>Flathead sole<br>Alaska plaice<br>Other flatfish<br>Pacific ocean perch<br>Northern rockfish<br>Shortraker rockfish<br>Rougheye rockfish<br>Other rockfish<br>Atka mackerel | Squid |
| **Other Species[3]** | Sculpins<br>Sharks<br>Skates | Octopus |
| **Forage Fish Species[4]** | Osmeridae family (eulachon, capelin, and other smelts)<br>Myctophidae family (lanternfishes)<br>Bathylagidae family (deep-sea smelts)<br>Ammodytidae family (Pacific sand lance)<br>Trichodontidae family (Pacific sand fish)<br>Pholidae family (gunnels)<br>Stichaeidae family (pricklebacks, warbonnets, eelblennys, cockscombs, and shannys)<br>Gonostomatidae family (bristlemouths, lightfishes, and anglemouths) | Order Euphausiacea (krill) |

[1]Must be returned to the sea
[2]TAC for each listing
[3]Aggregate TAC for group
[4]Management measures for forage fish are established in regulations implementing the FMP

## 3.2 Determining Harvest Levels

This section of the FMP provides the basis for determining harvest levels in the groundfish fisheries. Section 3.2.1 defines terms used in the harvest specification process. The maximum sustainable yield and optimum yield of groundfish in the Bering Sea and Aleutian Islands are addressed in Sections 3.2.2 and 3.2.3. Criteria for determining overfishing are described in Section 3.2.4, followed by the procedures for setting total allowable catch in Section 3.2.5. Section 3.2.6 specifies those groundfish fisheries for which the total allowable catch is apportioned by gear type, area, or season.

The Council's harvest strategy was reviewed in 2002 by Goodman *et al.*.The report contains a historical overview of the Council's approach to fishery harvest management, and an analysis of single-species, multispecies and ecosystem issues relating to the harvest strategy. The report is available by request from the Council office.

### 3.2.1 Definition of Terms

Maximum sustainable yield (MSY) is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions.

Optimum yield (OY) is the amount of fish which–

a) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;
b) is prescribed as such on the basis of the MSY from the fishery, as reduced by any relevant economic, social, or ecological factor; and
c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the MSY in such fishery.

Overfishing level (OFL) is a limit reference point set annually for a stock or stock complex during the assessment process, as described in Section 3.2.4, Overfishing criteria. Overfishing occurs whenever a stock or stock complex is subjected to a rate or level of fishing mortality that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis. Operationally, overfishing occurs when the harvest exceeds the OFL.

Acceptable biological catch (ABC) is an annual sustainable target harvest (or range of harvests) for a stock or stock complex, determined by the Plan Team and the Science and Statistical Committee during the assessment process. It is derived from the status and dynamics of the stock, environmental conditions, and other ecological factors, given the prevailing technological characteristics of the fishery. The target reference point is set below the limit reference point for overfishing.

Total allowable catch (TAC) is the annual harvest limit for a stock or stock complex, derived from the ABC by considering social and economic factors.

In addition to definitional differences, OY differs from ABC and TAC in two practical respects. First, ABC and TAC are specified for each stock or stock complex within the "target species" and "other species" categories, whereas OY is specified for the groundfish fishery (comprising target species and other species categories) as a whole. Second, ABCs and TACs are specified annually whereas the OY range is constant. The sum of the stock-specific ABCs may fall within or outside of the OY range. If the sum of annual TACs falls outside the OY range, TACs must be adjusted or the FMP amended.

### 3.2.2 Maximum Sustainable Yield of the Groundfish Complex

The groundfish complex and its fishery are a distinct management unit of the Bering Sea. This complex forms a large subsystem of the Bering Sea ecosystem with intricate interrelationships between predators and prey, between competitors, and between those species and their environment. Ideally, concepts such as productivity and MSY should be viewed in terms of the groundfish complex as a unit rather than for individual species or species groups. Due to the difficulty of estimating the parameters that govern interactions between species, however, estimates of MSY for the groundfish complex have sometimes been computed by summing MSY estimates for the individual species and species groups.

Early studies estimated MSY for the groundfish complex in the range of 1.7 to 2.4 million mt. This range was obtained by summing the MSY ranges for each target species and the “other species” category, as defined in Section 3.2.2 of this FMP. By way of comparison, this range included both the average annual catch (1.8 million mt) and the maximum annual catch (2.4 million mt) taken during the period 1968-1977 (see Section 4.3.1, History of Exploitation). However, current multi-species models suggest that the sum of single-species MSYs provides a poor estimate of MSY for the groundfish complex as a whole (Walters et al., in press) because biological reference points for single stocks, such as $F_{MSY}$, may change substantially when multi-species interactions are taken into account (Gislason 1999; Collie and Gislason 2001). Fishing mortality rates for prey species that are consumed by other marine predators should be conditioned on the level of predation mortality, which may change over time depending on predator population levels.

An ecosystem perspective suggests that the MSY of the groundfish complex may change if an environmental regime shift occurs or if the present mix of species is altered substantially. Also, as new data are acquired and as statistical methodology evolves over time, it is to be expected that estimates of MSY will change, even if the ecosystem has remained relatively stationary. Therefore, estimates of MSY contained in this section should be viewed in context, as historical estimates that guided development of the FMP.

### 3.2.3 Optimum Yield of the Groundfish Complex

The optimum yield of the groundfish complex is specified as 85 percent of the historical estimate of the MSY range for the target species and the “other species” categories (1.4 to 2.0 million mt), to the extent this can be harvested consistently with the management measures specified in this FMP, plus the actual amount of the nonspecified species category that is taken incidentally to the harvest of target species and the “other species” category. This deviation from the historical estimate of MSY reflects the combined influence of ecological, social, and economic factors. The important ecological factors may be summarized as follows:

- The OY range encompasses the summed ABCs of individual species for 1978-1981 (Low *et al.* 1978; and Bakkala *et al.* 1979, 1980, and 1981). This sum was used as an indicator of the biological productivity of the complex, although such use is not completely satisfactory because multi-species/ ecosystem interactions are not taken into account explicitly. The 15 percent reduction from MSY reduces the risk associated with incomplete data and questionable assumptions in assessment models used to determine the condition of stocks.

The important social and economic factors may be summarized as follows:

1. The OY range is not likely to have any significant detrimental impact on the industry. On the contrary, specification of OY as a constant range helps to create a stable management environment in which the industry can plan its activities consistently, with an expectation that each year’s total groundfish catch will be at least 1.4 million mt.
2. The OY range encompasses the annual catch levels taken in the period immediately prior to its implementation, during which the fishery operated profitably.

OY may need to be respecified in the future if major changes occur in the estimate of MSY for the groundfish complex. Likewise, OY may need to be respecified if major changes occur in the ecological, social, or economic factors governing the relationship between OY and MSY.

### 3.2.4 Overfishing Criteria

Overfishing is defined as any amount of fishing in excess of a prescribed maximum allowable rate. This maximum allowable rate is prescribed through a set of six tiers which are listed below in descending order of preference, corresponding to descending order of information availability. The Council's Science and Statistical Committee (SSC) will have final authority for determining whether a given item of information is "reliable" for the purpose of this definition, and may use either objective or subjective criteria in making such determinations.

For tier (1), a "pdf" refers to a probability density function. For tiers 1 and 2, if a reliable pdf of $B_{MSY}$ is available, the preferred point estimate of $B_{MSY}$ is the geometric mean of its pdf. For tiers 1 to 5, if a reliable pdf of $B$ is available, the preferred point estimate is the geometric mean of its pdf. For tiers 1 to 3, the coefficient **"** is set at a default value of 0.05. This default value was established by applying the 10 percent rule suggested by Rosenberg *et al.* (1994) to the 1/2 $B_{MSY}$ reference point. However, the SSC may establish a different value for a specific stock or stock complex as merited by the best available scientific information. For tiers 2 to 4, a designation of the form "$F_{X\%}$" refers to the fishing mortality rate ($F$) associated with an equilibrium level of spawning per recruit equal to $X\%$ of the equilibrium level of spawning per recruit in the absence of any fishing. If reliable information sufficient to characterize the entire maturity schedule of a species is not available, the SSC may choose to view spawning per recruit calculations based on a knife-edge maturity assumption as reliable. For tier 3, the term $B_{40\%}$ refers to the long-term average biomass that would be expected under average recruitment and $F=F_{40\%}$.

Tier 1 Information available: reliable point estimates of $B$ and $B_{MSY}$ and reliable pdf of $F_{MSY}$.
- 1a) Stock status: $B/B_{MSY} > 1$
  - $F_{OFL} = m_A$, the arithmetic mean of the pdf
  - $F_{ABC} \leq m_H$, the harmonic mean of the pdf
- 1b) Stock status: $a < B/B_{MSY} \leq 1$
  - $F_{OFL} = m_A \times (B/B_{MSY} - a)/(1 - a)$
  - $F_{ABC} \leq m_H \times (B/B_{MSY} - a)/(1 - a)$
- 1c) Stock status: $B/B_{MSY} \leq a$
  - $F_{OFL} = 0$
  - $F_{ABC} = 0$

Tier 2 Information available: reliable point estimates of $B$, $B_{MSY}$, $F_{MSY}$, $F_{35\%}$, and $F_{40\%}$.
- 2a) Stock status: $B/B_{MSY} > 1$
  - $F_{OFL} = F_{MSY}$
  - $F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%})$
- 2b) Stock status: $a < B/B_{MSY} \leq 1$
  - $F_{OFL} = F_{MSY} \times (B/B_{MSY} - a)/(1 - a)$
  - $F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%}) \times (B/B_{MSY} - a)/(1 - a)$
- 2c) Stock status: $B/B_{MSY} \leq a$
  - $F_{OFL} = 0$
  - $F_{ABC} = 0$

Tier 3 Information available: reliable point estimates of $B$, $B_{40\%}$, $F_{35\%}$, and $F_{40\%}$.

3a) Stock status: $B/B_{40\%} > 1$

$F_{OFL} = F_{35\%}$

$F_{ABC} \leq F_{40\%}$

3b) Stock status: $a < B/B_{40\%} \leq 1$

$F_{OFL} = F_{35\%} \times (B/B_{40\%} - a)/(1 - a)$

$F_{ABC} \leq F_{40\%} \times (B/B_{40\%} - a)/(1 - a)$

3c) Stock status: $B/B_{40\%} \leq a$

$F_{OFL} = 0$

$F_{ABC} = 0$

Tier 4 Information available: reliable point estimates of $B$, $F_{35\%}$, and $F_{40\%}$.

$F_{OFL} = F_{35\%}$

$F_{ABC} \leq F_{40\%}$

Tier 5 Information available: reliable point estimates of $B$ and natural mortality rate $M$.

$F_{OFL} = M$

$F_{ABC} \leq 0.75 \times M$

Tier 6 Information available: reliable catch history from 1978 through 1995.

OFL = the average catch from 1978 through 1995, unless an alternative value is established by the SSC on the basis of the best available scientific information

ABC $\leq$ 0.75 × OFL

### 3.2.5 Procedures for Setting Total Allowable Catch

The Secretary, after receiving recommendations from the Council, will determine up to 2 years of TACs and apportionments thereof, and reserves for each stock or stock complex in the "target species" and "other species" categories, by January 1 of the new fishing year, or as soon as practicable thereafter, by means of regulations implementing the FMP. Notwithstanding designated stocks or stock complexes listed by category in Table 3-1, the Council may recommend splitting or combining stocks or stock complexes in the "target species" category for purposes of establishing a new TAC if such action is desirable based on commercial importance of a stock or stock complex and whether sufficient biological information is available to manage a stock or stock complex on its own merits.

Prior to making final recommendations to the Secretary, the Council will make available to the public for comment as soon as practicable after its October meeting, proposed specifications of ABC and TAC for each target stock or stock complex and the "other species" category, and apportionments thereof, and reserves.

The Council will provide proposed recommendations for harvest specifications to the Secretary after its October meeting, including detailed information on the development of each proposed specification and any future information that is expected to affect the final specifications. As soon as practicable after the October meeting, the Secretary will publish in the *Federal Register* proposed harvest specifications based on the Council's October recommendations and make available for public review and comment, all information regarding the development of the specifications, identifying specifications that are likely to change, and possible reasons for changes, if known, from the proposed to final specifications. The prior public review and comment period on the published proposed specifications will be a minimum of 15 days.

At its December meeting, the Council will review the final SAFE reports, recommendations from the Groundfish Plan Teams, SSC, AP, and comments received. The Council will then make final harvest specifications recommendations to the Secretary for review, approval, and publication. New final annual specifications will supersede current annual specifications on the effective date of the new annual specifications.

#### 3.2.5.1 Framework for Setting Total Allowable Catch

A procedure has been developed whereby the Council may set annual harvest levels by specifying a total allowable catch for each groundfish fishery on an annual basis. The procedure is used to determine TACs for every groundfish species and species group managed by the FMP.

Scientists from the Alaska Fisheries Science Center, the Alaska Department of Fish and Game, and other agencies and universities prepare *Stock Assessment and Fishery Evaluation* (SAFE) documents annually (see Section 3.2.5.2 for further information). These documents are first reviewed by the Groundfish Plan Team, and then by the Council's SSC and AP, and the Council. Reference point recommendations are made at each level of assessment. Usually, scientists recommend values for ABC and OFL, and the AP recommends values for TAC. The Council has final authority to approve all reference points, but focuses on setting TACs so that OY is achieved and OFLs are not exceeded.

The procedure for setting TAC consists of the following steps:

1. Determine the ABC for each managed species or species group. ABCs are recommended by the Council's SSC based on information presented by the Plan Team.
2. Determine a TAC based on biological and socioeconomic information. The TAC must be lower than or equal to the ABC. The TAC may be lower if bycatch considerations or socioeconomic considerations cause the Council to establish a lower harvest.
3. Sum TACs for "target species" and "other species" to assure that the sum is within the optimum yield range specified for the groundfish complex in the FMP. If the sum falls outside this range the TACs must be adjusted or the FMP amended.

#### 3.2.5.2 Stock Assessment and Fishery Evaluation

For purposes of supplying scientific information to the Council for use in specifying TACs, a SAFE report is prepared annually.

The SAFE report will, at a minimum, contain or refer to the following:

1. current status of BSAI area groundfish resources, by major species or species group;
2. estimates of maximum sustainable yield and acceptable biological catch;
3. estimates of groundfish species mortality from nongroundfish fisheries, subsistence fisheries, and recreational fisheries, and difference between groundfish mortality and catch, if possible;
4. fishery statistics (landings and value) for the current year;
5. the projected responses of stocks and fisheries to alternative levels of fishing mortality;
6. any relevant information relating to changes in groundfish markets;
7. information to be used by the Council in establishing prohibited species catch limits for prohibited species with supporting justification and rationale (further detail in Section 3.6.2.3.2); and
8. any other biological, social, or economic information that may be useful to the Council.

#### 3.2.5.3 Reserves

The groundfish reserve at the beginning of each fishing year shall equal the sum of 15 percent of each target species and the "other species" category TACs, except for pollock and fixed-gear sablefish. When the TACs for the groundfish complex are determined by the Council, 15 percent of the sum of the TACs is set aside as a reserve. This reserve is used for: a) correction of operational problems in the fishing fleets, to promote full and efficient use of groundfish resources, b) adjustments of species TACs according to the condition of stocks during the fishing year, and c) apportionments.

The reserve is not designated by species or species groups and will be apportioned to the fisheries during the fishing year by the Regional Administrator in amounts and by species that s/he determines to be appropriate. The apportionment of the reserve to target species or to the "other species" category must be consistent with the most recent assessments of resource conditions unless the Regional Administrator finds that the socioeconomic considerations listed above or specified fishery operational problems dictate otherwise. Except as provided for in the National Standard Guidelines, the Regional Administrator must also find that the apportionment of reserves will not result in overfishing as defined in the guidelines. The Regional Administrator may withhold reserves for conservation reasons.

### 3.2.6 Apportionment of Total Allowable Catch

When the TAC for each target species and the "other species" category, except for pollock and fixed-gear sablefish, is determined, it is reduced by 15 percent to form the reserve, as described in Section 3.2.5.3. The remaining 85 percent of each TAC is then apportioned by the Regional Administrator.

Groundfish species and species groups under the FMP for which TAC has been achieved shall be treated in the same manner as prohibited species; they must be returned to the sea with a minimum of injury.

#### 3.2.6.1 Pollock

##### 3.2.6.1.1 Gear Allocation

The Regional Administrator, in consultation with the Council, may limit the amount of pollock that may be taken with trawls other than pelagic trawls. Prior to the Regional Administrator's determination, the Council will recommend to him or her a limit on the amount of pollock that may be taken with other than pelagic trawl gear. The Regional Administrator shall make the Council's recommendations available to the public for comment under the annual TAC specification process set forth under Section 3.2.5.

The following information must be considered by the Council when determining whether a limit will be recommended and what that limit should be:

a. PSC limits established under Section 3.6.2;

b. projected prohibited species bycatch levels with and without a limit on the amount of pollock that may be taken with other than pelagic trawl gear;

c. the cost of the limit on the bottom-trawl and pelagic trawl fisheries; and

d. other factors that determine the effects of the limit on the attainment of FMP goals and objectives.

#### 3.2.6.1.2 Seasonal Allocation

The pollock TAC shall be divided into two allowances: roe-bearing ("A" season) and non-roe-bearing ("B" season). Each allowance will be available for harvest during the times specified in the regulations. The proportion of the annual pollock TAC assigned to each allowance will be determined annually during the groundfish specifications process. Proposed and final notices of the seasonal allowances of the pollock TAC will be published in the *Federal Register* with the proposed and final groundfish specifications.

The following factors will be considered when setting seasonal allowances of the pollock TAC:

1. estimated monthly pollock catch and effort in prior years;
2. expected changes in harvesting and processing capacity and associated pollock catch;
3. current estimates of and expected changes in pollock biomass and stock conditions; conditions of marine mammal stocks, and biomass and stock conditions of species taken as bycatch in directed pollock fisheries;
4. potential impacts of expected seasonal fishing for pollock on pollock stocks, marine mammals, and stocks of species taken as bycatch in directed pollock fisheries;
5. the need to obtain fishery-related data during all or part of the fishing year;
6. effects on operating costs and gross revenues;
7. the need to spread fishing effort over the year, minimize gear conflicts, and allow participation by various elements of the groundfish fleet and other fisheries;
8. potential allocative effects among users and indirect effects on coastal communities; and
9. other biological and socioeconomic information that affects the consistency of seasonal pollock harvests with the goals and objectives of the FMP.

### 3.2.6.2 Sablefish

<u>Sablefish in the Bering Sea subarea</u>

Vessels using fixed gear, including hook-and-line and pot gear, shall be permitted to harvest no more than 50 percent of the TAC specified for sablefish. Vessels using trawl gear shall be permitted to harvest no more than 50 percent of the TAC specified for sablefish.

<u>Sablefish in the Aleutian Islands subarea</u>

Vessels using fixed gear, including hook-and-line and pot gear, shall be permitted to harvest no more than 75 percent of the TAC specified for sablefish. Vessels using trawl gear shall be permitted to harvest no more than 25 percent of the TAC specified for sablefish.

### 3.2.6.3 Pacific Cod

#### 3.2.6.3.1 Gear Allocations

Among gear groups

The BSAI Pacific cod TAC shall be allocated among gear groups as follows: 2 percent to vessels using jig gear; 51 percent to vessels using hook-and-line or pot gear; and 47 percent to vessels using trawl gear. The trawl apportionment will be divided 50 percent to catcher vessels and 50 percent to catcher processors.

Among vessels using hook-and-line or pot gear

The Regional Administrator annually will estimate the amount of Pacific cod taken as incidental catch in directed fisheries for groundfish other than Pacific cod by vessels using hook-and-line or pot gear and deduct that amount from the portion of Pacific cod TAC annually allocated to hook-and-line or pot gear. The remainder will be further allocated as directed fishing allowances as follows:

a. 80 percent to catcher/processor vessels using hook-and-line gear;

b. 0.3 percent to catcher vessels using hook-and-line gear;

c. 3.3 percent to catcher/processor vessels using pot gear;

d. 15 percent to catcher vessels using pot gear; and

e. 1.4 percent to catcher vessels less than 60 ft length overall that uses either hook-and-line gear or pot gear.

Specific provisions for the accounting of these directed fishing allowances and the transfer of unharvested amounts of these allowances to other vessels using hook-and-line or pot gear will be set forth in regulations.

#### 3.2.6.3.2 Seasonal Allocations

The amount of Pacific cod allocated to gear groups under Section 3.2.6.3.1 may be seasonally apportioned. Criteria for seasonal apportionments and the seasons authorized to receive separate apportionments will be set forth in regulations.

### 3.2.6.4 Atka Mackerel

The Regional Administrator, in consultation with the Council, will annually allocate up to 2 percent of the TAC specified for Atka mackerel in the eastern Aleutian Islands District/Bering Sea subarea to vessels using jig gear in these areas. The jig gear allocation will be specified during the annual groundfish specifications process based on recent annual catches of Atka mackerel by vessels using jig gear and the anticipated harvest of this species by the jig gear fleet during the upcoming fishing year.

### 3.2.6.5 Shortraker and Rougheye Rockfish

After subtraction of reserves, the Aleutian Islands subarea TAC specified for shortraker and rougheye rockfish will be allocated 70 percent to vessels using trawl gear and 30 percent to vessels using non-trawl gear.

### 3.2.7 Attainment of Total Allowable Catch

The attainment of a TAC for a species will result in the closure of the target fishery for that species. That is, once the TAC is taken, further retention of that species will be prohibited. Other fisheries targeting on other species could be allowed to continue as long as the non-retainable bycatch of the closed species is found to be non-detrimental to that stock.

## 3.3 Permit and Participation Restrictions

Certain permits are required of participants in the BSAI groundfish fisheries. The framework of the License Limitation Program (Section 3.3.1) and the exempted fishing permit program (Section 3.3.2) are set out below, however specific requirements are found in regulations implementing the FMP.

### 3.3.1 License Limitation Program

A Federal groundfish license is required for catcher vessels (including catcher/processors) participating in all BSAI groundfish fisheries, other than fixed gear sablefish. However, the following vessel categories are exempt from the license program requirements:

a. vessels fishing in State of Alaska waters (0-3 miles offshore);

b. vessels less than 32 ft LOA; or

c. jig gear vessels less than 60 ft LOA using a maximum of 5 jig machines, one line per machine, and a maximum of 15 hooks per line.

Any vessel that meets the LLP qualification requirements will be issued a license, regardless of whether they are exempt from the program or not.

#### 3.3.1.1 Elements of the License Limitation Program

1. Nature of Licenses. General licenses will be issued for the entire BSAI management area based on historical landings defined in Federal regulations. Vessels that qualify for both a BSAI and a Gulf of Alaska general license will be issued both as a non-severable package. Area endorsements for the Bering Sea and/or Aleutian Islands subareas will be issued along with the general license. General licenses and endorsements will remain a non-severable package.

2. License Recipients. Licenses will be issued to owners (as of June 17, 1995) of qualified vessels. The owners as of this date must be “persons eligible to document a fishing vessel” under Chapter 121, Title 46, U.S.C. In cases where the vessel was sold on or before June 17, 1995, and the disposition of the vessel's fishing history for license qualification was not mentioned in the contract, the license qualification history would go with the vessel. If the transfer occurred after June 17, 1995, the license qualification history would stay with the seller of the vessel unless the contract specified otherwise.

3. License Designations. Licenses and endorsements will be designated as Catcher Vessel or Catcher Processor and with one of three vessel length classes (less than 60 ft LOA, greater than or equal to 60 ft but less than 125 ft LOA, or greater than 125 ft LOA). Vessels less than 60 ft LOA with a catcher vessel designation may process up to 1 mt (round weight) of fish per day.

   General licenses will also contain a gear designation (trawl gear, non-trawl gear, or both) based on landings activity in any area through June 17, 1995. Vessels that used both trawl and non-trawl gear during the original qualification period would receive both gear designations, while vessels that used only trawl gear or only non-trawl gear during the original qualification period (general or endorsement period) would receive one or the other. For vessels that used only one gear type (trawl or non-trawl) in the original qualification period, and then used the other gear type between June 18, 1995 and February 7, 1998, the license recipient may choose one or the other gear designation, but will not receive both. For vessels that used only one gear type (trawl or non-trawl) in the original qualification period, but made a significant financial investment towards conversion to the other gear type or deployment of such gear on or before February 7, 1998, and made landings on that vessel with the new gear type by December 31, 1998, the license recipient may choose which gear designation to receive, but not both. A significant financial commitment is defined as a minimum purchase of $100,000 worth of equipment specific to trawling or having acquired groundline, hooks or pots, and hauling equipment for the purpose of prosecuting the non-trawl fisheries on or by February 7, 1998.

4. Who May Purchase Licenses. Licenses may be transferred only to "persons" defined as those "eligible to document a fishing vessel" under Chapter 121, Title 46, U.S.C. Licenses may not be leased.

5. Vessel/License Linkages. Licenses may be transferred without a vessel, i.e., licenses may be applied to vessels other than the one to which the license was initially issued. However, the new vessel is still subject to the license designations, vessel upgrade provisions, "20 percent upgrade rule" (defined in provision seven), and the no leasing provision. Licenses may be applied to vessels shorter than the maximum LOA allowed by the license regardless of the vessel's length designation. Vessels may also use catcher processor licenses on catcher vessels. However, the reverse is not allowed.

   Notwithstanding the above, licenses earned on vessels that did not hold a Federal fisheries permit prior to October 9, 1998, may be transferred only if the vessel originally assigned the license is transferred along with the license, unless a fishing history transfer occurred prior to February 7, 1998, in which case the vessel does not have to accompany the license earned from that fishing history; however, any future transfer of that license would have to include that vessel.

6. Separability of General Licenses and Endorsements. General licenses may be issued for the BSAI groundfish, Gulf of Alaska groundfish, and Bering Sea and Aleutian Islands crab fisheries. Those general licenses initially issued to a person based on a particular vessel's catch history are not separable and shall remain as a single "package". General licenses transferred after initial allocation shall remain separate "packages" in the form they were initially issued, and will not be combined with other general groundfish or crab licenses the person may own. Area endorsements are not separable from the general license they are initially issued under, and shall remain as a single "package", which includes the assigned catcher vessel or catcher processor and length designations.

7. Vessel Replacements and Upgrades. Vessels may be replaced or upgraded within the bounds of the vessel length designations and the "20 percent rule". This rule was originally defined for the vessel moratorium program. The maximum LOA with respect to a vessel means the greatest LOA of that vessel or its replacement that may qualify it to conduct directed fishing for groundfish covered under the license program, except as provided at § 679.4(d). The maximum LOA of a vessel with license qualification will be determined by the Regional Administrator as follows:

   a. For a vessel with license qualification that is less than 125 ft LOA, the maximum LOA will be equal to 1.2 times the vessel's original qualifying length or 125 ft, whichever is less; and

   b. For a vessel with license qualification that is equal to or greater that 125 ft, the maximum LOA will be equal to the vessel's original qualifying length.

   If a vessel upgrades under the "20 percent rule" to a length which falls into a larger license length designation after June 17, 1995, then the vessel owner would be initially allocated a license and endorsement(s) based on the vessels June 17, 1995, length. Those licenses and endorsements could not be used on the qualifying vessel, and the owner would be required to obtain a license for that vessel's designation before it could be fished.

8. License Ownership Caps. No more than 10 general groundfish licenses may be purchased or controlled by a "person", with grandfather rights to those persons who exceed this limit in the initial allocation. Persons with grandfather rights from the initial allocation must be under the 10 general license cap before they will be allowed to purchase any additional licenses. A "person" is defined as those eligible to document a fishing vessel under Chapter 121, Title 46, U.S.C. For corporations, the cap would apply to the corporation and not to share holders within the corporation.

9. Vessel License Use Caps. There is no limit on the number of licenses (or endorsements) that may be used on a vessel.

10. Changing Vessel Designations. If a vessel qualifies as a catcher processor, it may select a one time (permanent) conversion to a catcher vessel designation.

11. Implement a Skipper Reporting System. NMFS will implement a skipper reporting system that requires groundfish license holders to report skipper names, addresses, and service records.

12. Vessels Targeting Non-groundfish Species. Vessels targeting non-groundfish species that are allowed to land incidentally taken groundfish species without a Federal permit before implementation of the groundfish license program, will be allowed to continue to land bycatch amounts of groundfish without having a valid groundfish license. Additionally, vessels targeting sablefish and halibut under the IFQ program will continue to be allowed to retain bycatch amounts of groundfish species.

13. CDQ Vessel Exemption. Vessels less than 125 ft LOA obtained under an approved CDQ plan to participate in both CDQ and non-CDQ fisheries will be allowed to continue to fish both fisheries without a license, provided such vessel was under construction or operating in an existing community development plan as of October 9, 1998. If the vessel is sold outside the CDQ plan, the vessel will no longer be exempt from the rules of the license program.

14. Lost Vessels. Vessels that qualified for the moratorium and were lost, damaged, or otherwise out of the fishery due to factors beyond the control of the owner and which were replaced or otherwise reentered the fishery in accordance with the moratorium rules, and which made a landing any time between the time the vessel left the fishery and June 17, 1995, will be qualified for a general license and endorsement for that area.

15. Licenses Represent a Use Privilege. The Council may alter or rescind this program without compensation to license holders; further, licenses may be suspended or revoked for (serious and/or multiple) violations of fisheries regulations.

#### 3.3.1.2 Species and Gear Endorsements for Vessels Using Hook-and-line and Pot Gear

Vessels engaged in directed fishing for Pacific cod in the BSAI management area using hook-and-line and/or pot gear must qualify for a Pacific cod endorsement in addition to holding an area endorsement and general license. The following criteria apply to specific gear types and vessel classes:

- Hook-and-line catcher processors. Must have made at least 270 mt of landings in the directed commercial BSAI Pacific cod fishery (excluding discards) in any one of the years 1996, 1997, 1998, or 1999.
- Hook-and-line catcher vessels ≥60 ft LOA. Must have made at least 7.5 mt of cod landings in the directed commercial BSAI Pacific cod fishery (excluding discards) in any one of the years 1995, 1996, 1997, 1998, or 1999.

- Pot catcher/processors. Must have made at least 300,000 lbs of landings in the directed commercial BSAI Pacific cod fishery (excluding discards) in each of any two of the years 1995, 1996, 1997, or 1998.
- Pot catcher vessels ≥60 ft LOA. Must have made over 100,000 lbs of landings in the directed commercial BSAI Pacific cod fishery (excluding discards) in each of any two of the years 1995, 1996, 1997, 1998, or 1999.

Other Pacific cod endorsement requirements under the License Limitation Program apply as follows:

1. Harvest of CDQ Pacific cod. CDQ vessels shall not be exempt from the Pacific cod endorsements.
2. Vessels Earning Multiple Pacific Cod Endorsements. Vessels that qualify for a Pacific cod endorsement in more than one gear sector shall be issued an endorsement for each sector for which they qualify. Endorsements that are earned by a vessel shall be attached to that vessel's general license. The Pacific cod endorsement(s) shall not be severable from a general license, just as area endorsements are non-severable.
3. Vessels class exemptions. Vessels less than or equal to 32 ft LOA are exempt from the BSAI license limitation program and Pacific cod endorsements. Catcher vessels less than 60 ft LOA are exempt from the Pacific cod endorsements but are required to hold a general license.
4. Bait landings. Properly documented (Alaska Department of Fish and Game fishticket) commercial bait landings will count towards the landing requirements for a Pacific cod endorsement. A Pacific cod endorsement is required to fish Pacific cod in the commercial bait fishery. A Pacific cod endorsement is not required to fish Pacific cod for personal use bait.

Specific hardship and grandfather provisions will be set forth in regulations.

### 3.3.2 Exempted Permits

The Regional Administrator, after consulting with the Director of the Alaska Fisheries Science Center and with the Council, may authorize for limited experimental purposes, the target or incidental harvest of groundfish that would otherwise be prohibited. Exempted fishing permits might be issued for fishing in areas closed to directed fishing, for continued fishing with gear otherwise prohibited, or for continued fishing for species for which the quota has been reached. Exempted fishing permits will be issued by means of procedures contained in regulations.

As well as other information required by regulations, each application for an exempted fishing permit must provide the following information: 1) experimental design (e.g., staffing and sampling procedures, the data and samples to be collected, and analysis of the data and samples), 2) provision for public release of all obtained information, and 3) submission of interim and final reports.

The Regional Administrator may deny an exempted fishing permit for reasons contained in regulations, including a finding that:

a. according to the best scientific information available, the harvest to be conducted under the permit would detrimentally affect living marine resources, including marine mammals and birds, and their habitat in a significant way;
b. issuance of the exempted fishing permit would inequitably allocate fishing privileges among domestic fishermen or would have economic allocation as its sole purpose;

c. activities to be conducted under the exempted fishing permit would be inconsistent with the intent of the management objectives of the FMP;

d. the applicant has failed to demonstrate a valid justification for the permit;

e. the activity proposed under the exempted fishing permit could create a significant enforcement problem; or

f. the applicant failed to make available to the public information that had been obtained under a previously issued exempted fishing permit.

## 3.4 Gear Restrictions

### 3.4.1 Authorized Gear

Gear types authorized by the FMP are trawls, hook-and-line, pots, jigs, and other gear as defined in regulations. Further restrictions on gear which are necessary for conservation and management of fishery resources and which are consistent with the goals and objectives of the FMP are found at 50 CFR Part 679. Additional gear limitations by specific target fishery are described in Section 3.4.2.

### 3.4.2 Target Fishery-Specific

<u>Pollock</u>

The use of nonpelagic trawl gear in the directed fishery for pollock is prohibited.

## 3.5 Time and Area Restrictions

Management measures in place in the BSAI groundfish fisheries constrain fishing both temporally and spatially. In Section 3.5.1, criteria for determining fishing seasons are described. Area restrictions by gear type are described in Section 3.5.2. The FMP also authorizes the use of either temporal or spatial restrictions for marine mammal conservation, as detailed in Section 3.5.3. Section 3.5.4 addresses exemptions to the time and area restrictions in the FMP or its implementing regulations.

### 3.5.1 Fishing Seasons

Fishing seasons are defined as periods when harvesting groundfish is permitted. Fishing seasons will normally be within a calendar year, if possible, for statistical purposes, but could span two calendar years if necessary. In consultation with the Council, the Secretary will establish all fishing seasons by regulations that implement the FMP, to accomplish the goals and objectives of the FMP, the Magnuson-Stevens Act, and other applicable law. Season openings will remain in effect unless amended by regulations implementing the FMP.

The Council will consider the following criteria when recommending regulatory amendments:

- <u>biological</u>: spawning periods, migration, and other biological factors;
- <u>bycatch</u>: biological and allocative effects of season changes;
- <u>exvessel and wholesale prices</u>: effects of season changes on prices;
- <u>product quality</u>: producing the highest quality product to the consumer;

- safety: potential adverse effects on people, vessels, fishing time, and equipment;
- cost: effects on operating costs incurred by the industry as a result of season changes;
- other fisheries: possible demands on the same harvesting, processing, and transportation systems needed in the groundfish fishery;
- coordinated season timing: the need to spread out fishing effort over the year, minimize gear conflicts, and allow participation by all elements of the groundfish fleet;
- enforcement and management costs: potential benefits of seasons changes relative to agency resources available to enforce and manage new seasons; and
- allocation: potential allocation effects among users and indirect effects on coastal communities.

### 3.5.2 Area Restrictions

#### 3.5.2.1 Trawl Gear Only

The following time and area restrictions apply to some or all trawl vessels. Other time and area restrictions that may apply to trawl vessels are triggered by the attainment of a bycatch limit. These restrictions are described in Section 3.6.2.

##### 3.5.2.1.1 Crab and Halibut Protection Zone

The crab and halibut protection zone is closed to all trawling from January 1 to December 31. For the period March 15 to June 15, the western border of the zone extends westward. See Appendix B and Figure 3-2.

##### 3.5.2.1.2 Pribilof Islands Habitat Conservation Area

The Pribilof Islands Habitat Conservation Area is closed to all trawling from January 1 to December 31. See Appendix B and Figure 3-3.

##### 3.5.2.1.3 Chum Salmon Savings Area

The Chum Salmon Savings Area is closed to trawling from August 1 through August 31. See Appendix B and Figure 3-4. Trawling is also prohibited in this area upon the attainment of an ‘other salmon’ bycatch limit; see description under Section 3.6.2.

##### 3.5.2.1.4 Red King Crab Savings Area

The Red King Crab Savings Area is closed to non-pelagic trawling year round, except that when the Regional Administrator of NMFS, in consultation with the Council, determines that a guideline harvest level for Bristol Bay red king crab has been established, he or she may open a subarea of the Red King Crab Savings Area to non-pelagic trawling. See Appendix B and Figure 3-5.

##### 3.5.2.1.5 Nearshore Bristol Bay Trawl Closure

The Nearshore Bristol Bay area is closed to all trawling on a year round basis, except a subarea that remains open to trawling during the period April 1 to June 15 each year. See Appendix B and Figure 3-6.

### 3.5.2.1.6 Catcher Vessel Operational Area

Catcher/processors identified in the American Fisheries Act (see Section 3.7.2) are prohibited from engaging in directed fishing for pollock in the catcher vessel operational area (CVOA) during the non-roe ("B") season, unless they are participating in a community development quota fishery (see Section 3.7.3). See Appendix B and Figure 3-7.

**Figure 3-2 Crab and Halibut Protection Zone.**

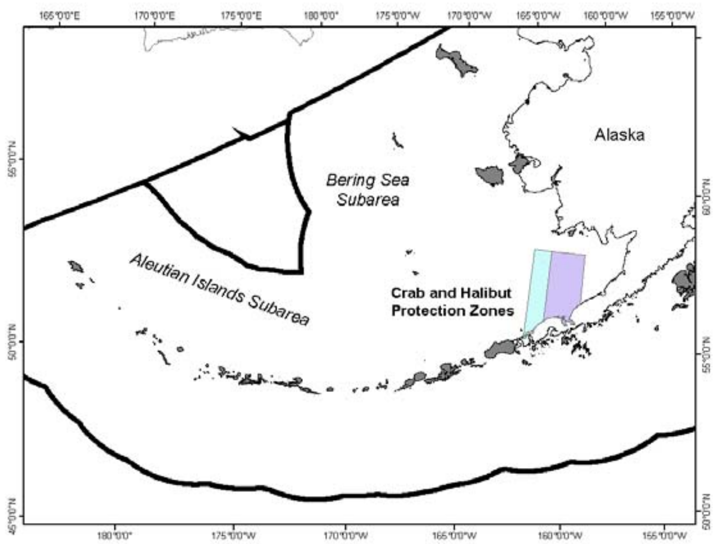



**Figure 3-3 Pribilof Island Habitat Conservation Area.**

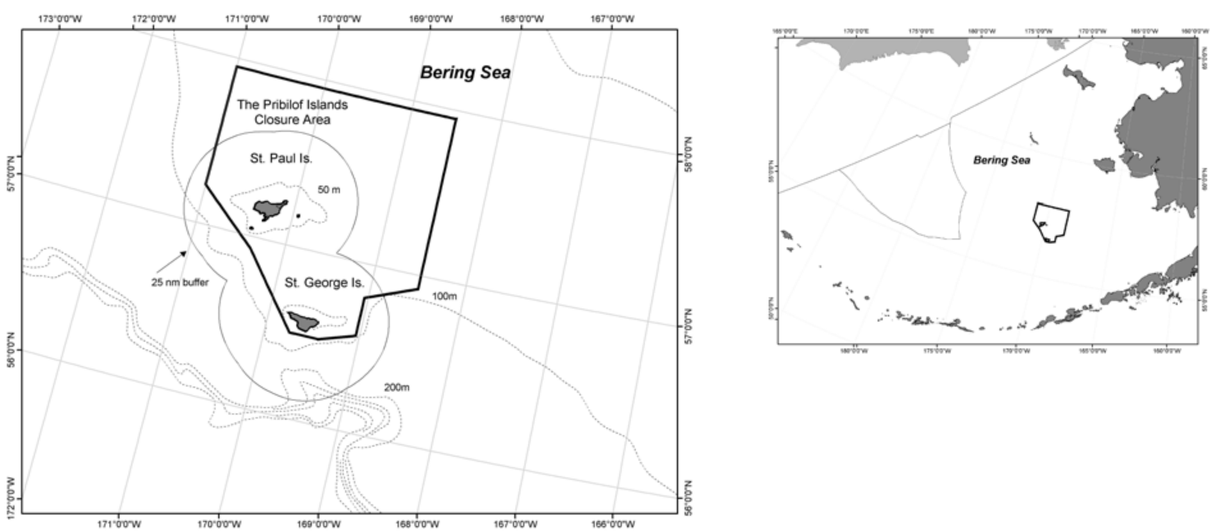


**Figure 3-4 Chum Salmon Savings Area.**

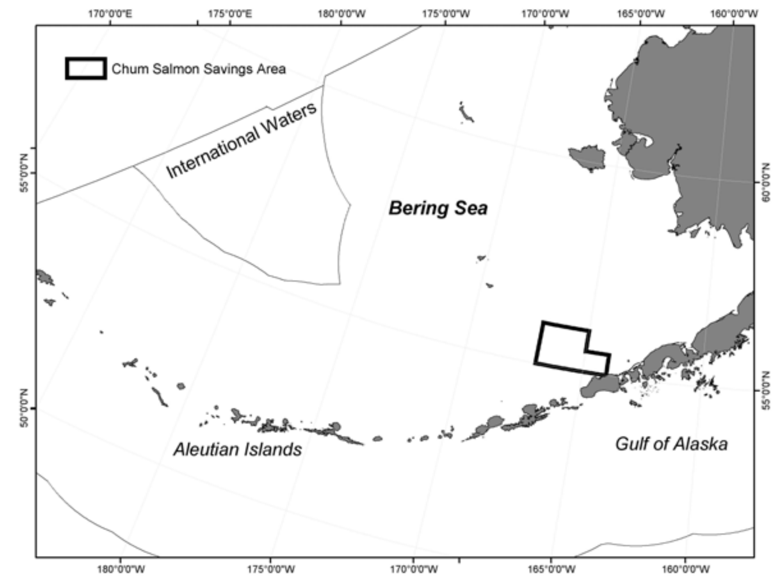



**Figure 3-5 Red King Crab Savings Area.**

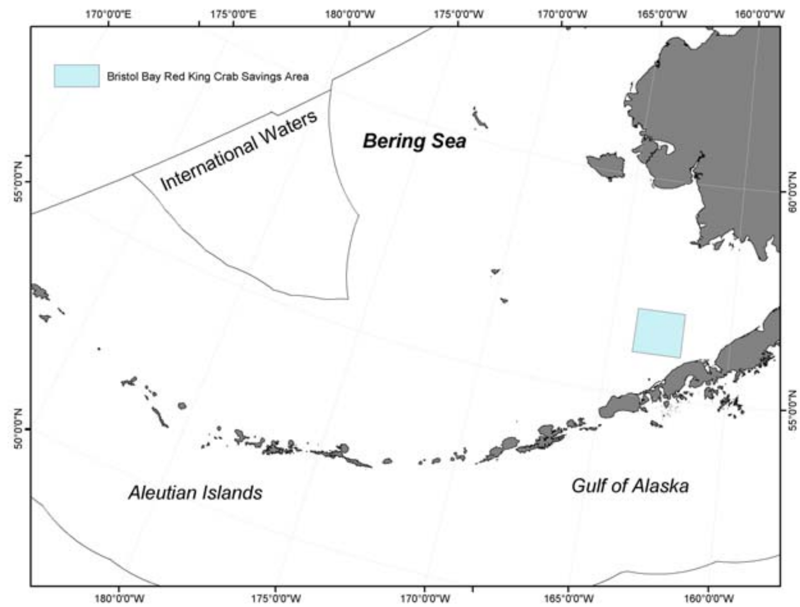


**Figure 3-6 Nearshore Bristol Bay Trawl Closure.**

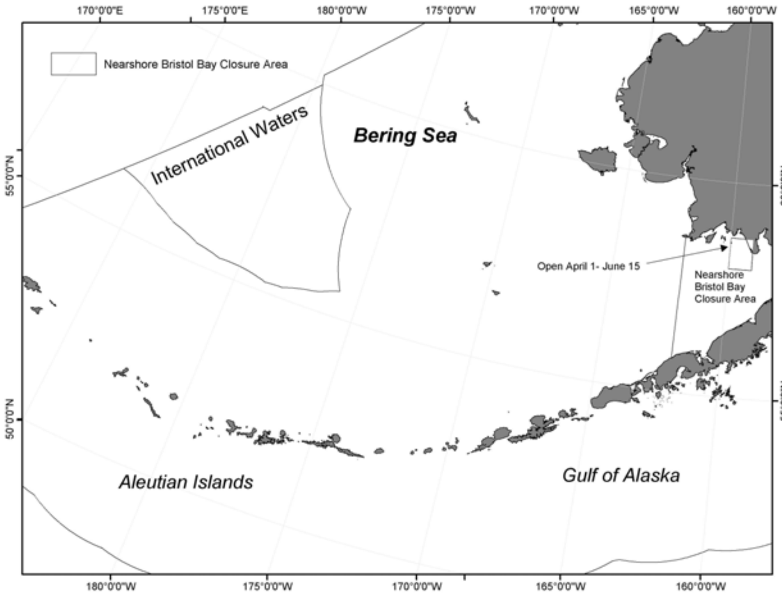
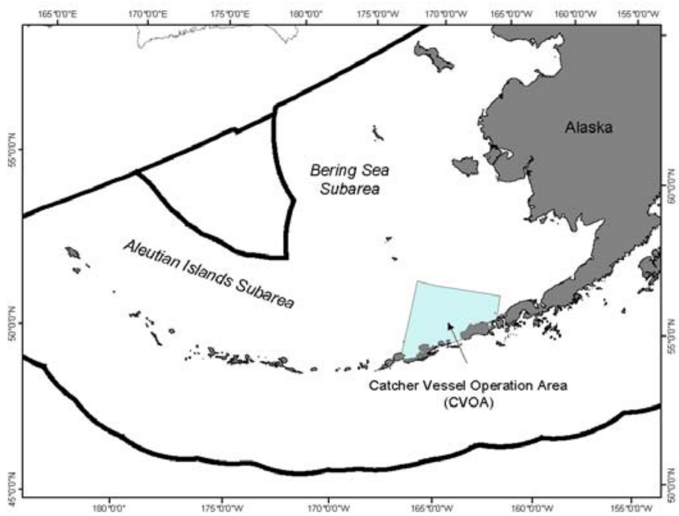



**Figure 3-7 Catcher Vessel Operational Area.**




### 3.5.3 Marine Mammal Conservation Measures

Regulations implementing the FMP may include special groundfish management measures intended to afford species of marine mammals additional protection other than that provided by other legislation. These regulations may be especially necessary when marine mammals species are reduced in abundance. Regulations may be necessary to prevent interactions between commercial fishing operations and marine mammal populations when information indicates that such interactions may adversely affect marine mammals, resulting in reduced abundance and/or reduced use of areas important to marine mammals. These areas include breeding and nursery grounds, haul out sites, and foraging areas that are important to adult and juvenile marine mammals during sensitive life stages.

Regulations intended to protect marine mammals might include those that would limit fishing effort, both temporarily and spatially, around areas important to marine mammals. Examples of temporal measures are seasonal apportionments of TAC specifications. Examples of spatial measures could be closures around areas important to marine mammals. The purpose of limiting fishing effort would be to prevent harvesting excessive amounts of the available TAC or seasonal apportionments thereof at any one time or in any one area.

### 3.5.4 Gear Test Areas

The Council may promulgate regulations establishing areas where specific types of fishing gear may be tested, to be available for use when the fishing grounds are closed to that gear type. Specific gear test areas contained in regulations that implement the FMP, and changes to the regulations, will be done by regulatory amendment. These gear test areas would be established in order to provide fishermen the opportunity to ensure that their gear is in proper working order prior to a directed fishery opening. The test areas must conform to the following conditions:

1. depth and bottom type must be suitable for testing the particular gear type;
2. must be outside State waters;
3. must be in areas not normally closed to fishing with that gear type;
4. must be in areas that are not usually fished heavily by that gear type; and
5. must not be within a designated Steller sea lion protection area at any time of the year.

## 3.6 Catch Restrictions

This section describes the retention and utilization restrictions for the groundfish fisheries, including prohibited species restrictions and incentive programs to reduce bycatch.

### 3.6.1 Prohibited Species

Pacific halibut, Pacific herring, Pacific salmon and steelhead, king crab, and Tanner crab are prohibited species and must be avoided while fishing for groundfish and must be returned to the sea with a minimum of injury except when their retention is authorized by other applicable law.

Groundfish species and species groups under this FMP for which the TAC has been achieved shall be treated in the same manner as prohibited species.

#### 3.6.1.1 Prohibited Species Donation Program

The Prohibited Species Donation Program authorizes the distribution of specified prohibited species, taken as bycatch in the groundfish trawl fisheries off Alaska, to economically disadvantaged individuals through a NMFS-authorized distributor selected by the Regional Administrator in accordance with regulations that implement the FMP. The program is limited to the following species:

1. Pacific salmon
2. Pacific halibut

### 3.6.2 Prohibited Species Catch Limits

When a target fishery, as specified in regulations implementing the FMP, attains a prohibited species catch (PSC) limit apportionment or seasonal allocation as described in the FMP (Section 3.6.2.1) and specified in regulations implementing the FMP, the bycatch zone(s) or management area(s) to which the PSC limit apportionment or seasonal allocation applies (described in Section 3.6.2.2) will be closed to that target fishery (or components thereof) for the remainder of the year or season, whichever is applicable. The procedure for apportioning PSC limits is detailed in Section 3.6.2.3.

#### 3.6.2.1 Individual Species Limits

The following species have PSC limits specified either in the FMP or in regulations implementing the FMP: red king crab, *Chionoecetes bairdi*, *C. opilio*, Pacific halibut, Pacific herring, Chinook salmon, and other salmon.

##### 3.6.2.1.1 Red King Crab

A PSC limit for red king crab in Zone 1 (as described in Section 3.6.2.2.1) is established in the following manner:

- When the number of mature female red king crab is below or equal to the threshold of 8.4 million mature crab, or the spawning biomass is less than 14.5 million lbs, the Zone 1 PSC limit will be 32,000 red king crab.
- When the number of mature female red king crab is above the threshold of 8.4 million mature crab and the effective spawning biomass is equal to or greater than 14.5 but less than 55 million lbs, the Zone 1 PSC limit will be 97,000 red king crab.
- When the number of mature female red king crab is above the threshold of 8.4 million mature crab, and the effective spawning biomass is equal to or greater than 55 million lbs, the Zone 1 PSC limit will be 197,000 red king crab.

##### 3.6.2.1.2 *C. bairdi* Crab

The PSC limit for *C. bairdi* Tanner crab is established in regulations implementing the FMP based on their abundance as indicated by the NMFS bottom trawl survey.

##### 3.6.2.1.3 *C. opilio* Crab

The PSC limit for *C. opilio* crab is established in regulations implementing the FMP based on their total abundance as estimated by the NMFS bottom trawl survey. Minimum and maximum PSC limits are also established in regulation.

##### 3.6.2.1.4 Pacific Halibut

Annual BSAI-wide Pacific halibut bycatch mortality limits for trawl and non-trawl gear fisheries will be established in regulations and may be amended by regulatory amendment. When initiating a regulatory amendment to change a halibut bycatch mortality limit, the Secretary, after consultation with the Council, will consider information that includes:

1. estimated change in halibut biomass and stock condition;

2. potential impacts on halibut stocks and fisheries;
3. potential impacts on groundfish fisheries;
4. estimated bycatch mortality during prior years;
5. expected halibut bycatch mortality;
6. methods available to reduce halibut bycatch mortality;
7. the cost of reducing halibut bycatch mortality; and
8. other biological and socioeconomic factors that affect the appropriateness of a specific bycatch mortality limit in terms of FMP objectives.

#### 3.6.2.1.5 Pacific Herring

The annual PSC limit of Pacific herring caught while conducting a trawl fishery for groundfish in the BSAI management area is one percent of the annual biomass of herring in the eastern Bering Sea.

#### 3.6.2.1.6 Chinook Salmon

PSC limits for Chinook salmon are established for the Bering Sea and Aleutian Islands subareas in regulations implementing the FMP.

#### 3.6.2.1.7 Other Salmon

When the Regional Administrator determines that 42,000 non-Chinook salmon have been caught by vessels using trawl gear during the time period of August 15 through October 14 in the catcher vessel operational area (see Section 3.5.2.1.6), NMFS will prohibit fishing with trawl gear for the remainder of the period September 1 through October 14 in the chum salmon savings area (see Section 3.6.2.2.3). Accounting for the 42,000 fish PSC limit will begin on August 15.

### 3.6.2.2 PSC Limitation Zones

Restrictions within the following areas are triggered by the attainment of bycatch limits as described in the FMP (Section 3.6.2.1) or specified in regulations implementing the FMP. Annual area closures that may also serve to limit the bycatch of prohibited species are listed in Section 3.5.2.

#### 3.6.2.2.1 Zones 1 and 2

Zones 1 and 2 close to directed fishing when crab bycatch limits, as specified in regulations, are attained in specific fisheries. The areas are described in Appendix B and Figure 3-8.

#### 3.6.2.2.2 *C. Opilio* Bycatch Limitation Zone

Upon attainment of the *C. Opilio* Bycatch Limitation Zone (COBLZ) bycatch allowance of *C. opilio* crab specified for a particular fishery category, the COBLZ will be closed to directed fishing for each category for the remainder of the year or for the remainder of the season. The area is described in Appendix B and Figure 3-9.

#### 3.6.2.2.3 Herring Savings Areas

If the Regional Administrator determines that the PSC limit of herring is attained, the herring savings areas may be closed for the remainder of the year or season. The herring savings areas are any of the three areas described in Appendix B and Figure 3-10. Summer Herring Savings Area 1 applies from June 15 through July 1 of a fishing year. Summer Herring Savings Area 2 applies July 1 through August 15 of a fishing year. Winter Herring Savings Area applies from September 1 through March 1 of the succeeding fishing year. Openings and closures begin and end at noon local time.

#### 3.6.2.2.4 Chum Salmon Savings Area

Upon attainment of the limit described in Section 3.6.2.1.7, NMFS will prohibit fishing with trawl gear for the remainder of the period September 1 through October 14 in the chum salmon savings area (described in Appendix B and Figure 3-4). This area is also closed to all trawling from August 1 through August 31, as described in Section 3.5.2.1.3.

#### 3.6.2.2.5 Chinook Salmon Savings Areas

If the Regional Administrator determines that the Bering Sea subarea PSC limit of Chinook salmon is caught while harvesting pollock with trawl gear in the Bering Sea subarea between January 1 and December 31, NMFS will prohibit directed fishing for pollock with trawl gear in Chinook salmon savings areas 1 and 2 (described in Appendix B and Figure 3-11), during time periods specified in regulations.

If the Regional Administrator determines that the Aleutian Islands subarea PSC limit of Chinook salmon is caught while harvesting pollock with trawl gear in the Aleutian Islands subarea between January 1 and December 31, NMFS will prohibit directed fishing for pollock with trawl gear in Chinook salmon savings area 1 (described in Appendix B and Figure 3-11), during time periods specified in regulations.

**Figure 3-8 Crab PSC Limitation Zones 1 and 2.**

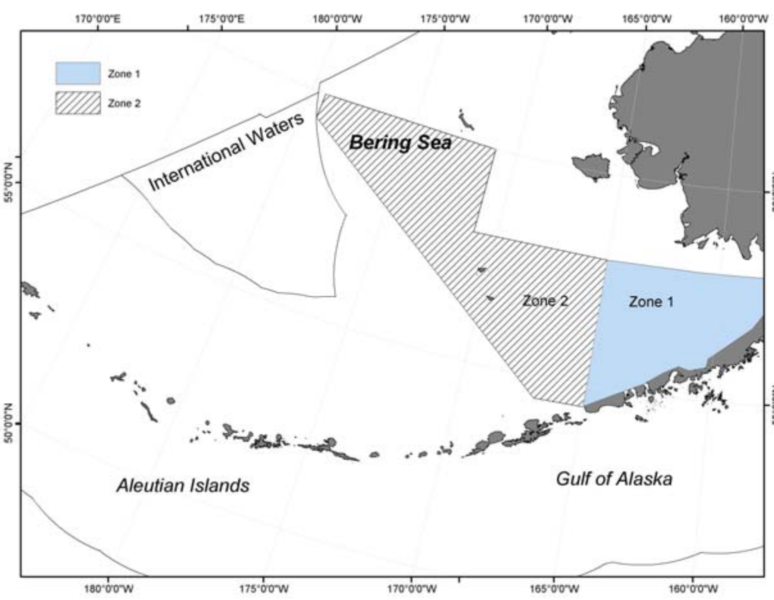


**Figure 3-9 *Chinoecetes opilio* Bycatch Limitation Zone.**

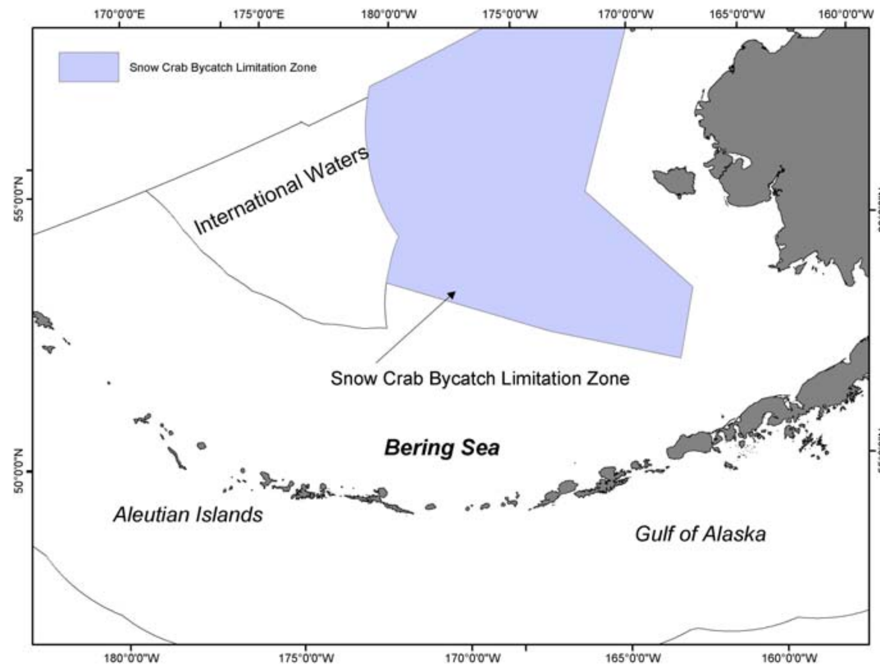



**Figure 3-10 Herring Savings Areas.**

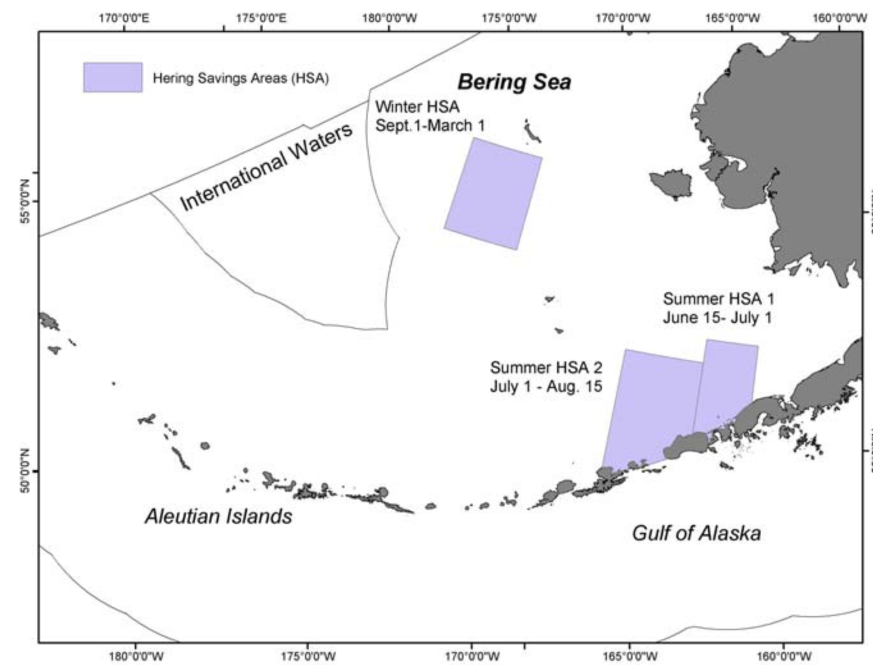
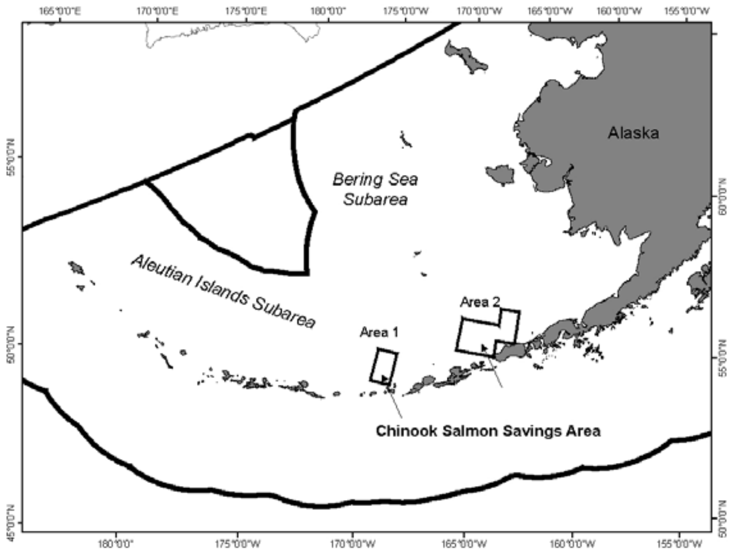


**Figure 3-11 Chinook Salmon Savings Areas.**




## 3.6.2.3 Apportionment of Prohibited Species Catch Limits

### 3.6.2.3.1 Target Fishery Categories

Trawl fisheries: The Pacific halibut PSC limit for trawl gear and the PSC limits for *C. bairdi* crab, *C. opilio* crab, red king crab, and herring apply to trawl fisheries for groundfish that are categorized by target species or species groups.

Non-trawl fisheries: The Pacific halibut PSC limit for non-trawl gear applies to non-trawl groundfish fisheries that may be categorized by target species or species groups, gear type, and area.

Fishery categories will be implemented by regulations that implement the goals and objectives of the FMP, the Magnuson-Stevens Act, and other applicable law. Fishery categories will remain in effect unless amended by regulations implementing the FMP. When recommending a regulatory amendment to revise fishery categories, the Council will consider the best information available on whether recommended fishery categories would best optimize groundfish harvests under the PSC limits established under Section 3.6.2.

### 3.6.2.3.2 Apportionments and Seasonal Allocations

Apportionments of PSC limits to target fishery categories established in Section 3.6.2.3.1, and seasonal allocations of those apportionments may be determined annually by the Secretary of Commerce, after consultation with the Council, using the following procedure:

1. Prior to the October Council meeting. The Plan Team will provide the Council the best available information on estimated prohibited species bycatch and mortality rates in the target groundfish fisheries, and estimates of seasonal and annual bycatch rates and amounts.

2. October Council meeting. While recommending proposed groundfish harvest levels under Section 3.2.3, the Council will also review the need to control the bycatch of prohibited species and will recommend appropriate apportionments of PSC limits to fishery categories as bycatch allowances.

Fishery bycatch allowances are intended to optimize total groundfish harvest under established PSC limits, taking into consideration the anticipated amounts of incidental catch of prohibited species in each fishery category. The Council may recommend exempting specified non-trawl fishery categories from the non-trawl halibut bycatch mortality limit restrictions after considering the same factors (1) through (8) set forth under Section 3.6.2.1.4. The Council will also review the need for seasonal apportionments of fishery bycatch allowances.

The Council will consider the best available information when recommending fishery apportionments of PSC limits and seasonal allocation of those apportionments. Types of information that the Council will consider relevant to seasonal allocation of fishery bycatch quotas include:

a. seasonal distribution of prohibited species;

b. seasonal distribution of target groundfish species relative to prohibited species distribution;

c. expected prohibited species bycatch needs on a seasonal basis relevant to changes in prohibited species biomass and expected catches of target groundfish species;

d. expected bycatch rates on a seasonal basis;

e. expected changes in directed groundfish fishing seasons;

f. expected start of fishing effort; and

g. economic effects of establishing seasonal halibut allocations on segments of the target groundfish industry.

3. As soon as practicable after the Council's October meeting, the Secretary will publish the Council's recommendations as a notice in the *Federal Register*. Information on which the recommendations are based will also be published in the *Federal Register* or otherwise made available by the Council. Public comments will be invited by means specified in regulations implementing the FMP.

4. Prior to the December Council meeting. The Plan Team will prepare for the Council a final SAFE report under Section 3.2.3 which provides the best available information on estimated prohibited species bycatch rates in the target groundfish fisheries, recommendations for halibut PSC limits and apportionments thereof among the target fisheries and gear types, and also may include an economic analysis of effects of the apportionments.

5. December Council meeting. While recommending final groundfish harvest levels, the Council reviews public comments, takes public testimony, and makes final decisions on apportionments of PSC limits among fisheries and seasons, using the factors (a) through (g) set forth under (2) above. The Council also makes final decisions on the exemption of any non-trawl fishery category from halibut bycatch mortality restrictions using the factors (1) through (8) set forth under Section 3.6.2.1.4.

6. As soon as practicable after the Council's December meeting, the Secretary will publish the Council's final decisions as a notice in the *Federal Register*. Information on which the final recommendations are based will also be published in the *Federal Register* or otherwise made available by the Council.

### 3.6.3 Retention and Utilization Requirements

#### 3.6.3.1 Utilization of Pollock

Roe-stripping of pollock is prohibited, and the Regional Administrator is authorized to issue regulations to limit this practice to the maximum extent practicable. It is the Council's policy that the pollock harvest shall be utilized to the maximum extent possible for human consumption.

#### 3.6.3.2 Improved Retention/Improved Utilization Program

Minimum retention requirements

All vessels participating in the groundfish fisheries are required to retain all catch of Improved Retention/ Improved Utilization Program (IR/IU) species, pollock and Pacific cod, when directed fishing for those species is open, regardless of gear type employed and target fishery. When directed fishing for an IR/IU species is prohibited, retention of that species is required only up to any maximum retainable amount in effect for that species, and these retention requirements are superseded if retention of an IR/IU species is prohibited by other regulations.

No discarding of whole fish of these species is allowed, either prior to or subsequent to that species being brought on board the vessel except as permitted in the regulations. At-sea discarding of any processed product from any IR/IU species is also prohibited, unless required by other regulations.

Minimum utilization requirements

All IR/IU species caught in the BSAI must be either 1) processed at sea subject to minimum product recovery rates and/or other requirements established by regulations implementing the FMP, or 2) delivered in their entirety to onshore processing plants for which similar processing requirements are implemented by State regulations.

### 3.6.4 Bycatch Reduction Incentive Programs

#### 3.6.4.1 Prohibited Species Catch

The Secretary of Commerce, after consultation with the Council, may implement by regulation measures that provide incentives to individual vessels to reduce bycatch rates of prohibited species for which PSC limits are established under Section 3.6.2. The intended effect of such measures is to increase the opportunity to harvest groundfish TACs before established PSC limits are reached.

## 3.7 Share-based Programs

This section describes the share-based programs that are in place for specific target fisheries in the Bering Sea and Aleutian Islands groundfish fisheries.

### 3.7.1 Fixed Gear Sablefish Fishery

The directed fixed gear sablefish fishery is managed under an Individual Fishing Quota (IFQ) program, implemented in 1994-1995. This form of limited entry replaced the open access fisheries for sablefish in the BSAI management area.

#### 3.7.1.1 Definitions

For purposes of Section 3.7.1, the following definitions of terms apply:

Person means any individual who is a citizen of the United States or any corporation, partnership, association, or other entity (whether or not organized or existing under the laws of any state) that meets the requirements set forth in 46 CFR Part 67.03, as applicable.

An Individual means a natural person who is not a corporation, partnership, association, or other entity.

Quota shares (QS) are equal to a person's fixed gear landings (qualifying pounds) for each area fished.

The Quota Share Pool is the total amount of quota share in each management area. The quota share pool may change over time due to appeals, enforcement, or other management actions.

Individual Fishing Quota (IFQ) means the annual poundage of fish derived by dividing a person's quota share into the quota share pool and multiplying that ratio by the annual fixed gear TAC for each management area.

Fixed Gear is defined to include all hook and line fishing gears (longlines, jigs, handlines, troll gear, and pot gear).

Catcher boat or catcher vessel means any vessel that delivers catch or landing in an unfrozen state.

Freezer longliner means any vessel engaged in fishing in the fixed gear fishery which, during a given trip, utilizes freezer capacity and delivers some or all of its groundfish catch in a frozen state.

Qualified crewmember is defined as any person that has acquired commercial fish harvesting time at sea (i.e. fish harvesting crew) equal to 5 months of any commercial fish harvesting activity in a fishery in state or federally managed waters of the U.S.. Additionally, any individual who receives an initial allocation of quota share will be considered a bona fide crew member.

#### 3.7.1.2 Management Areas

Quota shares and IFQs are made available for the Bering Sea and Aleutian Islands management sub-areas identified in this FMP.

#### 3.7.1.3 Initial Allocation of Quota Shares

##### 3.7.1.3.1 Initial Recipients

1. Initial assignments of quota shares are made to:
   a. a qualified person who is a vessel owner who meets the requirements in this section; or
   b. a qualified person who meets the requirements of this section engaged in a lease of a fishing vessel (written or verbal) or other "bare-boat charter" arrangement in order to participate in the fishery. (For instances identified under this section, the qualified person shall receive full credit for deliveries made while conducting the fishery under such a lease or arrangement.)
2. Initial quota shares for sablefish are assigned only to persons who meet all other requirements of this section and who have landed those species in any one of the following years: 1988, 1989, or 1990. These three years shall be known as the quota share qualifying years.
3. Quota shares are assigned initially for each management subarea to qualified persons based on recorded landings, as documented through fish tickets or other documentation for fixed gear landings.

Historical catch of sablefish is counted from 1985 through 1990. This historical period is known as the quota share base period. For each management subarea, NMFS will select a person's best five (5) years (subject to approval of the person involved) from the quota share base period to calculate their quota shares.

4. The sum of the catch in each person's five (5) selected years for each area shall equal that person's quota shares for that area. All quota share in any area are added together to form the "Quota Share Pool" for that area.

#### 3.7.1.3.2 Vessel Categories

Quota shares and IFQs shall be assigned by vessel category as follows:

1. Freezer Longliner Shares:

   A vessel is determined to be a freezer longliner in any year, if during that year it processed (froze) fixed gear (as defined above) caught groundfish. If a vessel is determined to be a freezer longliner and that vessel was used in the most recent calendar year of participation by the owner through September 25, 1991, then all qualifying pounds landed by that vessel owner during the qualifying years shall be assigned as freezer longliner shares, unless the owner also participated in the most recent year through September 25, 1991, operating only as a catcher vessel, then shares will be assigned to separate categories, in proportion to the catch made aboard each of the vessels.

2. Catcher Vessel Shares:

   a. All landings made during the quota share base period by a vessel owner, whose last vessel that participated in a fixed gear fishery through September 25, 1991, is determined to be a catcher vessel, shall be allocated catcher vessel quota shares.

   b. There are two categories of catcher vessel shares for the sablefish QS/IFQ fishery:

      i. vessels less than or equal to 60 ft in length overall, and

      ii. vessels greater than 60 ft in length overall.

   c. For initial allocation of catcher vessel quota shares:

      i. if, during the last year of participation in a fixed gear fishery through September 25, 1991, a quota share recipient simultaneously owned or leased two or more vessels on which sablefish were landed, and those vessels were in different vessel categories, then the quota share allocation is for each vessel category and may not be combined into a single category.

      ii. if a quota share recipient bought or sold vessels in succession during the qualifying period, and to the extent the quota share recipient operations were in one vessel category during one year and the next vessel owned was in another vessel category, the quota share is combined and applied to the latest vessel category of ownership as of September 25, 1991.

3. Community Development Quota (CDQ) Compensation Quota Share:

   All CDQ compensation quota share initially issued to a person in an IFQ regulatory area in which that person does not hold quota share is designated as uncategorized catcher vessel quota share, except if the CDQ compensation quota share initially issued to a person in an IFQ regulatory area in which that person does not hold quota share is issued as compensation for quota share foregone in the freezer vessel category, in which case it is designated as freezer vessel quota share. The IFQ resulting from uncategorized catcher vessel quota share can be fished on a vessel of any length. CDQ compensation quota share will remain uncategorized until it is transferred; upon transfer the CDQ compensation quota share must be designated in a specific catcher vessel category.

#### 3.7.1.3.3 Quota Share Blocks

1. All initial allocations of sablefish quota share and all CDQ compensation quota share initially issued to a person in an IFQ regulatory area that would result in less than 20,000 lbs of IFQ based on the 1994 TAC for the fixed gear sablefish fishery in that area are issued as a quota share block.
2. All initial allocations of sablefish quota share that would result in at least 20,000 lbs of IFQ based on the 1994 TAC for the fixed gear sablefish fishery in that area, and all CDQ compensation quota share initially issued to a persons in an IFQ regulatory area in which that person does not hold quota share, are issued as unblocked quota share.

### 3.7.1.4 Transfer Provisions

1. Any person owning freezer longliner quota shares may sell or lease those quota shares to any other qualified person for use in the freezer longliner category.
2. Any person owning catcher vessel quota shares may sell those quota shares to any person meeting the provisions outlined in this section. Ten percent of a person's catcher vessel quota shares may be leased during the first three years following implementation.
3. In order to purchase or lease quota share, the purchaser must be an individual who is a U.S. citizen and a bona fide fixed gear crew member. Additionally, persons who received an initial allocation of catcher vessel quota shares may purchase catcher vessel quota shares and/or IFQs.
4. Quota shares, or IFQs arising from those quota shares, for any management area may not be transferred to any other management area or between the catcher vessel and the freezer vessel categories. Quota shares, or IFQs arising from those quota shares, initially issued to Category B vessels may be used on Category C vessels.
5. The Secretary may, by regulation, designate exceptions to this section to be employed in case of personal injury or extreme personal emergency which allow the transfer of catcher vessel quota shares or IFQs for limited periods of time.
6. Quota share designated as a "block" may only be traded in its entirety and may not be divided into smaller quota share units. Blocks of quota share representing IFQs of less than 5,000 lbs in the initial allocation may be combined or "swept-up", to form larger blocks, as long as the consolidated block does not result in IFQs greater than 5,000 lbs.

### 3.7.1.5 Use and Ownership Provisions

1. Fish caught with freezer longliner IFQs may be delivered frozen or unfrozen.
2. Fish caught with catcher vessel quota shares may not be frozen aboard the vessel utilizing those quota shares.
3. Sablefish IFQ resulting from quota share assigned to vessel categories B and C may be used on a vessel with processing capacity as long as processed sablefish or halibut is not on the vessel during that same trip. Further, non-IFQ species may be processed on a vessel using sablefish IFQ resulting from quota share assigned to vessel categories B and C.
4. In order to use catcher boat IFQs the user must: 1) own or lease the quota share, 2) be a U.S. citizen, 3) be a bona fide crew member, 4) be aboard the vessel during fishing operations, and 5) sign the fish ticket upon landing except as noted in (5) below, or in emergency situations.

5. Persons, as defined in Section 3.7.1.1, who receive initial catcher vessel quota share may utilize a hired skipper to fish their quota providing the person owns the vessel upon which the quota share will be used, or the vessel is owned by a person with whom the quota share holder is affiliated through membership in a corporation or partnership. These initial recipients may purchase up to the total share allowed for the area. There shall be no leasing of such catcher vessel quota share other than as provided for in Section 3.7.1.4 above.

   This provision will cease upon the sale or transfer of quota share or upon any change in the identity of the corporation, partnership, or estate as defined below:

   a. Corporation: Any corporation that has no change in membership, except a change caused by the death of a corporate member providing the death did not result in any new corporate member. Additionally, corporate membership is not deemed to change if a corporate member becomes legally incapacitated and a trustee is appointed to act on his behalf, nor is corporate membership deemed to have changed if the ownership shares among existing members change, nor is corporate membership deemed to have changed if a member leaves the corporation.

   b. Partnership: Any partnership that has no change in membership, except a change caused by the death of a partner providing the death did not result in any new partners. Additionally, a partnership is not deemed to have changed if a partner becomes legally incapacitated and a trustee is appointed to act on his behalf, nor is a partnership deemed to have changed if the ownership shares among existing partners change, nor is a partnership deemed to have changed if a partner leaves the partnership.

   c. Estate: Any estate that has not been disposed to a legal heir.

   d. Individual: Any individual as defined in Section 3.7.1.1.

6. For sablefish, each qualified person or individual may own, hold, or otherwise control, individually or collectively, but may not exceed, 3,229,721 units of quota share for the GOA and BSAI.

7. Any person who receives an initial assignment of quota shares in excess of the limits set forth in (6) of this section shall:

   a. be prohibited from purchasing, leasing, holding or otherwise controlling additional quota shares until that person’s quota share falls below the limits set forth in (6) above, at which time each such person shall be subject to the limitations of paragraph (6) above; and

   b. be prohibited from selling, trading, leasing or otherwise transferring any interest, in whole or in part, of an initial assignment of quota share to any other person in excess of the limitations set forth in (6) above.

8. For sablefish, no more than 1 percent of the combined GOA and BSAI quota may be taken on any one vessel.

9. Persons must control IFQs for the amount to be caught before a trip begins, with the exception that limited overages will be allowed as specified in an overage program approved by NMFS and the International Pacific Halibut Commission.

10. Quota Share Block Provisions

    a. A person may own and use up to two blocks in each management area.

    b. Persons owning two blocks in a given management area may not use unblocked quota share in that area.

c. Persons who own less than two blocks in an area may own and use unblocked quota share up to the limits specified under this program, noting that the limit applies to both unblocked quota share and quota share embedded in blocks.

#### 3.7.1.6 Annual Allocation of Quota Share/Individual Fishing Quota

Individual fishing quotas are determined for each calendar year for each person by applying the ratio of a person's quota share to the quota share pool for an area to the annual fixed gear total allowable catch for each management area, after adjusting for the CDQ program. In mathematical terms:

IFQs = (QS / QS pool) x fixed gear TAC.

#### 3.7.1.7 General Provisions

1. For IFQ accounting purposes:
   a. The sale of catcher vessel caught sablefish or halibut to other than a legally registered buyer is illegal, except that direct sale to dockside customers is allowed provided the fisher is a registered buyer and proper documentation of such sales is provided to NMFS.
   b. Frozen product may only be off-loaded at sites designated by NMFS for monitoring purposes;
   c. Persons holding IFQs and wishing to fish must check-in with NMFS or their agents prior to entering any relevant management area, additionally any person transporting IFQ caught fish between relevant management areas must first contact NMFS or their agents.
2. Quota shares and IFQs arising from those quota shares may not be applied to trawl-caught sablefish.
3. Quota shares are a harvest privilege, and good indefinitely. However, they constitute a use privilege which may be modified or revoked by the Council and the Secretary at any time without compensation.
4. Discarding of sablefish is prohibited by persons holding sablefish IFQs and those fishing under the CDQ program.
5. Any person retaining sablefish or halibut with commercial fixed gear must own or otherwise control IFQs.
6. Persons holding IFQs may utilize those privileges at any time during designated seasons. Retention of fixed-gear caught sablefish or any halibut is prohibited during closed seasons. Seasons will be identified by the Council and the International Pacific Halibut Commission on an annual basis.
7. Those persons that would otherwise have received a full complement of sablefish quota share in the BSAI management area, but would receive less due to the provisions of CDQs, will be partially compensated and the cost of the compensation will be borne equally by all initial sablefish QS/IFQ recipients. In general this compensation plan will issue incremental amounts of quota share in each non-CDQ area to each disadvantaged person.

### 3.7.2 American Fisheries Act Pollock Fishery

Subtitle II of the American Fisheries Act (AFA) of 1998, entitled *Bering Sea Pollock Fishery*, directed the Council and NMFS to develop and implement four general categories of management measures: 1) regulations that limit access into the fishing and processing sectors of the BSAI pollock fishery and that allocate pollock to such sectors, 2) regulations governing the formation and operation of fishery cooperatives, 3) regulations that institute sideboard measures to protect other fisheries from spillover effects from the AFA, and 4) regulations governing catch measurement and monitoring in the BSAI pollock fishery. Key provisions are summarized in Appendix C. This entire subtitle of the AFA is incorporated into the FMP by reference and all management measures that are consistent with the provisions of Subtitle II of the AFA will be issued through regulations. The subtitle is reprinted in Appendix C. Certain provisions of the AFA pertaining to the Aleutian Islands directed pollock fishery were superseded by the Consolidated Appropriations Act of 2004, as further described in section 3.7.3.

Subsection 213(c) of the AFA (Appendix C) provides the Council with the authority to recommend management measures to supersede certain provisions of the AFA. Any measure recommended by the Council that supersedes a specific provision of the AFA must be implemented by FMP amendment in accordance with the Magnuson-Stevens Act. Under the authority set out in subsection 213(c) of the AFA, the Council has recommended the following management measures to supersede specific provisions of sections 210 and 211 of the AFA. These measures shall be implemented by NMFS through regulation.

#### 3.7.2.1 Inshore Cooperative Allocation Formula

*(supersedes the inshore cooperative allocation formula set out in subparagraph 210(b)(1)(B) of the AFA)*

An inshore catcher vessel cooperative that applies for and receives an AFA inshore cooperative fishing permit will receive a sub-allocation of the annual Bering Sea subarea inshore sector directed fishing allowance.

Each inshore cooperative's annual allocation amount(s) is determined using the following procedure:

1. Calculation of individual vessel catch histories. The Regional Administrator will calculate an official AFA inshore cooperative catch history for every inshore-sector endorsed AFA catcher vessel according to the following steps:
    a. Determination of annual landings. For each year from 1995 through 1997 the Regional Administrator will determine each vessel's total inshore landings; from the Bering Sea subarea and Aleutian Islands subarea separately.
    b. Offshore compensation. If a catcher vessel made a total of 500 or more mt of landings of Bering Sea subarea pollock or Aleutian Islands subarea pollock to catcher/processors or offshore motherships other than the EXCELLENCE (USCG documentation number 967502); GOLDEN ALASKA (USCG documentation number 651041); or OCEAN PHOENIX (USCG documentation number 296779) over the 3-year period from 1995 through 1997, then all offshore pollock landings made by that vessel during from 1995 through 1997 will be added to the vessel's inshore catch history by year and subarea.
    c. Best two out of three years. After steps (a) and (b) are completed, the 2 years with the highest landings will be selected for each subarea and added together to generate the vessel's official AFA inshore cooperative catch history for each subarea. A vessel's best 2 years may be different for the Bering Sea subarea and the Aleutian Islands subarea.
2. Calculation of annual quota share percentage. Each inshore pollock cooperative that applies for and receives an AFA inshore pollock cooperative fishing permit will receive an annual quota share percentage of pollock for the BS subarea that is equal to the sum of each member vessel's official AFA inshore cooperative catch history divided by the sum of the official AFA inshore cooperative catch histories of all inshore sector-endorsed AFA catcher vessels. The cooperative's quota share percentage will be listed on the cooperative's AFA pollock cooperative permit.
3. Conversion of quota share to annual TAC allocation. Each inshore pollock cooperative that receives a quota share percentage for a fishing year will receive an annual allocation of Bering Sea pollock

that is equal to the cooperative's quota share percentage multiplied by the annual inshore pollock allocation. Each cooperative's annual pollock TAC allocation may be published in the final BSAI TAC specifications notices.

#### 3.7.2.2 Definition of Qualified Catcher Vessel

*(supersedes AFA paragraph 210(b)(3) that has the effect of requiring a qualified catcher vessel to have actually fished for BSAI pollock in the year prior to the year in which the cooperative will be in effect)*

A catcher vessel is qualified to join an inshore catcher vessel cooperative under paragraph 210(b)(3) of the AFA, if:

1. Active vessels. The vessel delivered more pollock harvested in the BS inshore directed pollock fishery to the inshore cooperative's designated AFA inshore processor than to any other shoreside processor or stationary floating processor during the year prior to the year in which the cooperative fishing permit will be in effect; or
2. Inactive vessels. The vessel delivered more pollock harvested in the BS inshore directed pollock fishery to the inshore cooperative's designated AFA inshore processor than to any other shoreside processor or stationary floating processor during the last year in which the vessel harvested BS pollock in the directed fishery for delivery to an AFA inshore processor.

#### 3.7.2.3 Crab Processing Sideboard Limits

*(supersedes the 1995-1997 formula set out in subparagraph 211(c)(2)(A) of the AFA)*

Upon receipt of an application for a cooperative processing endorsement from the owners of an AFA mothership or AFA inshore processor, the Regional Administrator will calculate a crab processing cap percentage for the associated AFA inshore or mothership entity. The crab processing cap percentage for each BSAI king or Tanner crab species is equal to the percentage of the total catch of each BSAI king or Tanner crab species that the AFA crab facilities associated with the AFA inshore or mothership entity processed in the aggregate, on average, in 1995, 1996, 1997, and 1998 with 1998 given double-weight (counted twice).

#### 3.7.2.4 Inshore Cooperative Contract Fishing by non-Member Vessels

*(supersedes subparagraph 210(b)(1)(B) of the AFA that prohibits inshore cooperative vessels from fishing in excess of their cooperative allocation, and paragraph 210(b)(5) of the AFA that prohibits inshore cooperative vessels from fishing for any BSAI pollock that is not allocated to the cooperative under 210(b)(1)(B))*

An inshore catcher vessel cooperative may contract with a non-member vessel to harvest a portion of its inshore pollock allocation provided that the non-member vessel holds an AFA catcher/vessel permit with an inshore processing endorsement and is a member of another inshore cooperative. Procedures for entering into and fishing under such contracts will be established in regulations.

### 3.7.3 Aleutian Islands Directed Pollock Fishery

Section 803 of the Consolidated Appropriations Act of 2004 (Pub. L. 108-199) established the Aleutian Islands directed pollock fishery allocation to the Aleut Corporation. This act supersedes the AFA provisions for the directed pollock fishery in the Aleutian Islands subarea. Beginning in 2004, the non-CDQ directed pollock fishery in the Aleutian Islands is fully allocated to the Aleut Corporation for the purpose of economic development in Adak, Alaska. NMFS, in consultation with the Council, will manage the Aleutian Islands directed pollock fishery to ensure compliance with the implementing statute (Pub. L. 108-199) and with the annual harvest specifications. Management provisions and considerations may include but are not limited to: prohibitions on having pollock from more than one management area on board the vessel, catch monitoring control plan requirements for shoreside and stationary floating processors, Aleut Corporation responsibilities for vessel and processor approval and quota management, observer requirements, and economic development reporting.

The harvest specifications for the Aleutian Islands directed pollock fishery include the following provisions:

1. When the combined BSAI groundfish fishery recommended TACs, without the Aleutian Islands pollock recommended TAC, are equal to the 2 million mt OY specified at §679.20(a)(1)(i), the Aleutian Islands pollock fishery recommended TAC would be funded by reducing the Bering Sea pollock fishery recommended TAC. When the sum of other BSAI groundfish fisehry recommended TACs is below the 2 million mt BSAI OY, the allocation to the Aleutian Islands pollock fishery recommended TAC would be funded from the difference between the sum of all other BSAI groundfish fishery recommended TACs and the OY, to the extent possible in whole or in part. If the difference is only large enough to fund part of the allocation, the remainder of the funding would come from the Bering Sea pollock fishery recommended TAC.

2. The annual Aleutian Islands pollock TAC will equal the limit on the Aleutian Islands pollock TAC specified in regulations when the Aleutian Islands pollock ABC is equal to or more than the limit on the Aleutian Islands pollock TAC specified in regulations. When the Aleutian Islands pollock ABC is less than the limit on the Aleutian Islands pollock TAC specified in regulations, the annual Aleutian Islands pollock TAC will not exceed the annual Aleutian Islands pollock ABC.

3. The CDQ direct fishery allowance and the incidental catch allowance for pollock in the Aleutian Islands will be deducted from the Aleutian Islands annual pollock TAC.

4. The "A" season apportionment will be no greater than the lesser of the annual TAC or 40 percent of the Aleutian Islands pollock ABC. The "A" season pollock harvest (Aleutian Islands directed pollock fishery, any "A" season CDQ fishery, and incidental catch allowance) shall be no more than 40 percent of the Aleutian Islands pollock ABC.

   The directed pollock fishery allocation to the Aleut Corporation for the "B" season will be equal to the annual Aleutian Islands pollock initial TAC minus the incidental catch allowance and minus the "A" season directed pollock fishery allocation. The "B" season allocation may be further adjusted by rollover of unharvested "A" season pollock.

5. Any unharvested pollock initial TAC from the Aleutian Islands fishery that is not expected to be harvested during the fishing year may be reallocated as soon as practicable to the Bering Sea subarea pollock fishery in accordance with regulations.

6. The harvest of the Aleutian Islands directed pollock fishery allocation is limited to vessels eligible to harvest pollock under section 208 of Title II, Division C of Pub. L. 105-277 and vessels 60 feet or less in length over all. During 2005 through 2008, no more than 25 percent of the directed pollock fishery may be allocated to vessels 60 feet or less in length overall. During 2009 through 2012, no more than 50 percent of the directed pollock fishery may be allocated to vessels 60 feet or less in length overall. Beginning in 2013, 50 percent of the directed pollock fishery will be allocated to vessels 60 feet or less in length overall.

### 3.7.4 Community Development Quota Multispecies Fishery

The western Alaska Community Development Quota (CDQ) Program (hereinafter the CDQ Program) was established to provide fishermen who reside in western Alaska communities a fair and reasonable opportunity to participate in the Bering Sea and Aleutian Islands groundfish fisheries; to expand their participation in salmon, herring, and other nearshore fisheries; and to help alleviate the growing social and economic crisis within these communities. Residents of western Alaska communities are predominantly Alaska Natives who have traditionally depended upon the marine resources of the Bering Sea for their economic and cultural well-being. The CDQ program is a joint program of the Secretary and the Governor of the State of Alaska. Through the creation and implementation of community development plans, western Alaska communities will be able to diversify their local economies, provide community residents with new opportunities to obtain stable, long-term employment, and participate in the BSAI fisheries which have been foreclosed to them because of the high capital investment needed to enter the fishery.

The NMFS Regional Administrator shall hold the designated percent of the annual total allowable catch of groundfish for each management subarea in the BSAI for the western Alaska community quota as noted below. These amounts shall be released to eligible Alaska communities who submit a plan, approved by the Governor of Alaska, for their wise and appropriate use.

The CDQ program is structured such that the Governor of Alaska is authorized to recommend to the Secretary that a Bering Sea rim community be designated as an eligible fishing community to receive a portion of the reserve. To be eligible a community must meet specified criteria and have developed a fisheries development plan approved by the Governor of Alaska. The Governor shall develop such recommendations in consultation with the Council. The Governor shall forward any such recommendations to the Secretary, following consultation with the Council. Upon receipt of such recommendations, the Secretary may designate a community as an eligible fishing community and, under the plan, may release appropriate portions of the reserve.

Not more than 33 percent of the total western Alaska community quota for any single species category may be designated for a single CDQ applicant, except that if portions of the total quota are not designated by the end of the second quarter, applicants may apply for any portion of the remaining quota for the remainder of that year only.

#### 3.7.4.1 Eligible Western Alaska Communities

The Governor of Alaska is authorized to recommend to the Secretary that a community within western Alaska which meets all of the following criteria be eligible for the CDQ program:

1. be located on or proximate to the Bering Sea coast from the Bering Strait to the western most of the Aleutian Islands or a community located on an island within the Bering Sea, which the Secretary of the Interior has certified pursuant to section 11(b)(2) or (3) of Pub. L. No. 92-203 as Native villages are defined in section 3(c) of Pub. L. No. 92-203;
2. be unlikely to be able to attract and develop economic activity other than commercial fishing that would provide a substantial source of employment;
3. its residents have traditionally engaged in and depended upon fishing in the waters of the Bering Sea coast;
4. has not previously developed harvesting or processing capability sufficient to support substantial participation in the commercial groundfish fisheries of the BSAI because of a lack of sufficient funds for investing in harvesting or processing equipment; and

5. has developed a community development plan approved by the Governor, after consultation with the Council.

Also, Akutan is included in the list of eligible CDQ communities.

#### 3.7.4.2 Fixed Gear Sablefish Allocation

The NMFS Regional Administrator shall hold 20 percent of the annual fixed-gear total allowable catch of sablefish for each management subarea in the BSAI for the western Alaska sablefish community quota. The portions of fixed-gear sablefish TACs for each management area not designated to CDQ fisheries will be allocated as quota share and IFQs and shall be used pursuant to the program outlined in Section 3.7.1.

#### 3.7.4.3 Pollock Allocation

Ten percent of the pollock TAC in the BSAI management area shall be allocated as a directed fishing allowance to the CDQ program. This quota shall be released to communities on the Bering Sea coast which submit a plan, approved by the Governor of Alaska, for the wise and appropriate use of the quota.

#### 3.7.4.4 Multispecies Groundfish and Prohibited Species Allocations

In addition to the CDQ allocations authorized in Section 3.7.4.2 and Section 3.7.4.3, 7.5 percent of the TAC for all BSAI groundfish species or species groups, except squid, will be issued as a CDQ allocation from the groundfish reserve. A pro-rata share of PSC species also will be issued. PSC will be allocated before the trawl/non-trawl splits. The program is patterned after the pollock CDQ program.

## 3.8 Flexible Management Authority

### 3.8.1 Inseason Adjustments

Harvest levels for each groundfish species or species group that are set by the Council for a new fishing year are based on the best biological, ecological, and socioeconomic information available. The Council finds, however, that new information and data relating to stock status may become available to the Regional Administrator and/or the Council during the course of a fishing year which warrants inseason adjustments to a fishery.

Such changes in stock status might not have been anticipated or were not sufficiently understood at the time harvest levels were being set. Changes may become known from events within the fishery as it proceeds, or they may become known from new scientific survey data. Certain changes warrant swift action by the Regional Administrator to protect the resource from biological harm by instituting gear modifications or adjustments through closures or restrictions. Other changes warrant action to provide greater fishing opportunities for the industry by instituting time or area adjustments through openings or extension of a season beyond a scheduled closure.

Other inseason actions may be necessary to promulgate interim fishery closures in portions of the Bering Sea and the Aleutian Islands management subareas to reduce prohibited species bycatch rates and the probability of premature attainment of PSC limits and allowances. The intent of such interim closures would be to provide fishermen with a greater opportunity to harvest groundfish quota amounts by guaranteeing a longer fishing period before PSC limits or allowances are reached and bycatch zones or areas are closed to specified fisheries or gear types.

Ideally, the need to implement interim closures of areas to limit fishery operations that exhibit unexpectedly high bycatch rates would be identified through an examination of bycatch data collected inseason by observers. At times, however, data on bycatch rates may not be timely enough for effective implementation of season closures. Alternatively, the fishery bycatch rates may vary so much from week to week that the Regional Administrator may have difficultly determining whether bycatch rates in a fishery or area are intrinsically high, are an exhibition of "dirty fishing", or simply reflect natural variability in an otherwise "clean" fishery or area. Historical data could be used, therefore, to determine whether consistent "hot spots" occur. Historical information may then be compared with variable inseason data to help determine whether an inseason closure is warranted to reduce overall bycatch rates.

The need for inseason action for conservation purposes may be related to several circumstances. For instance, certain target or bycatch species may have decreased in abundance. When new information indicates that a species has decreased in abundance, allowing a fishery to continue to a harvest level now known to be too high could increase the risk of overfishing that species. Conservation measures limited to establishing prohibited species catch limits for such prohibited species may be necessary during the course of the fishery to prevent jeopardizing the well-being of prohibited species stocks.

When current information demonstrates a harvest level to have been set too low, closing a fishery at the annually specified harvest level would result in under-harvesting that species, which also results in the fishery unnecessarily foregoing economic benefits during that year unless the total allowable catch were increased and the fishery allowed to continue.

Similarly, current information may indicate that a prohibited species is more abundant than was anticipated when limits were set. Closing a fishery on the basis of the preseason PSC limit that is proven to be too low would impose unnecessary costs on the fishery. Increasing the PSC limits may be appropriate if such additional mortality inflicted on the prohibited species of concern would not impose detrimental effects on the stock or unreasonable costs on a fishery that utilize the prohibited species. However, adjustments to target quotas or PSC limits that are not initially specified on the basis of biological stock status is not appropriate.

The Council finds that inseason adjustments are accomplished most effectively by management personnel who are monitoring the fishery and communicating with those in the fishing industry who would be directly affected by such adjustments. Therefore, the Council authorizes the Secretary, by means of his or her delegation to the Regional Administrator of NMFS, to make inseason adjustments to conserve fishery resources on the basis of all relevant information. Using all available information, he or she may extend, open, or close fisheries in all or part of a regulatory area, or restrict the use of any type of fishing gear as a means of conserving the resource. He or she may also change any previously specified TAC or PSC limit if such are proven to be incorrectly specified on the basis of the best available scientific information or biological stock status. Such inseason adjustments must be necessary to prevent one of the following occurrences:

a. the overfishing of any species or stock of fish, including those for which PSC limits have been set; and/or

b. the harvest of a TAC for any groundfish, the taking of a PSC limit for any prohibited species, or the closure of any fishery based on a TAC or PSC limit that, on the basis of currently available information, is found by the Secretary to be incorrectly specified.

The Regional Administrator may also promulgate an inseason closure of an area to reduce prohibited species bycatch rates provided the closure period extends no longer than the time period specified in regulations. Interim closures must be based upon a determination that such closures are necessary to prevent:

a. a continuation of relatively high bycatch rates in a statistical areas, or portion thereof;

b. the take of an excessive share of PSC limits or allowances established under Section 3.6.2 by vessels fishing in an area;

c. the closure of one or more directed groundfish fisheries due to excessive prohibited species bycatch rates occurring in a specified target fishery; and

d. the premature attainment of established PSC limits or allowances and associated loss of opportunity to vessels to harvest the groundfish optimum yield.

The types of information that the Regional Administrator will consider in determining whether conditions exist that require an inseason adjustment or action are described as follows, although he or she is not precluded from using information not described but determined to be relevant to the issue:

a. the effect of overall fishing effort within an area;

b. catch per unit of effort and rate of harvest;

c. relative distribution and abundance of stocks of target groundfish species and prohibited species within an area;

d. the condition of a stock in all or part of an area;

e. inseason prohibited species bycatch rates observed in target groundfish fisheries in all or part of a statistical area;

f. historical prohibited species bycatch rates observed in target groundfish fisheries in all or part of a statistical area;

g. economic impacts of fishing businesses being affected; or

h. any other factor relevant to the conservation and management of groundfish species or any incidentally-caught species that are designated as a prohibited species or for which a PSC limit has been specified.

The Regional Administrator is constrained, however, in his or her choice of management responses to prevent potential overfishing by having to first consider the least restrictive adjustments to conserve the resource. The order in which the Regional Administrator must consider inseason adjustments to prevent overfishing are specified as: 1) any gear modification that would protect the species in need of conservation protection, but that would still allow fisheries to continue for other species; 2) a time or area closure that would allow fisheries for other species to continue in non-critical areas and time periods; and 3) total closure of the management area and season.

The procedure that the Secretary must follow requires that the Secretary publish a notice of proposed adjustments in the *Federal Register* before they are made final, unless the Secretary finds for good cause that such notice is impracticable or contrary to the public interest. If the Secretary determines that the prior comment period should be waived, he or she is still required to request comments for 15 days after the notice is made effective, and respond to any comments by publishing in the *Federal Register* either notice of continued effectiveness or a notice modifying or rescinding the adjustment.

To effectively manage each groundfish resource throughout its range, the Regional Administrator must coordinate inseason adjustments, when appropriate, with the State of Alaska to assure uniformity of management in both State and Federal waters.

Any inseason time or area adjustments made by the Regional Administrator will be carried out within the authority of this FMP. Such action is not considered to constitute an emergency that would warrant a plan amendment within the scope of section 305(e) of the Magnuson-Stevens Act. Any adjustments will be made by the Regional Administrator by such procedures provided under existing law. Any inseason adjustments that are beyond the scope of the above authority will be accomplished by emergency regulations as provided for under section 305(e) of the Magnuson-Stevens Act.

### 3.8.2 Measures to Address Identified Habitat Problems

An FMP may contain only those conservation and management measures that pertain to fishing or to fishing vessels. The Secretary, upon the recommendation of the Council, may adopt regulations of the kinds and for the purposes set forth below:

a. regulations establishing gear, timing, or area restrictions for purposes of protecting particular habitats of species in the BSAI groundfish fishery;

b. regulations establishing area or timing restrictions to prevent the harvest of fish in contaminated areas; and/or

c. regulations restricting disposal of fishing gear by vessels.

### 3.8.3 Vessel Safety

The Council will consider, and may provide for, temporary adjustments regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safety of the vessels, after consultation with the U.S. Coast Guard and persons utilizing the fishery.

## 3.9 Monitoring and Reporting

### 3.9.1 Recordkeeping and Reporting

The Council and NMFS must have the best available biological and socioeconomic information with which to carry out their responsibilities for conserving and managing groundfish resources, as well as other fish resources, such as crab, halibut, and salmon, that are incidentally caught in the groundfish fishery. This information is used for making inseason and inter-season management decisions that affect these resources as well as the fishing industry that utilize them. This information is also used to judge the effectiveness of regulations guiding these decisions. The Council will recommend changes to regulations when necessary on the basis of such information.

The need for the Council and NMFS to consider the best available information is explicit in the goals and objectives as established by the Council and contained in the FMP. They are also explicit in the Magnuson-Stevens Act, Executive Order 12866, the Regulatory Flexibility Act, the National Environmental Policy Act, and other applicable law. The Secretary, therefore, will require segments of the fishing industry to keep and report certain records as necessary to provide the Council and NMFS with the needed information to accomplish these goals and objectives. The Secretary may implement and amend regulations at times to carry out these requirements after receiving Council recommendations to do so, or at other times as necessary to accomplish these goals and objectives. Regulations will be proposed and implemented in accordance with the Administrative Procedure Act, the Magnuson-Stevens Act, and other applicable law.

Information on catch and production, effort, and price

In consultation with the Council, the Secretary may require recordkeeping that is necessary and appropriate to determine catch, production, effort, price, and other information necessary for conservation and management of the fisheries. Such requirements may include the use of catch and/or product logs, product transfer logs, effort logs, or other records. The Secretary may require the industry to submit periodic reports or surveys of catch and fishery performance information derived from the logs or other recordkeeping requirements.

Recordkeeping and reporting is required of operators of catcher vessels, catcher/processor vessels, mothership processor vessels, and by responsible officers of shoreside processor plants.

#### 3.9.1.1 Processor Reports

All processors of groundfish shall report information necessary for the management of groundfish resources. The regulations implementing this plan specify the information to be reported and the time schedule for reporting.

#### 3.9.1.2 At-Sea Processor Vessels

1. Reporting requirements

Vessels that catch and process groundfish at sea (catcher/processors) and vessels that receive catch from other vessels for processing (mothership/processors) have the ability to operate for extended periods without landing. To avoid delay in monitoring catches, catcher/processors and mothership/processors are required to report to the Regional Administrator of NMFS at regular intervals as specified in the regulations.

2. Check-in and check-out report

Catcher/processors are required to check in and check out of any fishing area for which TAC is established within a time period prescribed by regulation. This report may be by radio through the U.S. Coast Guard to the Regional Administrator of NMFS. The Council intends that this requirement will enhance the ability of NMFS to monitor the timeliness of the written catch reports described in (1) above and to assess the total harvest capacity in a fishing area for purposes of projecting dates when a TAC, or apportionment of TAC, will be reached.

3. Catch/receipt and product transfer report

Operators of catcher/processor and mothership/processor vessels must submit a weekly catch/receipt and product transfer report. This report will be required after notification of starting fishing by a vessel and continuing until that vessel's entire catch or cargo of fish has been off-loaded for each weekly period, Sunday through Saturday, or for each portion of such a period. This report must be sent to the Regional Administrator within one week of the end of the reporting period through such means as the Regional Administrator will prescribe by regulations and must contain the following information:

a. name and radio call sign of the vessel;

b. federal permit number for the BSAI groundfish fisheries;

c. month and days fished or during which fish were received at sea;

d. the estimated round weight of all fish caught or received at sea by that vessel during the reporting period by species or species group, rounded to the nearest one-tenth of a metric ton (0.1 mt), whether retained, discarded, or off-loaded;

e. the number of cartons of product and the unit net weight, in kilograms or pounds, of each carton of processed fish by species or species group produced by that vessel during the reporting period;

f. the area in which each species or species group was caught;

g. if any species or species groups were caught in more than one area during a reporting period, the estimated round weight of each, rounded to the nearest 0.1 mt by area; and

h. the product weight, rounded to the nearest 0.1 mt, and the number of cartons transferred or off-loaded by product type and by species or species group.

4. Cargo transfer/off-loading log

Operators of catcher/processor and mothership/processor vessels must record certain information in a separate transfer log. He or she must record the following information, within a time specified by regulations, for each transfer or off-loading of any fishery product in the EEZ, as well as quantities transferred or off-loaded outside the EEZ, within any state's territorial waters, or within the internal waters of any state:

a. the time and date (GMT) and location (in geographic coordinates or if within a port, the name of the port) the transfer began and was completed;

b. the product weight and product type, by species or species group, of all fish products transferred or off-loaded rounded to the nearest tenth of a metric ton (0.1 mt);

c. the name and permit number of the vessel off-loading to or, if to a shoreside facility, the name of the commercial facility receiving the product; and

d. the intended port of destination of the receiving vessel if off-loaded to another vessel.

### 3.9.2 Observer Program

The Council and NMFS must have the best available biological and socioeconomic information with which to carry out their responsibilities for conserving and managing groundfish resources. To address management and scientific information needs, NMFS, in consultation with the Council, will require U.S. fishing vessels that catch groundfish from the EEZ or receive groundfish from the EEZ, and shoreside processors that receive groundfish caught in the EEZ, to accommodate observers certified by NMFS. Provisions of the North Pacific Groundfish Observer Program will be developed in consultation with the Council and established in regulations. The purpose of the groundfish observer program is to verify catch composition and quantity, including those discarded at sea, and collect biological information on marine resources.

## 3.10 Council Review of the Fishery Management Plan

### 3.10.1 Procedures for Evaluation

The Council will maintain a continuing review of the fisheries managed under this FMP through the following methods:

l. Maintain close liaison with the management agencies involved, usually the Alaska Department of Fish and Game and NMFS, to monitor the development of the fisheries and the activity in the fisheries.

2. Promote research to increase their knowledge of the fishery and the resource, either through Council funding or by recommending research projects to other agencies.

3. Conduct public hearings at appropriate times and in appropriate locations to hear testimony on the effectiveness of the management plans and requests for changes.
4. Consider all information gained from the above activities and develop, if necessary, amendments to the FMP. The Council will also hold public hearings on proposed amendments prior to forwarding them to the Secretary for possible adoption.

### 3.10.2 Schedule for Review

Adaptive management requires regular and periodic review. Unless specified below, all critical components of the FMP will be reviewed by the Council at such time as a supplement to the programmatic environmental impact statement on the groundfish fisheries is anticipated, or as otherwise warranted. Following the Council's review, components of the FMP may be identified that should be further examined in the programmatic analysis.

<u>Management Approach</u>

Objectives identified in the management policy statement (Section 2.2) will be reviewed annually by the Council. The Council will also review, modify, eliminate, or consider new issues, as appropriate, to best carry out the goals and objectives of the management policy.

<u>Essential Fish Habitat Components</u>

To incorporate the regulatory guidelines requirement for review and revision of essential fish habitat (EFH) FMP components, the Council will conduct a complete review of all the EFH components of each FMP once every 5 years and will amend those EFH components to include new information.

In between each five-year comprehensive review, the Council will utilize its annual FMP amendment cycle to solicit proposals on habitat areas of particular concern and/or conservation and enhancement measures to minimize the potential adverse effects from fishing. Those proposals that the Council endorses should be developed independent of the five-year comprehensive EFH review cycle.

An annual review of existing and new EFH information will be conducted and this information will be provided to the BSAI Groundfish Plan Team for their review during the annual SAFE report process. This information could be included in the "Ecosystems Considerations" chapter of the SAFE report.

# Chapter 4 Description of Stocks and Fishery

A description of the stocks that are managed as part of the Fishery Management Plan (FMP) for the Bering Sea/Aleutian Islands (BSAI) groundfish is contained in Section 4.1, and includes a discussion of stock units and the status and trends of groundfish species. Section 4.2 describes the habitat of the BSAI management area, defines essential fish habitat (EFH) for each of the managed species and provides recommendations, and describes habitat areas of particular concern. Fishing activities that affect the groundfish stocks are addressed in Section 4.3, including the history of exploitation in the BSAI, and a description of the commercial and subsistence fisheries for groundfish. Section 4.4 examines the economic and socioeconomic characteristics of the groundfish fisheries, and Section 4.5 describes fishing communities.

## 4.1 Stocks

The Bering Sea supports about 300 species of fishes, the majority of which are found near or on the bottom (Wilimovsky 1974). The fish groups of primary concern in this plan are the bottom or near-bottom dwelling forms – the flatfish, rockfish, sablefish, Pacific cod, pollock, and Atka mackerel. Although not bottom-dwelling, squids (*Cephalopoda*), sharks, and octopus are also included in the FMP.

There is a general simplification in the diversity of groundfish species in the Bering Sea compared to the more southern regions of the Gulf of Alaska (GOA) and Washington to California. As a result, certain species inhabiting the Bering Sea are some of the largest groundfish resources found anywhere in the world. Relatively few groundfish species in the eastern Bering Sea and the Aleutian Islands are large enough to attract target fisheries: walleye pollock, Pacific cod, Pacific ocean perch, sablefish, Atka mackerel, several species of rockfish and flatfish. Since the 1960s, pollock catches have accounted for the majority of the Bering Sea groundfish harvest. Yellowfin sole and rock sole currently dominate the flatfish group and have the longest history of intense exploitation by foreign fisheries. Other flatfish species that are known to occur in aggregations large enough to form target species are Greenland turbot, flathead sole, Alaska plaice, and arrowtooth flounder.

### 4.1.1 Stock Units

The groundfish and squid resources considered in this FMP consist of species that are wide ranging in their general distribution, occurring in the eastern Bering Sea, Aleutian Islands waters, the Gulf of Alaska, and in some cases further south. For the most part, groundfish species are managed as a single stock in the BSAI management area. This section contains a summary of distribution and known stock structure information for the target species. Further information on species stock structure can be found in the annual *Stock Assessment and Fishery Evaluation* (SAFE) report; the information in this section is summarized from the 2003 SAFE report (NPFMC 2003).

For pollock, there are currently three stocks identified for management purposes, although there is undoubtedly some degree of exchange between them. The eastern Bering Sea stock is the largest. There is also an Aleutian Island region stock, and a central Bering Sea-Bogoslof Island pollock stock, which is a mixture of pollock that migrate from the U.S. and Russian shelves to the Aleutian Basin.

Pacific cod is distributed widely over the eastern Bering Sea and the Aleutian Islands area, and in the BSAI is managed as a single unit. Tagging studies (e.g., Shimada and Kimura 1994) have demonstrated significant migration both within and between the eastern Bering Sea, Aleutian Islands, and Gulf of Alaska, and genetic studies (e.g., Grant *et al.* 1987) have failed to show significant evidence of stock structure within these areas.

Adult sablefish live mainly in offshore waters at bottom depths of 200 meters and greater, from northern Mexico to the Bering Sea (Wolotira *et al.* 1993). Sablefish appear to form two populations, the northern of which inhabits Alaska and northern British Columbia waters. Northern sablefish appear to be highly migratory, with substantial movement between the BSAI and the GOA (Heifitz and Fujioka 1991, Kimura *et al.* 1998). As a result, sablefish in Alaska waters are assessed as a single population, although for management purposes discrete regions are identified to distribute exploitation throughout their wide geographical range. In the BSAI, the management areas distinguish the eastern Bering Sea and the Aleutian Islands region.

Flatfish in the BSAI are predominately found on the eastern Bering Sea continental shelf and slope, with lower abundance in the Aleutian Islands for those species whose range extends to that area. Each of the flatfish species is assessed as a single unit in the BSAI.

Yellowfin sole is one of the most abundant flatfish species in the eastern Bering Sea. They inhabit the continental shelf, and abundance in the Aleutian Islands region is negligible. Greenland turbot are distributed throughout the BSAI management area. The absence of juveniles in the Aleutian Islands region suggests that the population originates from the eastern Bering Sea or elsewhere, and the annual stock assessment assumes that Greenland turbot in the two regions represent a single stock. Arrowtooth flounder is most abundant in the eastern Bering Sea but which ranges into the Aleutian Islands region.

Although two species of rock sole are known to occur in the North Pacific ocean, the northern rock sole perdominates in the BSAI. Flathead sole consist of two species of *Hippoglossoides* whose ranges overlap in the BSAI (Walters and Wildebuer 1997). Alaska plaice is mainly distributed on the eastern Bering Sea continental shelf, with a summer distribution at depths less than 110 m.

Rockfish are primarily assessed at the BSAI level, although some species are assigned separate harvest quotas in the eastern Bering Sea and the Aleutian Islands region. Many rockfish are not thought to exhibit large-scale movements as adults. Analysis of genetic material from north Pacific rockfish, with a view to determining evidence of stock structure, is an active area of research.

Pacific ocean perch (POP) inhabit the outer continental shelf and upper slope regions of the north Pacific Ocean and Bering Sea. An earlier study of POP in Alaska analyzed differences in biological features (e.g., growth rate) between eastern Bering Sea and Aleutian Islands fish and suggested that each of these areas has its own unique stock (Chikuni 1975). Further research has posed uncertainty as to whether the eastern Bering Sea POP represent a discrete stock (Spencer and Ianelli 2001), and since 2001, POP in the BSAI have been assessed and managed as a single stock.

Northern rockfish are patchily distributed in the BSAI, with the majority of harvest occurring as incidental catch in the Aleutian Islands Atka mackerel fishery. Initial genetic analysis has revealed no evidence of population structure (Gharrett 2003), although sample sizes were small. Shortraker rockfish in the BSAI appear to be a separate stock from those in the GOA. Rougheye rockfish also show evidence of two distinct species, with overlapping ranges in the GOA. The two most abundant species in the ‘other rockfish’ complex are the light dusky rockfish and the shortspine thornyhead, however distributions for these species are not well documented.

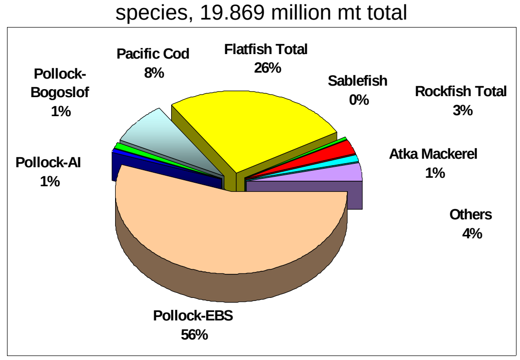
Atka mackerel center of abundance is the Aleutian Islands region, with a geographical range extending to the waters off Kamchatka, the eastern Bering Sea, and the Gulf of Alaska. Tag capture information from Alaska suggests that Atka mackerel populations are localized and do not travel long distances. Atka mackerel are not targeted in the eastern Bering Sea.

The predominant species of squid in commercial catches in the eastern Bering Sea is believed to be the red squid, *Berryteuthis magister*, while *Onychoteuthis borealijaponicus*, the boreal clubhook squid, is likely the principal species encountered in the Aleutian Islands region. Squid are generally migratory pelagic schooling species, with a lifespan thought to be 1-2 years.

### 4.1.2 Status of Stocks

This section summarizes the status of the various groundfish stocks of commercial importance in the BSAI. More detailed assessments and current estimates of biomass and acceptable biological catches can be found in the *Stock Assessment and Fishery Evaluation* (SAFE) report, that is produced annually (or biennially for some stocks) by the Bering Sea and Aleutian Islands Groundfish Plan Team (available at www.fakr.noaa.gov/npfmc). The information in this section comes from the November 2003 SAFE report (NPFMC 2003). The SAFE report contains further details on fishery statistics, resource assessment surveys, and the analytical techniques applied to the assessment of the various species.

**2003 Exploitable Biomass of BSAI Groundfish**, by species, 19.869 million mt total

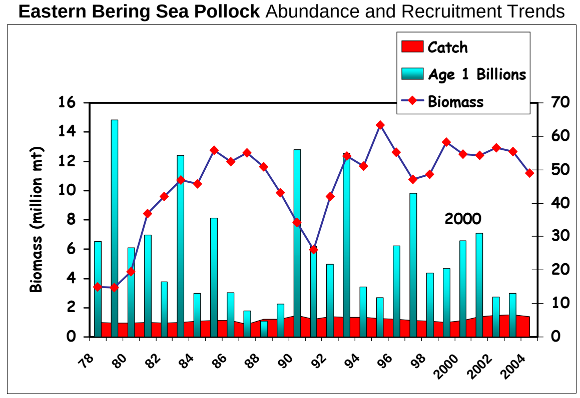



#### 4.1.2.1 Pollock

Three stocks of pollock inhabit the BSAI area: the eastern Bering Sea, Aleutian Islands, and Aleutian Basin stocks. Exploitation and abundance of these stocks are very different.

The eastern Bering Sea pollock stock peaked in 1985, and declined to about 6 million mt by 1991. The age 3 and older biomass increased again in 1995 and has been variable around 12 million mt since. For 2004, spawning biomass of eastern Bering Sea pollock (3,525,000 mt) was estimated to be well above the biomass level that produces maximum sustainable yield (2,468,000 mt).

**Eastern Bering Sea Pollock** Abundance and Recruitment Trends




**Projected age 3+ biomass and ABC (mt) of eastern Bering Sea walleye pollock.**

| Year | Biomass | ABC |
|---|---|---|
| 2002 | 9,800,000 | 2,110,000 |
| 2003 | 11,100,000 | 2,330,000 |
| 2004 | 11,000,000 | 2,560,000 |

The Aleutian Islands pollock stock is considerably smaller than the eastern Bering Sea and Aleutian Basin stock. Age 3+ biomass in the Aleutian Island area is estimated at about 330,000 mt in 2004, and an ABC of 27,400 mt. Between 1999 and 2003, the Council recommended that no directed fishing for pollock occur in the Aleutian Islands area given current low abundance and the importance of pollock as prey for Steller sea lions. In 2004 Congress legislated that the Council would apportion the Aleutian Island pollock TAC to the Aleut Corporation to provide economic development in Adak.

The Aleutian Basin pollock stock is at low levels. Biomass in the Aleutian Basin area is estimated by the hydroacoustic survey in the Bogoslof area. Biomass in the Bogoslof area declined from 2,400,000 mt in 1988 to only 54,000 mt in 1994. The projected 2004 exploitable biomass was 227,000 mt. This stock has historically contributed to the fishery in the international waters of the central Bering Sea (the Donut Hole fishery), which provided catches of 1.0 to 1.4 million mt during the years 1986 through 1989. No directed fishing has occurred on this stock since 1991.

The BSAI pollock TAC has been allocated between inshore and offshore trawl fishing sectors since 1992. The American Fisheries Act (AFA) of 1998 established specific allocations for the pollock TAC: 10 percent to the community development quota program, with the remainder allocated 50 percent to catcher vessels delivering inshore, 40 percent to catcher processors processing offshore, and 10 percent to catcher vessels delivering to motherships. The Act also established the authority and mechanisms for pollock fishery cooperatives (for further information, see Appendix C). The Consolidated Appropriations Act of 2004 allocated all of the Aleutian Islands directed pollock fishery to the Aleut Corporation.

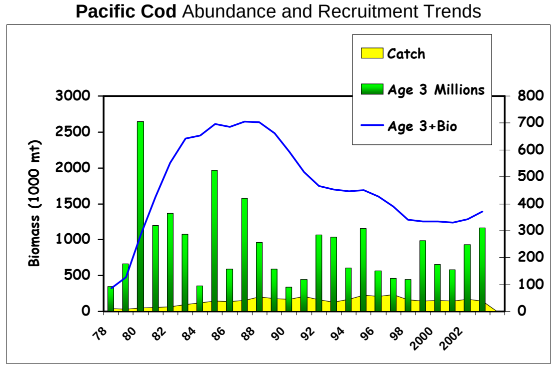
In 1990, roe-stripping of pollock was prohibited, and the Bering Sea pollock fishery was divided into roe and non-roe fishing seasons. The pollock fishery has also been affected by management measures designed to protect Steller sea lions since 1992. Temporal and spatial dispersion of the fleet has been accomplished through fishery exclusion zones around rookeries or haulout sites, phased in reduction in the seasonal proportions of TAC that can be taken in Steller sea lion critical habitat, and additional seasonal TAC allocations.

Measures have also been implemented to reduce bycatch in the pollock fishery. Bycatch limits for chum salmon (42,000 fish), Chinook salmon (29,000 fish in the Bering Sea subarea and 700 fish in the Aleutian Islands subarea), and herring (1 percent of total BSAI herring biomass) trigger area closures for the pollock fisheries in particular (see Section 3.6). Beginning in 1998, 100 percent retention was required for pollock under the improved retention/improved utilization (IR/IU) program. In 1999, the use of bottom trawl gear for directed pollock fishing was prohibited, to reduce bycatch of halibut and crabs.

### 4.1.2.2 Pacific Cod

The BSAI Pacific cod stock increased to high levels in the mid 1990s, then declined. The 2000 year class was above average, with recruits into the fishery beginning in 2003. Significant uncertainty surrounds the maximum permissible ABC computed in the stock assessment model. Between 1998 and 2002, the ABC was set below the maximum permissible ABC from the model. In 2003 and 2004, Council, with advice from the Groundfish Plan Team and the SSC, instead selected an ABC through an alternative 'constant catch' approach, as the resulting ABC is at least as conservative as under the previous approach.

**Pacific Cod** Abundance and Recruitment Trends




**Projected age 3+ biomass and ABC (mt) of BSAI Pacific cod.**

| Year | Biomass | ABC |
|---|---|---|
| 2002 | 1,540,000 | 223,000 |
| 2003 | 1,680,000 | 223,000 |
| 2004 | 1,660,000 | 223,000 |

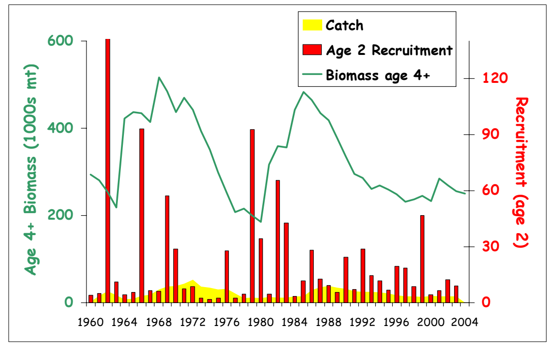
The BSAI Pacific cod TAC is not apportioned by area, but is currently allocated 2 percent to jig gear, 51 percent to fixed gear, and 47 percent to trawl gear. The fixed gear allocation is seasonally apportioned by trimester. Any unused TAC from the jig gear quota becomes available to fixed gear on September 15. 80 percent of the fixed gear apportionment is reserved for longline catcher/processors, 0.3 percent for longline catcher vessels, 15 percent for pot catcher vessels, 3.3

percent for pot catcher/processors, and 1.4 percent for fixed gear catcher vessels less than 60 ft length overall. Beginning in 1998, 100 percent retention was required for Pacific cod under the IR/IU program.

### 4.1.2.3 Sablefish

Sablefish in the Bering Sea, Aleutian Islands, and Gulf of Alaska are considered to be of one stock. The resource is managed by region in order to distribute exploitation throughout its range. Large catches of sablefish (up to 26,000 mt) were made in the Bering Sea during the 1960s, but have declined considerably. Since 1991, catch has rarely exceed 1,000 mt. Catch in the Aleutian Islands has never exceeded 3,600 mt, and in the early 2000s has hovered at around 1,000 mt. Biomass of the sablefish stock off Alaska has increased from recent lows during 1998 and 2000, and now appears to be at a moderate level.

**Alaska Sablefish** Abundance and Recruitment Trends




**Projected age 4+ biomass and ABC (mt) of BSAI sablefish.**

| Year | Biomass | ABC |
|---|---|---|
| 2002 | 67,000 | 4,480 |
| 2003 | 70,000 | 6,000 |
| 2004 | 71,000 | 6,460 |

The TAC for sablefish is apportioned among gear types. Sablefish in the Bering Sea is allocated 50 percent to fixed gear and 50 percent to trawl gear. In the Aleutian Islands, the sablefish TAC is allocated 75 percent to fixed gear and 25 percent to trawl gear. Twenty percent of the fixed gear allocations is reserved for use by community development quota program participants. The remaining fixed gear apportionment of the sablefish TAC is managed under an individual fishing quota (IFQ) program, which began in 1995. Important, although small, state water open access sablefish fisheries occur in the Aleutian Islands.

### 4.1.2.4 Flatfish

After pollock, flatfish species comprise a large proportion of groundfish exploitable biomass in the BSAI. Dominant species are yellowfin sole and rock sole. Other abundant or commercially important BSAI flatfish species are Greenland turbot, arrowtooth flounder, flathead sole, and Alaska plaice.

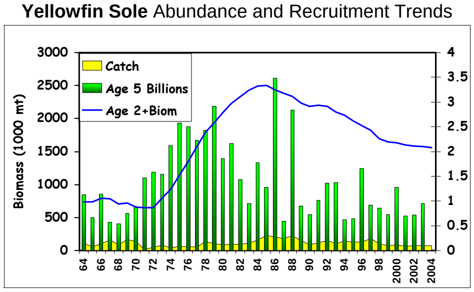
**Projected biomass and ABC (mt) of BSAI flatfish, 2004.**

| Species | Biomass | ABC |
|---|---|---|
| yellowfin sole | 1,560,000 [1] | 114,000 |
| Greenland turbot | 132,000 [2] | [3] |
| arrowtooth flounder | 696,000 [2] | 115,000 |
| rock sole | 1,160,000 [1] | 139,000 |
| flathead sole | 505,000 [4] | 61,900 |
| Alaska plaice | 1,050,000 [2] | 203,000 |
| other flatfish | 90,300 [2] | 13,500 |

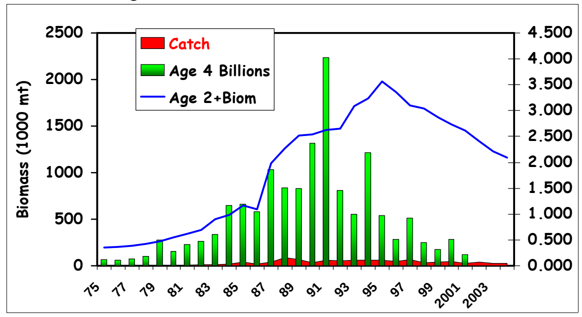
[1]age 2+ biomass
[2]age 1+ biomass
[3]Greenland turbot ABC is apportioned by subarea.
[4]age 3+ biomass

As of 2004, the biomass of most BSAI flatfish stocks remains relatively high. For many flatfish species, recruitment in more recent years has been low; consequently, stock declines are expected in coming years. The yellowfin sole stock has been declining since the mid-1980s, however the possibility of the 1995 year class being above average suggests that the stock may be more stable in the near future. Although biomass of rock sole increased from 2002 to 2003, it is expected to decline over the next few years. Recruitment of Alaska plaice has been stable since the late 1970s. The eastern Bering Sea bottom trawl survey for 2003 estimated a decrease in biomass for the 'other flatfish' stocks of 8 percent over 2002.

**Yellowfin Sole** Abundance and Recruitment Trends

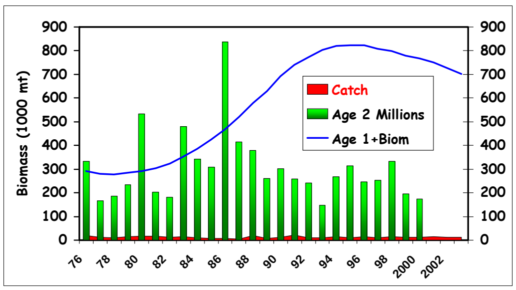


**Eastern Bering Sea Rock Sole** Abundance and Recruitment Trends



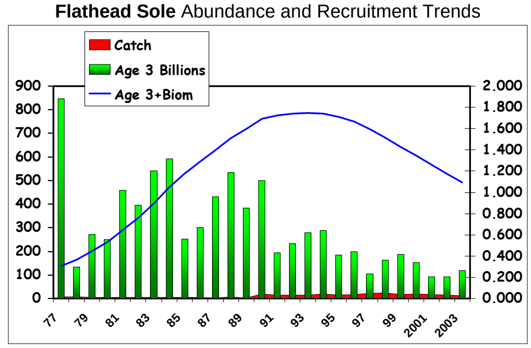

Yellowfin sole and arrowtooth flounder are caught primarily with bottom trawl gear. Rock sole are important as the target of a high value roe fishery in February and March that accounts for the majority of the annual catch. Arrowtooth flounder has a low perceived commercial value, despite research in the early 1990s on their commercial utilization (Hiatt *et al.* 2003). This results in high discard rates. Alaska plaice is also a little utilized species, with a retention rate in 2002 of only 3 percent. The principle species of the 'other flatfish' group are starry flounder and rex sole; these species contributed 85 percent of the 'other flatfish' harvest in 2003.

**Arrowtooth Flounder** Abundance and Recruitment Trends



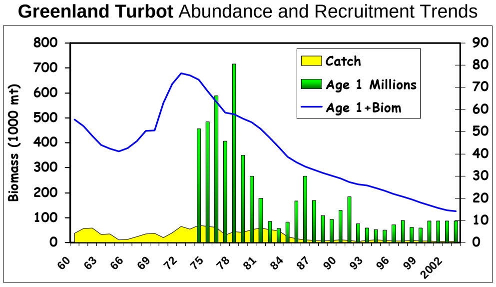

Other than yellowfin sole, flatfish species as a whole are lightly harvested. This is due primarily to halibut and crab bycatch limits, which frequently close down the fisheries prior to the achievement of TAC. Additionally, the Council frequently sets conservative quotas for these fisheries, at levels significantly less than their ABCs, because they are unlikely to achieve their TACs and that OY quota can instead be set for more highly valued species such as pollock, Pacific cod, and yellowfin sole.

**Flathead Sole** Abundance and Recruitment Trends




Unlike biomass of other BSAI flatfish species, biomass of Greenland turbot is at low levels and declining. Biomass has declined due to poor year classes from 1981-1997. Catch has also declined from a peak of 57,000 mt in 1981. Since the 1990s, the Council has set low TACs (7,000 mt or lower) for Greenland turbot as an added conservation measure due to concerns about low recruitment. Biomass is projected to continue declining despite conservative management. The ABC for Greenland turbot is allocated by subarea, based on the proportion of biomass in each area. In 2004, the ABC for the Aleutian Islands was 1,578 mt (33 percent of the total), and for the Bering Sea was 3,162 mt. Greenland turbot were harvested almost exclusively (greater than 90 percent) by trawl gear until the early 1990s when longlines became the dominant gear type for this species. No halibut bycatch has been apportioned for a directed trawl fishery since 1996, effectively prohibiting this gear type from targeting turbot.

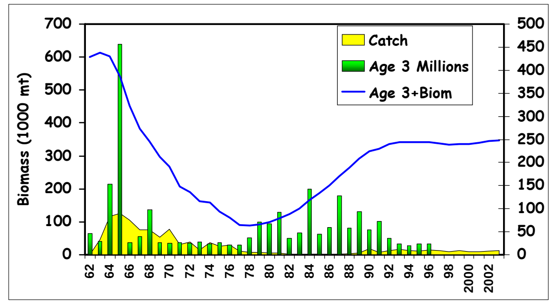
**Greenland Turbot** Abundance and Recruitment Trends




### 4.1.2.5 Pacific Ocean Perch

Pacific ocean perch (commonly referred to by its acronym POP) are the dominant red rockfish species in the north Pacific. They are caught primarily along the Aleutian Islands, and to a lesser extent in the eastern Bering Sea and Gulf of Alaska. Heavy exploitation by foreign fleets resulted in peak catches of 47,000 mt in the eastern Bering Sea in 1961, and 109,100 mt in 1965 in the Aleutian Islands, and subsequent biomass declines. Above average year classes in the early 1980s has boosted biomass levels, which have remained relatively stable since 1995.

**BSAI Pacific Ocean Perch** Abundance and Recruitment Trends




| **Projected age 3+ biomass (mt) of Pacific ocean perch in the BSAI.** | |
|---|---|
| Year | Biomass |
| 2002 | 337,000 |
| 2003 | 375,000 |
| 2004 | 349,000 |

ABCs and TACs for POP are apportioned by subarea, and for the Aleutian Islands, are further allocated by district. In 2004, the ABC for POP was 2,128 mt in the Bering Sea, 3,059 mt in the eastern Aleutian Islands, 2,926 in the central Aleutian Islands, and 5,187 in the western Aleutian Islands.

### 4.1.2.6 Other Rockfish

Rockfish other than Pacific ocean perch were divided into two complexes, the other red rockfish complex and the other rockfish complex, through 2000. Since 2001, northern, shortraker and rougheye rockfish have been managed as separate species in order to manage them more consistently.

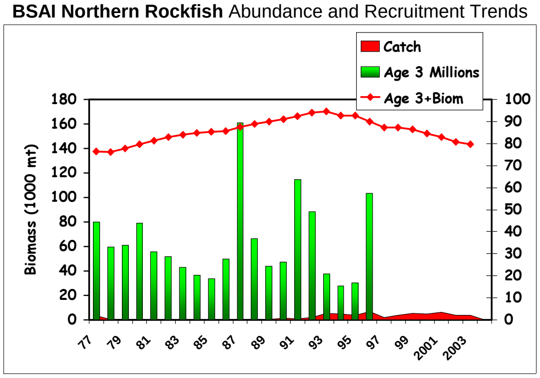
In the early 2000s, approximately 90 percent of northern rockfish were harvested in the Atka mackerel bottom trawl fishery, mainly in the Western Aleutian Islands district. Compared to northern rockfish, shortraker rockfish, and rougheye rockfish are a relatively high valued species, and consequently are less frequently discarded.

**Survey biomass and ABC (mt) of BSAI rockfish, 2004.**

| Species | Biomass | ABC |
|---|---|---|
| northern rockfish | 142,000 | 6,880 |
| shortraker rockfish | 23,400 | 526 |
| rougheye rockfish | 10,400 | 195 |
| eastern Bering Sea ‘other rockfish’ | 18,300 | 960 |
| Aleutian Islands ‘other rockfish’ | 12,100 | 634 |

[1]ABC is apportioned by subarea

**BSAI Northern Rockfish** Abundance and Recruitment Trends



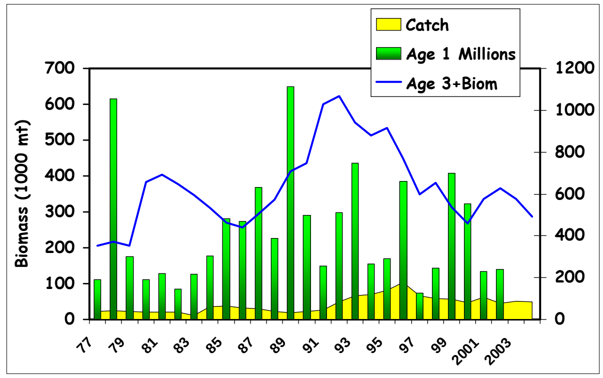

Since 1998, the Aleutian Islands TAC for shortraker/rougheye rockfish is allocated between trawl and fixed gear fisheries. Since 2001, shortraker and rougheye rockfish have been allocated separate TACs. Thirty percent of the TAC is allocated to fixed gear and 70 percent to vessels using trawl gear.

The "other rockfish" category contains eight rockfish species; the most abundant members are shortspine thornyhead and light dusky. Shortspine thornyheads are a higher priced species, and are caught mainly by fixed gear rather than trawl fisheries. The ABCs for the complex are listed in the box above.

### 4.1.2.7 Atka Mackerel

Atka mackerel are found along the Aleutian Islands, and to a lesser extent in the western Gulf of Alaska. Biomass increased from 1977 to a peak in 1992, declined over the 1990s, and has since increased. Catches have been relatively high since 1992, in response to evidence of a large exploitable biomass in the central and western Aleutian Islands; a record 103,000 mt was harvested in 1996. The Atka mackerel fishery takes place primarily with bottom trawl gear at depths of less than 200 m. The fishery is highly localized and takes place in the same few locations each year.

**Aleutian Islands Atka Mackerel** Abundance and Recruitment Trends




In 1993, TAC allocations in the Aleutian Islands subarea was divided into districts, in part to allows localized management. In 2004, the ABCs for Atka mackerel were 11,240 mt in the combined Eastern Aleutian Islands/Bering Sea subarea, 31,100 in the Central Aleutian Islands, and 24,360 in the Western Aleutian Islands.

Since 1998, Atka mackerel have also been allocated by gear. A total of 1 percent of the combined Eastern Aleutian Islands/Bering Sea subarea TAC is allocated to jig gear. Once the jig fleet takes its 1 percent allocation, its allocation will increase to 2 percent for future years.

**Projected age 3+ biomass (mt) of BSAI Atka mackerel.**

| Year | Biomass |
|---|---|
| 2002 | 440,000 |
| 2003 | 358,000 |
| 2004 | 286,000 |

Atka mackerel are an important prey for Steller sea lions, and management measures have been taken to reduce the impacts of an Atka mackerel fishery on Steller sea lions. Since June 1998, the Atka mackerel fishery has been dispersed, both temporally and spatially, to reduce localized depletions of Atka mackerel. The TAC is now be equally split into two seasons, and the amount taken within sea lion critical habitat is limited.

#### 4.1.2.8 Squid

There is no reliable estimate of squid abundance in the eastern Bering Sea. As a result, squid is managed in Tier 6 of the overfishing definitions, such that the overfishing level and ABC is based on catch history between 1978 and 1995. The BSAI ABC for squid is set at 1,970 mt.

Squid were a target fishery in the late 1970s and early 1980s for Japanese and Korean trawl vessels. Catches peaked at 6,886 mt in the eastern Bering Sea and 2,332 mt in the Aleutian Islands during this time. While not a target of the domestic fisheries, squid are taken incidentally in the target fisheries for pollock. Between 2001 and 2003, total catch averaged about 1,400 mt in the eastern Bering Sea, and was negligible in the Aleutian Islands. Discard rates of squid in the other target groundfish fisheries ranged between 40 and 85 percent during 1992-1998.

## 4.2 Habitat

The most prominent and unique feature of the BSAI management area is the extensive continental shelf in the eastern and northern portion of the sea. It constitutes approximately 80 percent of the total shelf area in the Bering Sea (Hood and Kelly 1974) and is one of the world's largest. For the Bering Sea as a whole, 44 percent of its 2.3 million $km^2$ area is continental shelf, 13 percent continental slope, and 43 percent deepwater basin (Figure 4-1). A number of large bays, including Bristol and Kuskokwim Bays and Norton Sound on the Alaska coast, makes the coast line of the Bering Sea highly irregular. The area of all bays in the Bering Sea makes up 11.1 percent of the total area of the sea (Gershanovich 1963).

The broad eastern Bering Sea shelf is extremely smooth and has a gentle uniform gradient resulting from sediment deposits (Sharma 1974). The sediments, originating along the coast and transported offshore in graded suspension by storm waves, are predominantly sands over the inner shelf and silt and clay sediments on the other shelf and slope. The continental slope bordering the eastern Bering Sea shelf is abrupt and very steep and is scoured with valleys and large submarine canyons (Sharma 1974).

The Aleutian-Commander Islands arc forms a partial barrier to the exchange of Bering Sea and Pacific Ocean water. This chain is made up of more than 150 islands and has a total length of approximately 2,260 km (Gershanovich 1963). Shelf areas throughout most of the Aleutians portion of the chain are narrow (and frequently discontinuous between islands) ranging in width on the north and south sides of the island from about 4 km or less to 42-46 km. The shelf broadens in the eastern Aleutian Islands.

An additional geographical feature of the Aleutian Islands is Bowers Ridge. The submerged ridge, forming an arc off the west-central Aleutian Islands, is about 550 km long and 75-110 km wide, becoming even wider in the vicinity of the Rat Islands (Gershanovich 1963). The southern portion of the ridge summit is 150-200 m deep, the central portion is 600-700 m deep, and the northern portion 800-1,000 m deep.

Exchange of water between the Bering Sea and the Pacific Ocean occurs through the various Aleutian Island passes with an estimated 14 percent of the Pacific water remaining in the Bering Sea (Sharma 1974). The net gain from Pacific water and surface runoff from rivers is lost to the Arctic Ocean through the Bering Strait, creating a net movement of water northward.

The dominant water movement on the eastern Bering Sea continental shelf originates from Pacific waters entering the Bering Sea in the vicinity of Unimak Island (Figure 4-2). These waters move northward toward St. Matthews Islands and eastward toward Bristol Bay. The northward stream divides near St. Matthews Island before joining again and passing through the Bering Strait.

The eastward flowing current along the Alaska Peninsula upon reaching the head of Bristol Bay is deflected westward by waters from the Kvichak and Nushagak Rivers (Sharma 1974). These westward flowing waters are mixed with Kuskokwim River water near the mouth of Kuskokwim Bay and directed southward, forming a cyclonic gyre in the southeastern Bering Sea.

The Bering Sea is influenced mainly by subarctic climate, except for the southernmost part, which can be included in the temperate zone (Sharma 1974). It lies in a region of moderate to strong atmospheric pressure gradients and is subject to numerous storms. A major environmental feature of the Bering Sea is the pack ice which covers most of the continental shelf in the eastern and northern sections of the sea in winter and spring. The ice edge begins to intrude into the northern Bering Sea in November, and normally reaches it maximum in late March (Potocsky 1975). At its maximum the ice pack may cover the continental shelf south to the Pribilof Islands and extend from the Pribilof Islands eastward to the vicinity of Port Moller. The areas of the outer shelf between the Pribilof Islands and Unimak Island and deeper waters of the Bering Sea are generally ice free throughout the year because of the intrusion of warmer Pacific Ocean water. In April and May the ice edge begins to retreat and by early summer the Bering Sea is normally free of ice.

The physical, climatic, and oceanographic features in the eastern Bering Sea combine to create conditions highly favorable for primary biological productivity. These conditions are only surpassed by some of the upwelling regions in the eastern Pacific and Atlantic Oceans (Hood and Kelly 1974). This productivity supports some of the largest fish, marine mammal, and bird populations in the world. Although the processes for this high productivity are not fully understood, they probably originate from the upwelling of nutrient-rich water along the Aleutian Islands chain (Sharma 1974), the mixing of Pacific Ocean and Bering Sea waters, the seasonable extremes in climate with a buildup of nutrients during the winter months (Gershanovich *et al.* 1974) and the expansive nature of the continental shelf.

**Figure 4-1 Bathymetric map of the Bering Sea (Sayles 1979).**

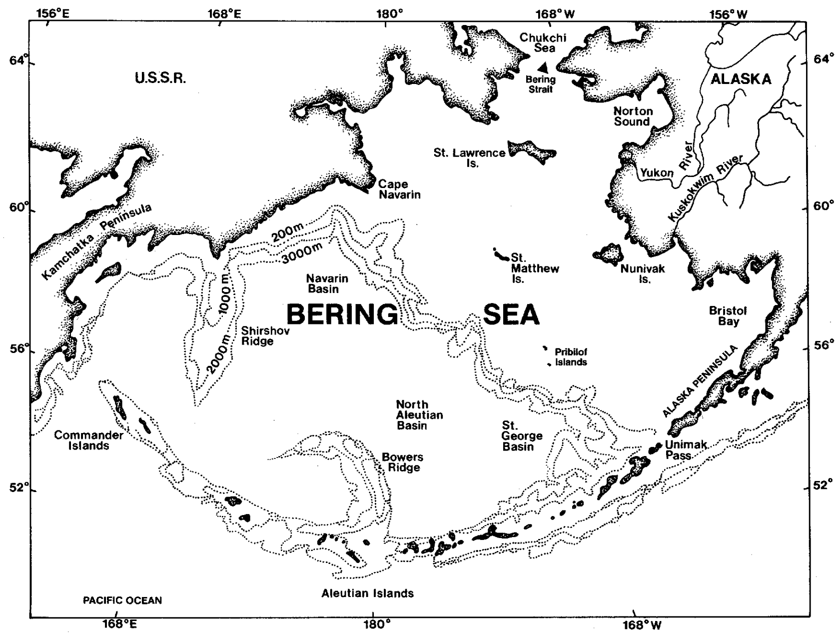
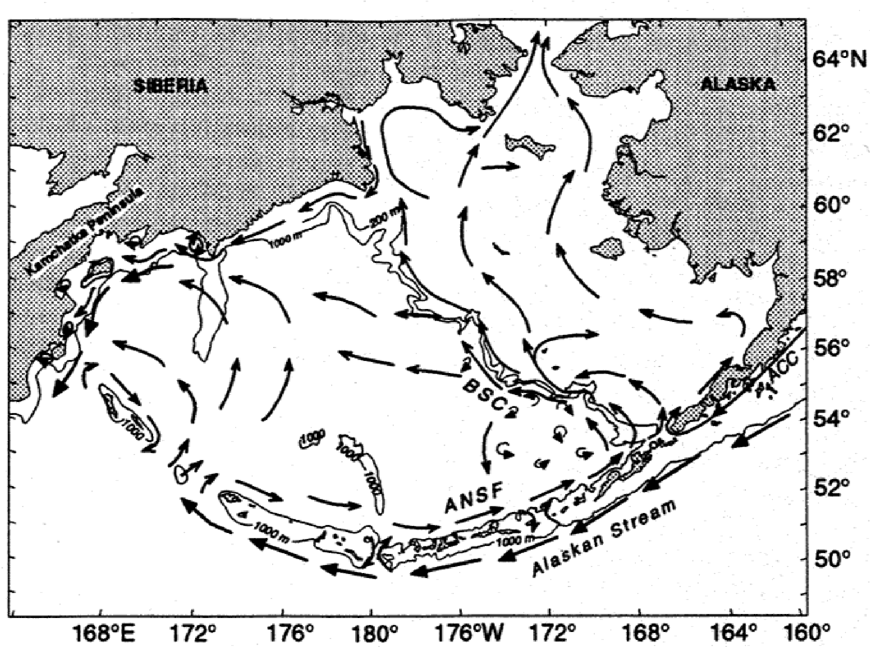



**Figure 4-2 Currents in the Bering Sea (Stabeno *et al.* 1993).** Schematic of mean circulation in the upper 40 m of the Bering Sea water column over the basin and shelf (after Stabeno and Reed 1994, Schumacher and Stabeno 1998). The arrows with solid heads represent currents with mean speeds typically >50 cm/s. The Alaskan Stream, Kamchatka Current, Bering Slope Current (BSC), and Aleutian North Slope Current (ANSF) are each indicated. The 100-m flow and 1,000-m isobath are indicated.



### 4.2.1 Habitat Types

The Bering Sea covers a flat, relatively featureless shelf whose southern boundary extends from near Unimak Pass to Cape Navarin, and from a deepwater basin bounded by the shelf and the Aleutian Island Arc. The Bering Sea has certain characteristic features which make it different from other corresponding regions in higher latitudes (see Table 4-1). The Aleutian Island Arc contains a narrow shelf that drops off rapidly to the Bering Sea on the north and the North Pacific Ocean to the south. Seasonal changes are more moderate than over the Bering Sea shelf. Ocean currents flow through the passes between the Islands, and south of the chain the narrow shelf is washed by a westward current which is stronger in the eastern part; on the Bering Sea side this current is missing.

The waters of the Bering Sea can be partitioned (Kinder and Schumacher, 1981a,b) during the summer by transition zones which separate four hydrographic domains (Figure 4-3). The hydrographic domains are distinguished by bottom depth and seasonal changes in their vertical density structure. During the winter the structure is absent or much less apparent under the ice. Beginning in the nearshore area, the coastal domain includes waters less than 50 m in depth that due to tidal mixing do not stratify seasonally. A zone of transition separates the coastal domain from the middle shelf domain. In the middle shelf domain, over bottom depths of 50 to 100 m, seasonal stratification sets up during the ice-free season, and warmer, less saline waters overlie colder and more saline bottom waters. This stratification persists until broken down by winter cooling and storms. A broad transition zone separates the middle shelf zone from the outer shelf domain. This latter domain, in water depths from 100 to 170 m, is characterized by well-mixed upper and lower layers separated by a complex intermediate layer containing fine density structure. In general, the outer shelf waters intrude shoreward near the bottom, while middle shelf waters spread seaward above them. Beyond the outer shelf domain, the shelf break front separates the shelf waters from the oceanic domain, with its more saline, less aerobic waters overlying the Bering Sea slope and deep basin.

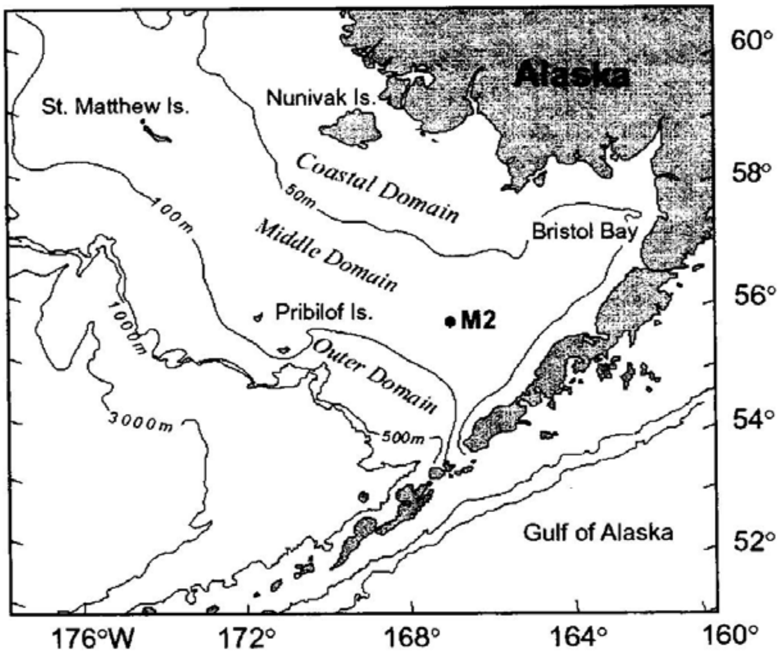
Net circulation in the Bering Sea is generally sluggish. However, moderate to strong tidal and wind-driven currents can be established over the shelf. Nearshore coastal currents from the Gulf of Alaska shelf flow into the Bering Sea through Unimak Pass and then apparently continue northeastward along the Alaska Peninsula. Within Bristol Bay, the flow becomes counter-clockwise and follows the 50 m depth contour toward Nunivak Island. In the middle shelf domain (water depths from 50-100 m), currents are weak and variable, responding temporarily as wind-driven pulses. In the outershelf domain, a mean northwestward flow exists along the shelf edge and upper slope following depth contours.

With respect to the physiographic regimes and hydrographic domains of the Bering Sea, many species perform seasonal and spawning migrations from one domain to another. Shelf dwellers, such as yellowfin sole and Pacific halibut spawn in deep water 275-410 m (Garrison and Miller 1982), while walleye pollock form mid-water spawning shoals. Other species also make similar off-on shelf migrations for spawning and feeding. Adult sablefish and Pacific ocean perch live principally on the continental slope at water depths greater than 200 m but are known to make large daily vertical movements within the water column for feeding.

**Table 4-1 Characteristic Features of the Eastern Bering Sea Shelf Ecosystem** (Favorite and Laevastu 1981).

| Characteristic Features | Consequences |
|---|---|
| **PHYSICAL FEATURES** | |
| Large Continental Shelf | • High standing stocks of biota<br>• High fish production<br>• Large food resources for mammals |
| High latitude area | • Nutrient replenishment with seasonal turnover<br>• Environmental distribution limits for many species<br>• Large seasonal changes<br>• Seasonal presence of ice<br>• Accumulation of generations |
| Large seasonal changes | • Seasonally changing growth<br>• Seasonal migrations<br>• Possibility of large anomalies |
| Ice | • Presence of ice-related mammals<br>• Migration of biota (in and out) caused by ice<br>• Limited production in winter |
| Cold bottom water | • Out migration of biota<br>• Higher mortalities and lower growth of benthic and demersal biota<br>• Accumulation of generations |
| High runoff | • Low salinities (near coasts)<br>• High turbidities<br>• Presence of euryhaline fauna |
| Sluggish circulation | • Local biological production<br>• Local pelagic spawning |
| **BIOLOGICAL FEATURES** | |
| High production and slow turnover | • High standing stocks |
| Fewer species than in lower latitudes | • Few species quantitatively very dominant |
| High amounts of marine mammals and birds | • High predation by apex predators |
| Pronounced seasonal migrations | • Great local space and time changes of abundance |
| **FISHERIES RESOURCE FEATURES** | |
| Pollock dominate semidemersal species | • Flexible feeding and breeding habits, especially environmental adaptation |
| Yellowfin sole dominate demersal species | • Abundant benthos food supply |
| Herring and capelin dominate pelagic species | • Important forage species in the ecosystem |
| Abundant crab resources | • Large, relatively shallow shelf. Few predators on adults, especially environmental adaptation. |
| Abundant marine mammals | • Abundant food supply, no enemies, insignificant hunting. Competes with man on fishery resources |
| **MAN-RELATED FEATURES** | |
| Fisheries development rather recent | • Ecosystem in near-natural state, not yet fully adjusted to effects of extensive fishery |
| Little inhabited coasts | • Ample space for breeding colonies for mammals and birds. Very limited local fisheries. |

**Figure 4-3 Hydrographic domains in the Bering Sea** (Hunt and Stabeno 2002), with 50, 100, 200, and 1,000 m isobaths.




### 4.2.2 Essential Fish Habitat Definitions

For each groundfish species, the amount of information available on the distribution of a life stage is indicated by the level to which it is classified (Table 4-2). A summary of the habitat information levels for each species is listed in Table 4-3. A detailed description of life history features and habitat requirements of FMP species is contained in Appendix D. Appendix E includes the maps of EFH for the species described in this section.

**Table 4-2 Classification of EFH levels**

| | |
|---|---|
| Level 0 | No systematic sampling has been conducted for this species and life stage; may have been caught opportunistically in small numbers during other research. |
| Level $0_a$ | Some information on a species' life stage upon which to infer general distribution. |
| Level $0_b$ | No information on the life stage, but some information on a similar species or adjacent life stage from which to infer general distribution. |
| Level $0_c$ | No information on the actual species' life stage and no information on a similar species or adjacent life stages, or where complexity of a species stock structure prohibited inference of general distribution. |
| Level 1 | Distribution data are available for some or all portions of the geographic range of the species. |
| Level 2 | Habitat-related densities of the species are available |
| Level 3 | Growth, reproduction, or survival rates within habitats are available |
| Level 4 | Production rates by habitat are available |

**Table 4-3 Levels of essential fish habitat information currently available for BSAI groundfish, by life history stage.** Juveniles were subdivided into early and late juvenile stages based on survey selectivity curves.

| Species | Eggs | Larvae | Early Juveniles | Late Juveniles | Adults |
|---|---|---|---|---|---|
| Pollock | 1 | 1 | 1 | 1 | 2 |
| Pacific cod | $0_a$ | $0_a$ | $0_a$ | 1 | 2 |
| Sablefish | $0_a$ | $0_a$ | $0_a$ | 1 | 2 |
| Yellowfin sole | $0_a$ | $0_a$ | $0_a$ | 1 | 2 |
| Greenland turbot | $0_a$ | $0_a$ | $0_a$ | 1 | 2 |
| Arrowtooth flounder | $0_a$ | $0_a$ | $0_a$ | 1 | 2 |
| Rock sole | $0_a$ | $0_a$ | $0_a$ | 1 | 2 |
| Flathead sole | $0_a$ | $0_a$ | $0_a$ | 1 | 2 |
| Other flatfish | $0_a$ | $0_a$ | $0_a$ | 1 | 2 |
| Pacific ocean perch | - | $0_a$ | $0_a$ | 1 | 1 |
| Northern rockfish | - | $0_b$ | $0_b$ | 1 | 1 |
| Shortraker rockfish | - | $0_b$ | $0_{a-b}$ | $0_b$ | 1 |
| Rougheye rockfish | - | $0_b$ | $0_{a-b}$ | 1 | 1 |
| Dusky rockfish | - | $0_b$ | $0_b$ | $0_a$ | 1 |
| Thornyhead rockfish | $0_a$ | $0_a$ | $0_a$ | $0_a$ | 1 |
| Atka mackerel | $0_a$ | $0_a$ | $0_b$ | $0_b$ | 2 |
| Squid | $0_a$ | - | $0_a$ | $0_a$ | $0_a$ |
| Other species | | | | | |
| sculpins | $0_a$ | $0_a$ | $0_a$ | $0_a$ | 1 |
| skates | $0_a$ | - | $0_a$ | $0_a$ | 1 |
| sharks | - | - | $0_a$ | $0_a$ | $0_a$ |
| octopus | $0_a$ | - | $0_a$ | $0_a$ | $0_a$ |
| Forage fish species | | | | | |
| eulachon and capelin | $0_a$ | $0_a$ | $0_a$ | $0_a$ | $0_a$ |
| myctophids and bathylagids | $0_c$ | $0_c$ | $0_a$ | $0_a$ | $0_a$ |
| sand lance | $0_a$ | $0_a$ | $0_a$ | $0_a$ | $0_a$ |
| sand fish | $0_a$ | $0_c$ | $0_a$ | $0_a$ | $0_a$ |
| pholids and stichaeids | $0_c$ | $0_c$ | $0_a$ | $0_a$ | $0_a$ |
| gonostomatids | $0_c$ | $0_c$ | $0_c$ | $0_c$ | $0_a$ |
| euphausiids | $0_a$ | $0_a$ | $0_a$ | $0_a$ | $0_a$ |

**NOTE**: '-' indicates a species that has internal fertilization and bears live young.

### 4.2.2.1 Walleye Pollock

**Eggs (duration 14-25 days) - Level 1:** Pelagic waters of the outer continental shelf and upper slope of the eastern Bering Sea from Unimak Island northwest to Zhenchug Canyon. Also in pelagic waters (200-400 m depth) over basin and lower slope areas in the Aleutian Islands and the Aleutian Basin. These are likely areas of upwelling or have gyres. Spawning occurs in February-April.

**Larvae (duration 60 days) - Level 1:** Epipelagic waters on the inner, middle, and outer continental shelf and upper slope throughout the eastern Bering Sea, eastern portions of the Aleutian Basin and throughout the Aleutians Islands. Survival is enhanced where food (copepod nauplii and small euphausiids) is concentrated, such as along semi-permanent fronts (mid-shelf front near the 100 m isobath) in the eastern Bering Sea, within ephemeral gyres, and possibly in association with jellyfish.

**Juveniles (up to 4 years) - Level 1:** Throughout the eastern Bering Sea and the Aleutian Islands both pelagically and on-bottom (no known substrate preferences) throughout the inner, middle, and outer shelf regions. At ages 2 and 3 years, pollock are located off-bottom within the water column, principally in the middle and outer shelf regions northwest of the Pribilof Islands. Ranges of juveniles of strong year-classes have varied from throughout the eastern Bering Sea (1978 year-class) to almost exclusively north of Zhenchug Canyon (1989 year-class). Feeding areas contain pelagic crustaceans such as copepods and euphausiids.

**Adults (4+ years old) - Level 2:** Meso-pelagic and semi-demersal habitats (no known substrate preferences) along the middle and outer continental shelf in the eastern Bering Sea from the U.S. Russia Convention Line to Unimak Pass and northeast along the Alaska Peninsula and throughout the Aleutian Islands. Also exists pelagically over deep Aleutian basin waters. Feeding areas are those that concentrate pelagic crustaceans (e.g., euphausiids) and juvenile fish (primarily juvenile pollock), such as in upwelling regions along the shelf break or fronts on the middle shelf. Known spawning areas in the eastern Bering Sea are: north of Unimak Island, along the mid-shelf front (100 m isobath)between Unimak Island and the Pribilof Islands, south of the Pribilof Islands, and possibly at other areas to the north, particularly at heads of submarine canyons. Known spawning areas in the Aleutian Islands are: over deep waters north of Umnak and Unalaska Islands, the region north of the Islands of Four Mountains, through Amukta Pass to Seguam Island, and north of Kanaga and Tanaga Islands. Pollock may prefer waters of 2-3°C for spawning.

#### 4.2.2.2 Pacific Cod

**Eggs (duration 15-20 days) - Level $0_a$:** Areas of mud and sand on the inner, middle, and outer continental shelf and upper slope throughout the eastern Bering Sea and Aleutian Islands in winter and spring.

**Larvae (duration unknown) - Level $0_a$:** Epipelagic waters throughout the eastern Bering Sea and Aleutian Islands regions in winter and spring.

**Early Juveniles (up to 2 years) - Level $0_a$:** Areas of mud and sand and the water column on the inner and middle continental shelf of the eastern Bering Sea and Aleutian Islands, particularly those with mysids, euphausiids and shrimp.

**Late Juveniles (2-4 years) - Level 1:** Areas of soft substrate (clay, mud, and sand) and the lower portion of the water column on the inner, middle, and outer continental shelf areas of the eastern Bering Sea and Aleutian Islands, particularly those with mysids, euphausiids, shrimp, pollock, flatfish, crab, and fishery discards.

**Adults (4+ years old) - Level 2:** Areas of mud and sand along the inner, middle, and outer continental shelf up to 500m along with the lower portion of the water column of the eastern Bering Sea and Aleutian Islands. Spawning occurs in January-May near the bottom across broad areas of the shelf, but predominately along the outer shelf between 100-200 m in the eastern Bering Sea, and throughout the area <200 m in the Aleutian Islands. After spawning, the mature population spreads out throughout the shelf in the eastern Bering Sea and Aleutian Islands, but with concentrations along the outer shelf northwest of the Pribilof Islands and along the outer and middle shelf areas northwest of the Alaskan Peninsula and into Bristol Bay. Feeding areas contain pollock, flatfish, and crab.

#### 4.2.2.3 Sablefish

**Eggs (duration 14-20 days) - Level $0_a$:** Pelagic waters of the upper and lower slope, and basin areas from 200-3000 m from late winter to early spring (December-April) in the eastern Bering Sea and Aleutian Islands.

**Larvae (duration up to 3 months) - Level $0_a$:** Epipelagic waters of the middle and outer continental shelf, the slope and basin areas in the BSAI during late spring-early summer months (April - July).

**Early Juveniles (up to 2 years) - Level $0_a$:** Pelagic waters, during first summer, along the outer, middle, and inner continental shelf of the BSAI. Areas of soft-bottom in nearshore bays and island passes after the first summer until end of second summer.

**Late Juveniles (2-5 years) - Level 1:** Areas of soft bottom deeper than 200 m associated with the continental slope and deep shelf gulleys and fjords (presumably within the lower portion of the water column) of the BSAI. Feeding areas contain mesopelagic and benthic fishes, benthic invertebrates and jellyfish.

**Adults (5+years) - Level 2:** Areas of soft bottom deeper than 200 m (presumably within the lower portion of the water column) associated with the continental slope and deep shelf gulleys in the BSAI. Feeding areas contain mesopelagic and benthic fishes, benthic invertebrates and jellyfish. A large portion of the adult diet is comprised of gadid fishes mainly pollock.

#### 4.2.2.4 Yellowfin Sole

**Eggs (duration unknown) - Level $0_a$:** Pelagic inshore waters of the southeastern Bering Sea shelf from Norton Sound to Bristol Bay in spring and summer.

**Larvae (duration 2-3 months) - Level $0_a$:** Pelagic inshore waters of the southeastern Bering Sea shelf from Norton Sound to Bristol Bay in spring, summer and fall.

**Early Juveniles (to 5.5 years old) - Level $0_a$:** Demersal areas (bottom and lower portion of the water column) on the inner, middle and outer portions of the continental shelf (down to 250 m) and within nearshore bays of the eastern Bering Sea.

**Late Juveniles (5.5-9 years old) - Level 1:** Areas of sandy bottom along with the lower portion of the water column within nearshore bays and on the inner, middle and outer portions of the continental shelf (down to 250 m) of the eastern Bering Sea south of St Matthew Island (approximately 61° N. longitude) and in Norton Sound. Feeding areas contain polychaetes, bivalves, amphipods and echiurids.

**Adults (9+ years old) - Level 2:** Areas of sandy bottom along with the lower portion of the water column on the inner, middle and outer portions of the continental shelf (down to 250 m) of the eastern Bering Sea south of St. Matthew Island (approximately 61° N. longitude) and in Norton Sound. Areas of known concentrations vary seasonally. Adult spawning areas in summer (May-August) are located along the inner shelf from Cape Constantine to Cape Peirce, throughout Kuskokwim Bay, and North of Nunivak Island. Summer (June-October) feeding concentrations of adults are located along the inner and middle portions of the shelf from Kuskokwim and Bristol Bays south along the Alaskan Peninsula to Amak Island, and northwest to St. Matthew Island. Feeding areas contain polychaetes, bivalves, amphipods and echiurids. In winter, yellowfin sole adults migrate to deeper waters of the shelf (100-200 m) south of 60° N. longitude to the Alaskan Peninsula.

#### 4.2.2.5 Greenland Turbot

**Eggs (duration unknown) - Level $0_a$:** Benthypelagic waters of the outer continental shelf and slope in the eastern Bering Sea and throughout the Aleutian Islands.

**Larvae (8-9 months) - Level $0_a$:** Pelagic waters of the outer continental shelf, slope, and adjacent basin in the eastern Bering Sea and throughout the Aleutian Islands.

**Early Juveniles (to 4 years old) - Level $0_a$:** Substrate and lower portion of the water column of the inner, middle and outer portions of the continental shelf and the adjacent upper slope region of the eastern Bering Sea and throughout the Aleutian Islands.

**Late Juveniles (4-5 years old) - Level 1:** Substrate (particularly mud and muddy-sand) and lower portion of the water column of the middle and outer continental shelf and adjacent upper and lower slope regions of the eastern Bering Sea and throughout the Aleutian Islands. Feeding areas contain euphausiids, polychaetes, and small fish.

**Adults (5+ years old) - Level 2:** Substrate (particularly mud and muddy-sand) and lower portion of the water column of the outer continental shelf and adjacent upper and lower slope regions of the eastern Bering Sea and throughout the Aleutian Islands. Annual spring and fall migrations from deeper to shallower waters. Feeding areas contain pollock and small fish.

### 4.2.2.6 Arrowtooth Flounder

**Eggs (duration unknown) - Level $0_a$:** Pelagic waters of the middle and outer continental shelf and slope in the eastern Bering Sea and throughout the Aleutian Islands in winter.

**Larvae (duration 2-3 months) - Level $0_a$:** Pelagic waters of the inner, middle and outer continental shelf and adjacent nearshore bays in the eastern Bering Sea and throughout the Aleutian Islands.

**Early Juveniles (to 2 years old) - Level $0_a$:** Areas of gravel, sand and mud and the associated water column of the inner continental shelf and the adjacent nearshore bays in the eastern Bering Sea and throughout the Aleutian Islands.

**Late Juveniles (2-4 years old) - Level 1:** Areas of gravel, sand and mud and the associated water column of the middle and outer continental shelf and adjacent upper slope regions of the eastern Bering Sea and throughout the Aleutian Islands. Feeding areas contain euphausiids, crustaceans, and small fish.

**Adults (4+ years old) - Level 2:** Areas of gravel, sand and mud and the associated water column of the middle and outer continental shelf and adjacent upper slope regions of the eastern Bering Sea and throughout the Aleutian Islands. Summer feeding areas on the middle and outer shelf would be those containing gadids, euphausiids, and other fish. Spawning areas in winter are on the outer shelf and upper slope regions.

### 4.2.2.7 Rock Sole

**Eggs (duration unknown) - Level $0_a$:** Areas of pebbles and sand on the middle and outer continental shelf in the eastern Bering Sea in winter (December-March).

**Larvae (duration 2-3 months) - Level $0_a$:** Pelagic waters of the eastern Bering Sea over the inner, middle and outer continental shelf, the slope, and the Aleutian Basin.

**Early Juveniles (to 3.5 years old) - Level $0_a$:** Inner, middle and outer portions of the continental shelf along with the lower portion of the water column of the eastern Bering Sea south of 61° N. longitude and in Norton Sound. Feeding areas contain polychaetes, bivalves, amphipods and crustaceans.

**Late Juveniles (3.5-8 years old) - Level 1:** Areas of pebbles and sand along with the lower portion of the water column within nearshore bays and on the inner, middle and outer portions of the continental shelf of the eastern Bering Sea south of 61° N. longitude and in Norton Sound. Feeding areas contain polychaetes, bivalves, amphipods and crustaceans.

**Adults (8+ years old) - Level 2:** Areas of pebbles and sand along with the lower portion of the water column on the inner, middle and outer portions of the continental shelf of the eastern Bering Sea south of 61° N. longitude and in Norton Sound. Areas of known concentrations vary seasonally and include adult spawning areas in winter and feeding areas in summer (May-October), which include Bristol Bay, portions of outer Kuskokwim Bay, north of the Alaskan Peninsula to Unimak Island, and near the Pribilof Islands. Feeding areas contain polychaetes, bivalves, amphipods and crustaceans.

### 4.2.2.8 Flathead Sole

**Eggs (duration unknown) - Level $0_a$:** Pelagic waters of the middle and outer portions of the southeastern Bering Sea shelf, adjacent slope and basin waters, and throughout the Aleutian Islands in winter and early spring.

**Larvae (duration unknown) - Level $0_a$:** Pelagic waters of the inner, middle, and outer portions of the southeastern Bering Sea shelf, adjacent slope and basin waters, and throughout the Aleutian Islands in spring and summer.

**Early Juveniles (to 2 years old) - Level $0_a$:** Bottom substrate and lower water column on the inner, middle and outer portions of the southeastern Bering Sea shelf and throughout the Aleutians Islands.

**Late Juveniles (2-3 years old) - Level 1:** Bottom substrate (particularly sand and mud) and lower portion of the water column on the inner, middle, and outer portions of the southeastern Bering Sea shelf south of 61° N. longitude and throughout the Aleutian Islands. Feeding areas contain polychaetes, bivalves, ophiuroids, pollock, small tanner crab and other crustaceans.

**Adults (3+ years old) - Level 2:** Bottom substrate (particularly sand and mud) and lower portion of the water column on the inner, middle, and outer portions of the southeastern Bering Sea shelf south of 61˚N and throughout the Aleutian Islands. Feeding areas, primarily on the inner, middle and outer shelf in spring, summer and fall, contain polychaetes, bivalves, ophiuroids, pollock, small tanner crab and other crustaceans. Spawning areas in winter and early spring are located primarily on the outer shelf.

### 4.2.2.9 "Other Flatfish" - Alaska Plaice

**Eggs (duration unknown) - Level $0_a$:** Pelagic waters of the middle and outer continental shelf of the eastern Bering Sea in spring and early summer.

**Larvae (duration 2-4 months) - Level $0_a$:** Pelagic waters of the inner, middle and outer continental shelf of the eastern Bering Sea in summer and fall.

**Early Juveniles (up to 4 years) - Level $0_a$:** Substrate (particularly areas of sand and mud) and lower portion of the water column on the inner and middle continental shelf of the eastern Bering Sea.

**Late Juveniles (4-7 years) - Level 1:** Substrate (particularly areas of sand and mud) and lower portion of the water column on the inner, middle and outer continental shelf of the eastern Bering Sea. Feeding areas contain polychaetes, amphipods, and echiurids. With increasing age, plaice overwinter near the edge of the shelf, and return to the middle and inner shelf for feeding in spring, summer and fall.

**Adults (7+ years) - Level 2:** Substrate (particularly areas of sand and mud) and lower portion of the water column on the inner, middle and outer continental shelf of the eastern Bering Sea. Feeding areas contain polychaetes, amphipods, and echiurids. Overwinters near the edge of the shelf in the southeastern Bering Sea from the Pribilof islands to Unimak Island and north along the Alaskan peninsula. Occurs across broad areas of the middle and inner shelf on summer and fall.

### 4.2.2.10 Pacific Ocean Perch

**Eggs (internal incubation, ~90days) - no EFH definition determined:** Internal fertilization and incubation. Incubation is assumed to occur during the winter months.

**Larvae (duration 60-180 days) - Level $0_a$:** Pelagic waters of the inner, middle, and outer continental shelf, the upper and lower slope and the basin areas of the BSAI, during the spring and summer months.

**Early Juveniles (larval stage to 3 years) - Level $0_a$:** Initially pelagic, then demersal in very rocky areas of the inner continental shelf of the BSAI. Includes the water column.

**Late Juveniles (3-10 years) - Level 1:** Areas of cobble, gravel, mud, and sand along the inner, middle, and outer continental shelf and upper slope areas, shallower than adults, and the middle and lower portions of the water column of the BSAI. Feeding areas contain euphausiids.

**Adults (10+ years) - Level 1:** Areas of cobble, gravel, mud, and sand along the outer continental shelf and upper slope areas and middle and lower portions oft the water column of the BSAI. Feeding areas contain euphausiids. Areas of high concentrations tend to vary seasonally and may be related to spawning behavior. In summer, adults inhabit shallower depths (180-250m) and in the fall they migrate farther offshore (300-420m).

### 4.2.2.11 Northern Rockfish

**Eggs - no EFH definition determined:** Internal fertilization and incubation.

**Larvae - Level $0_b$**: Pelagic waters of the inner, middle, and outer continental shelf, the upper and lower slope and the basin areas extending to the seaward boundary of the EEZ of the BSAI, during the spring and summer months.

**Early juveniles (up to 25cm) - Level $0_b$:** Pelagic waters and substrate of the inner, middle, and outer continental shelf of the BSAI.

**Late Juveniles (greater than 25 cm) - Level 1:** Areas of cobble and rock along the shallower regions (relative to adults) of the outer continental shelf of the BSAI.

**Adults (13+ years) - Level 1:** Areas of cobble and rock along the outer continental slope and upper slope regions and the middle and lower portions of the water column of the BSAI. Areas of relatively shallow banks of the outer continental shelf have been found to have concentrated populations.

### 4.2.2.12 Shortraker and Rougheye Rockfish

**Eggs - no EFH definition determined:** Internal fertilization and incubation.

**Larvae (duration unknown) - Level $0_b$:** Epipelagic waters of the inner, middle, and outer continental shelf, the upper and lower slope and the basin areas of the BSAI, during the spring and summer months.

**Early Juveniles - Level $0_{a-b}$:** Pelagic waters and substrate on the entire continental shelf of the BSAI.

**Late Juveniles - Level $0_b$ and Level 1:** Areas shallower than adult along the continental shelf of the BSAI. Juvenile shortraker rockfish have been only rarely seen.

**Adults (15+ years) - Level 1:** Areas of mud, sand, rock, cobble, and gravel and the lower portion of the water column on the outer continental shelf and upper slope of the BSAI. Fishery concentrations at 100-500 m. Feeding areas contain shrimps, squid and myctophids.

### 4.2.2.13 "Other Rockfish"

Dusky rockfish

**Eggs - no EFH definition determined:** Internal fertilization and incubation.

**Larvae - Level $0_b$:** Pelagic waters of the inner, middle, and outer continental shelf, the upper and lower slope and the basin areas extending to the seaward boundary of the EEZ of the BSAI, during the spring and summer months.

**Early juveniles (up to 25cm) - Level $0_b$:** Pelagic waters of the inner, middle, and outer continental shelf of the BSAI.

**Juveniles (greater than 25cm) - Level $0_a$:** Areas of cobble, rock and gravel and the water column along the inner, middle, and outer continental shelf of the BSAI.

**Adults (up to 50 years) - Level 1:** Areas of cobble, rock and gravel along the outer continental shelf and upper slope region and the middle and lower portions of the water column of the BSAI. Feeding areas contain euphausiids.

Thornyhead rockfish

**Eggs - Level $0_a$:** Pelagic waters of the BSAI during the late winter and early spring.

**Larvae (duration <15 months) - Level $0_a$:** Pelagic waters of the BSAI.

**Juveniles (>15 months) - Level $0_a$:** Areas of mud, sand, rock, cobble, and gravel and the lower portion of the water column along the middle and outer continental shelf and upper slope of the BSAI.

**Adults (12+ years) - Level 1:** Areas of mud, sand, rock, cobble, and gravel and the lower portion of the water column along the middle and outer continental shelf and upper and lower slope of the BSAI. Feeding areas contain shrimp, fish (cottids), and small crabs.

### 4.2.2.14 Atka Mackerel

**Eggs (duration 1-1.5 months) - Level $0_a$:** Areas of gravel, rock and kelp in shallow water in island passes, nearshore, and on the inner continental shelf in the Aleutian Islands and south eastern Bering Sea in areas of swift current in summer.

**Larvae (duration 1.5-6 months) - Level $0_a$:** Epipelagic waters of the outer continental shelf of the southeastern BSAI, the Aleutian Basin (to the edge of the EEZ), and in the adjacent North Pacific Ocean (to the edge of the EEZ) in fall and winter.

**Juveniles (up to 3 years) - Level $0_b$:** Unknown habitat association; assumed to settle near areas inhabited by adults, but have not been observed in fishery or surveys.

**Adults (3+ years) - Level 2:** Areas of gravel, rock and kelp on the inner, middle and outer portions of the shelf in the Aleutian Islands and the entire water column to the surface. Areas of gravel and rock on the outer portion of the shelf in the SE Bering Sea and extending nearshore near the Pribilof Islands, including the entire water column. Feeding areas contain copepods, euphausiids and meso-pelagic fish (myctophids). Spawning occurs in nearshore (inner shelf and in island passes) rocky areas and in kelp in shallow waters in summer. Move to offshore deeper areas nearby in winter. Perform diurnal/tidal movements between demersal and pelagic areas.

### 4.2.2.15 Squid

<u>Red Squid</u>

**Eggs - Level $0_a$:** Areas of mud and sand on the upper and lower slope throughout the BSAI.

**Larvae - no EFH definition determined:** Not applicable (no larval stage).

**Juveniles and Adults - Level $0_a$:** Pelagic waters of the shelf, slope and basin to the seaward edge of the EEZ in the BSAI. Feeding areas contain euphausiids, shrimp, forage fish, and other cephalopods.

### 4.2.2.16 "Other Species"

<u>Sculpins</u>

**Eggs - Level $0_a$:** All substrates on the inner, middle and outer continental shelf of the BSAI. Some species deposit eggs in rocky shallow waters near shore.

**Larvae - Level $0_a$:** Pelagic waters of the inner, middle and outer continental shelf and slope of the BSAI, predominately over the inner and middle shelf.

**Juveniles - Level $0_a$:** Broad range of demersal habitats from intertidal pools, all shelf substrates (mud, sand, gravel, etc.) and rocky areas of the upper slope of the BSAI.

**Adults - Level 1:** Broad range of demersal habitats from intertidal pools, all shelf substrates (mud, sand, gravel, etc.) and rocky areas of the upper slope of the BSAI.

Sharks

**Eggs - no EFH definition determined:** Not applicable (most are oviparous).

**Larvae - no EFH definition determined:** Not applicable (no larval stage).

**Juveniles and Adults - Level $0_a$:** All waters and substrate types in the inner, middle and outer continental shelf and slope of the BSAI.

Skates

**Eggs - Level $0_a$:** All bottom substrates of the slope and across the shelf throughout the BSAI.

**Larvae - no EFH definition determined:** Not applicable (no larval stage)

**Juveniles - Level $0_a$:** Broad range of substrate types (mud, sand, gravel, and rock) and the water column on the shelf and the upper slope of the BSAI.

**Adults - Level 1:** Broad range of substrate types (mud, sand, gravel, and rock) and the lower portion of the water column on the shelf and the upper slope of the BSAI.

Octopus

**Eggs - Level $0_a$:** All bottom substrates of the shelf throughout the BSAI.

**Larvae - no EFH definition determined:** Not applicable (no larval stage).

**Juveniles and Adults - Level $0_a$:** Broad range of substrate types (mostly rock, gravel, and sand) and the lower portion of the water column on the shelf and the upper slope of the BSAI. Feeding areas are those containing crustaceans and molluscs.

#### 4.2.2.17 Forage Fish Complex

Eulachon

**Eggs (duration 30-40 days) - Level $0_a$:** Bottom substrates of sand, gravel and cobble in rivers during April-June.

**Larvae (duration 1-2 months) - Level $0_a$:** Pelagic waters of the inner continental shelf throughout the eastern Bering Sea.

**Juveniles (to 3 years of age) - Level $0_a$:** Pelagic waters of the middle and outer continental shelf and upper slope throughout the eastern Bering Sea.

**Adults (3+ years) - Level $0_a$:** Pelagic waters of the middle to outer continental shelf and upper slope throughout the eastern Bering Sea for non-spawning fishes (July-April). Feeding areas are those containing euphausiids and copepods. Rivers during spawning (April-June).

Capelin

**Eggs (duration 2-3 weeks) - Level $0_a$:** Sand and cobble intertidal beaches down to 10 m depth along the shores of the eastern Bering Sea in Bristol Bay, Norton Sound, and along the northern shore of the Alaskan Peninsula during May-August.

**Larvae (duration 4-8 months) - Level $0_a$:** Epipelagic waters of the inner and middle continental shelf throughout the eastern Bering Sea.

**Juveniles (1-2 yrs) - Level $0_a$:** Pelagic waters of the inner and middle continental shelf throughout the eastern Bering Sea. May be associated with fronts and ice edges in winter.

**Adults (2+ yrs )- Level $0_a$:** Pelagic waters of the inner, middle and outer continental shelf throughout the eastern Bering Sea during their non-spawning cycle (September-April). Populations associated with fronts and the ice edge formed in winter. Intertidal beaches of sand and cobble down to 10 m depth during spawning (May-August).

Myctophids and Bathylagids

**Eggs - Level $0_c$ - no EFH definition determined:** No information available at this time.

**Larvae - Level $0_c$ - no EFH definition determined:** No information available at this time.

**Juveniles - Level $0_a$:** Pelagic waters ranging from near surface to lower portion of water column of the slope and basin regions throughout the eastern Bering Sea, the Aleutians Islands, and to the seaward extent of the EEZ in the Bering Sea and North Pacific Ocean.

**Adults - Level $0_a$:** Pelagic waters ranging from near surface to lower portion of water column of the slope and basin regions throughout the eastern Bering Sea, the Aleutians Islands, and to the seaward extent of the EEZ in the Bering Sea and North Pacific Ocean.

Sand lance

**Eggs (3-6 weeks) - Level $0_a$:** Bottom substrate of sand to sandy gravel along the inner continental shelf throughout the eastern Bering Sea and the Aleutians Islands.

**Larvae (100-131 days) - Level $0_a$:** Pelagic and neustonic waters along the inner continental shelf throughout the eastern Bering Sea and the Aleutians Islands.

**Juveniles - Level $0_a$:** Soft bottom substrates (sand, mud) and the entire water column of the inner and middle continental shelf throughout the eastern Bering Sea and the Aleutians Islands. Feeding areas contain zooplankton, calanoid copepods, mysid shrimps crustacean larvae, gammarid amphipods and chaetognaths.

**Adults - Level $0_a$:** Soft bottom substrates (sand, mud) and the entire water column of the inner and middle continental shelf throughout the eastern Bering Sea and the Aleutians Islands. Feeding areas contain zooplankton, calanoid copepods, mysid shrimps crustacean larvae, gammarid amphipods and chaetognaths.

Sand fish

**Eggs - Level $0_a$:** Egg masses attached to rock in nearshore areas throughout the eastern Bering Sea and the Aleutians Islands.

**Larvae - Level $0_c$ - no EFH definition determined:** No information available at this time.

**Juveniles - Level $0_a$:** Bottom substrates of mud and sand of the inner continental shelf throughout the eastern Bering Sea and the Aleutians Islands.

**Adults - Level $0_a$:** Bottom substrates of mud and sand of the inner continental shelf throughout the eastern Bering Sea and the Aleutians Islands.

**Adults - Level $0_a$:** Pelagic waters throughout the eastern Bering Sea, the Aleutians Islands and to the seaward extent of the EEZ in the Bering Sea and North Pacific Ocean. Dense populations are associated with upwelling or nutrient-rich areas, such as the edge of the continental shelf, heads of submarine canyons, edges of gullies on the continental shelf, in island passes along the Aleutian Islands and over submerged seamounts.

Pholids and Stichaeids

**Eggs - Level $0_c$ - no EFH definition determined:** No information available at this time.

**Larvae - Level $0_c$ - no EFH definition determined:** No information available at this time.

**Juveniles - Level $0_a$:** Intertidal to demersal waters of the inner continental shelf with mud substrate throughout the eastern Bering Sea and the Aleutians Islands. Certain species are associated with vegetation such as eelgrass and kelp.

**Adults - Level $0_a$:** Intertidal to demersal waters of the inner continental shelf with mud substrate throughout the eastern Bering Sea and the Aleutians Islands. Certain species are associated with vegetation such as eelgrass and kelp.

Gonostomatids

**Eggs - Level $0_c$ - no EFH definition determined:** No information is available at this time.

**Larvae - Level $0_c$ - no EFH definition determined:** No information is available at this time.

**Juveniles - Level $0_c$ - no EFH definition determined:** No information is available at this time.

**Adults - Level $0_a$:** Bathypelagic waters throughout the eastern Bering Sea, Aleutians Islands, and to the seaward extent of the EEZ in the Bering Sea and North Pacific Ocean.

Euphausiids

**Eggs - Level $0_a$:** Neustonic waters throughout the eastern Bering Sea, the Aleutians Islands, and to the seaward extent of the EEZ in the Bering Sea and North Pacific Ocean in spring.

**Larvae - Level $0_a$:** Epipelagic waters throughout the eastern Bering Sea, the Aleutians Islands, and to the seaward extent of the EEZ in the Bering Sea and North Pacific Ocean in spring.

**Juveniles - Level $0_a$:** Pelagic waters throughout the eastern Bering Sea, the Aleutians Islands and to the seaward extent of the EEZ in the Bering Sea and North Pacific Ocean. Dense populations are associated with upwelling or nutrient-rich areas, such as the edge of the continental shelf, heads of submarine canyons, edges of gullies on the continental shelf, in island passes along the Aleutian Islands and over submerged seamounts.

**Adults - Level $0_a$:** Pelagic waters throughout the eastern Bering Sea, the Aleutians Islands and to the seaward extent of the EEZ in the Bering Sea and North Pacific Ocean. Dense populations are associated with upwelling or nutrient-rich areas, such as the edge of the continental shelf, heads of submarine canyons, edges of gullies on the continental shelf, in island passes along the Aleutian Islands and over submerged seamounts.

### 4.2.3 Habitat Areas of Particular Concern

There are several habitat types in Alaska that have important ecological functions, are sensitive and vulnerable to human impacts, and are relatively rare. A summary of these habitat types is provided below.

#### 4.2.3.1 Living Substrates in Shallow Waters

Habitat areas of particular concern include nearshore areas of intertidal and submerged vegetation, rock, and other substrates. These areas provide food and rearing habitat for juvenile groundfish and spawning areas of some species (e.g., Atka mackerel, yellowfin sole), and may have a high potential to be affected by shore-based activities.

Shallow inshore areas (less than 50 m depth) are very important to king crab reproduction. After molting through four larval (zoea) stages, king crab larvae develop into glaucothoe which are young crabs that settle in the benthic environment in nearshore shallow areas with significant cover, particularly those with living substrates (macroalgae, tube building polychaete worms, kelp, mussels, and erect bryozoans). The area north and adjacent to the Alaska peninsula (Unimak Island to Port Moller) and the eastern portion of Bristol Bay are locations known to be particularly important for rearing juvenile king crab.

All nearshore marine and estuarine habitats used by Pacific salmon, such as eel grass beds, submerged aquatic vegetation, emergent vegetated wetlands, and certain intertidal zones, are sensitive to natural or human induced environmental degradation, especially in urban areas and in other areas adjacent to intensive human-induced developmental activities. Many of these areas are unique and rare. The coastal zone is under the most intense development pressure, and estuarine and intertidal areas are limited in comparison with the areal scope of other marine habitats for salmon.

Herring also require shallow water living substrates for reproduction. Spawning takes place near the shoreline between the high tide level and 11 m. Herring deposit their eggs on vegetation, primarily rockweed (*Fucus* sp.) and eelgrass (*Zostera* sp.). These “seaweeds” are found along much of the Alaska coastline, but they often occur in discrete patches.

#### 4.2.3.2 Living Substrates in Deep Waters

Habitat areas of particular concern include offshore areas with substrates of high-micro habitat diversity, which serve as cover for groundfish and other organisms. These can be areas with rich epifaunal communities (e.g., coral, anemones, bryozoans, etc.), or with large particle size (e.g., boulders, cobble). Complex habitat structures are considered most readily impacted by fishing activities (see previous sections of this document).

Corals are generally considered to be very slow growing organisms, and are a habitat of particular concern. Although scientists are not quite sure of coral's importance to fish habitat, it would certainly provide vertical structure for fish to use for protection and cover. Some observations to this claim have been provided by submersible observations. Coral habitat is likely very sensitive to human-induced environmental degradation from both fishing and non-fishing threats. It is not known how much coral there is off the coast of Alaska, but it is likely to be rare relative to other habitat types.

There are several species of deepwater coral found off Alaska. Two common species are red tree coral (*Primnoa willeyi*) and sea raspberry (*Eunephtya* sp.). Although these corals are thought to be distributed throughout the Gulf of Alaska and Aleutian Islands, much of the data analysis has focused on the eastern Gulf of Alaska. NMFS trawl surveys have indicated high concentrations in the immediate vicinity of Dixon Entrance, Cape Ommaney, and Alsek Valley (Draft EA/RIR for Amendment 29 to the GOA Groundfish FMP, September 1992). In the GOA, NMFS surveys have taken red tree coral in very deep areas (125-210 fathoms), whereas sea raspberries have generally been taken in shallower areas (70-110 fathoms).

Information on coral distribution has been summarized in a 1981 report by R. Cimberg, T. Gerrodette, and K. Muzik titled, “Habitat Requirements and Expected Distribution of Alaska Coral.” Though this report was written in the context of potential impacts of oil and gas exploration and development, information on habitat and distribution is relevant for our purposes. Though the report discusses coral distributions throughout Alaska, the focus here is on the information contained relevant to southeast Alaska.

The study notes that this Region probably has the largest number of coral species due to the variety of habitats in terms of depth, substrate, temperature, and currents. *Primnoa sp.*, or red tree corals, are more abundant in southeast Alaska than in any other region. Other species of fan corals have been observed as well as bamboo corals, cup corals, soft corals, and hydrocorals. The greatest number of distributional records for red tree corals are from the Gulf of Alaska, in particular from the inside waters of southeast Alaska. In southeast Alaska, red tree corals have frequently been reported in Chatham Strait, Frederick Sound, and Behm Canal. The frequency of occurrences increases toward the ocean entrances and further away from the fjords. This trend is likely due to swifter currents near the entrances and/or greater turbidity and lower salinities in the fjords. Areas of highest densities are found in regions where currents are 3/4 knots.

Distributional records were additionally analyzed relative to the depths at which they occurred. Red tree corals have been reported at depths from 10 to 800 m. The lower depth limit varied in different regions of Alaska, increasing along a geographic gradient from the Aleutians to southeast Alaska. The lower depth limit of these corals in each area corresponds with a mean spring temperature of 3.7 degrees C. The report indicates that in southeast Alaska there is a difference in the lower depth limit exhibited north of 57° N. latitude and that experienced south of that line (roughly running through Sitka). The data from the report indicate that, in the area of southeast Alaska north of 57° N. latitude, red tree corals are predominately found between 50 and 150 meters in depth. Significant occurrences continue to exist from 150 to 250 m, and taper off rapidly beyond 250 m south of the 57° N. latitude line, they occur over a broader depth range with equal occurrences from 50 to 450 m. The report indicates that other species of sea fans may be found deeper than *Primnoa sp.*, at depths up to 2,000 m.

Bamboo corals also occur in the waters of both the inside passages of southeast Alaska and in the southeast Gulf of Alaska. These corals have a lower temperature tolerance, about 3° C, and exist in depths from 300-3,500 m. These corals are also expected to exist in a rocky, stable substrate and have a low tolerance for sediments.

The depth distribution of soft corals is, like the red tree corals, expected to range from 10-800 m, though they may exist on a much wider range of substrates. Hydrocorals, also occurring in southeast Alaska, have a depth range of 700-950 m, though they may occur at shallower depths in southeast Alaska than in the more northern, colder waters.

The report notes (again in the context of potential disturbance by oil and gas exploration and development) that recolonization of tropical coral communities requires at least several decades to recover from major perturbations. Alaskan corals would likely take much longer to recolonize following similar disturbances. For example, given a predicted growth rate of 1 cm/year for *Primnoa sp.*, a colony 1 m high would require at least 100 years to return to the pre-impacted state. This, of course, is regardless of the origin of the impact.

#### 4.2.3.3 Freshwater Areas Used by Anadromous Fish

Habitat areas of particular concern also include all anadromous streams, lakes, and other freshwater areas used by Pacific salmon and other anadromous fish (such as smelt), especially in urban areas and in other areas adjacent to intensive human-induced developmental activities.

### 4.2.4 Essential Fish Habitat Recommendations

Appendix F contains a description of potential adverse effects on EFH from fishing and non-fishing activities. Based on this assessment, Sections 4.2.4.1 and 4.2.4.2 contain habitat conservation and enhancement recommendations for non-fishing and fishing threats to EFH.

#### 4.2.4.1 Habitat Conservation and Enhancement Recommendations for Non-fishing Threats to Essential Fish Habitat

Habitat alteration may lower both the quantity and quality of species production through physical changes or chemical contamination of habitat. Species and individuals within species differ in their tolerance to effects of habitat alteration. It is possible for the timing of a major alteration event and the occurrence of a large concentration of living marine resources to coincide in a manner that may affect fishery stocks and their supporting habitats. The effects of such events may be masked by natural phenomena or may be delayed in becoming evident. However, the process of habitat degradation more characteristically begins with small-scale projects that result in only minor losses or temporary disruptions to organisms and habitat. As the number and rate of occurrence of these and other major projects increases, their cumulative and synergistic effects become apparent over larger areas. It is often difficult to separate the effects of habitat alteration from other factors such as fishing mortality, predation, and natural environmental fluctuations. Decreasing the probability of impact will lead to the highest protection of EFH. The probability of impact directly relates to the amount of human activity we introduce to an environment. Recommendations are offered to protect EFH in Tables 4-4, 4-5, and 4-6.

**Table 4-4 Near Shore Habitat and Waters (0-3 nm)**

| Recommendation | Area | Species |
|---|---|---|
| Minimize construction of structures such as causeways or breaches that would affect local flushing, water temperatures, water quality, lateral drift, and/or migration. | Sensitive areas, special aquatic and vegetation areas | groundfish, salmon, scallop, crab |
| Minimize construction of structures such as docks that ground on tidal lands during low water events. | Sensitive areas, special aquatic and vegetation areas | groundfish, salmon, crab |
| Minimize deposition of fill in tidelands. | Sensitive areas, special aquatic and vegetation areas | groundfish, salmon, crab |
| Stage rapid response equipment and establish measures for accidental impacts such as oil and hazardous material spills. | ports, sensitive areas | groundfish, salmon, scallop, crab |
| Monitor point source pollution sites such as fish processing waste, sewage, and storm water run off outfalls. | ports, vessel processors, communities | groundfish, salmon, scallop, crab |
| Minimize disposal or dumping of dredge spoils, drilling muds, and municipal and industrial wastes. | known concentration of bottom species and their habitats | groundfish, salmon, scallop, crab |
| Test dredge spoils prior to marine disposal | port and upland sources | groundfish, salmon, scallop, crab |
| Establish monitoring that incorporates Federal and State regulatory agency determinations, i.e., tracking database and GIS system | area wide | groundfish, salmon, scallop, crab |

**Table 4-5 Pelagic Habitat and Waters (3-12 nm)**

| Recommendation | Area | Species |
|---|---|---|
| Assess cumulative oil and gas production activities. | BSAI, Chukchi Sea, OCS, Cook Inlet, GOA | groundfish, salmon, scallop, crab |
| Identify marine disposal sites. | area wide | groundfish, salmon, scallop, crab |
| Establish monitoring that incorporates Federal and State regulatory agency determinations, i.e., tracking database and GIS system | area wide | groundfish, salmon, scallop, crab |
| Establish no discharge zones for ballast waters to prevent introduction of non-indigenous species and chemical contaminants. | ports, known gyres areas | groundfish, salmon, scallop, crab |
| Minimize disposal or dumping of dredge spoils, drilling muds, and municipal and industrial wastes. | known concentration of bottom species and their habitats | groundfish, salmon, scallop, crab |

**Table 4-6 Offshore Habitat and Waters (greater than 12 nm)**

| Recommendation | Area | Species |
|---|---|---|
| Establish monitoring that incorporates Federal and State regulatory agency determinations, i.e., tracking database and GIS system | area wide | groundfish, salmon, scallop, crab |
| Establish no discharge zones for ballast waters to prevent introduction of non-indigenous species and chemical contaminants. | known offshore gyre areas | groundfish, salmon, scallop, crab |
| Minimize disposal or dumping of dredge spoils, drilling muds, and municipal and industrial wastes. | known concentration of bottom species and their habitats | groundfish, salmon, scallop, crab |

#### 4.2.4.2 Habitat Conservation and Enhancement Recommendations for Fishing Threats to Essential Fish Habitat

Area closures to trawling and dredging in the BSAI area serve to protect EFH from potential adverse impacts caused by these gear types. Other management measures, such as the Pribilof Islands Habitat Conservation Area and the Bristol Bay Closure Area, are designed to reduce the impact of fishing on marine ecosystems. Catch quotas, bycatch limits and gear restrictions control removals of prey species. Studies that compare seafloor habitats in areas heavily trawled with areas that have had little trawl effort may reveal future habitat conservation and enhancement measures necessary to protect EFH. Additionally, the annual review of existing and new EFH information during the SAFE development process is expected to identify adverse effects to EFH from fishing and proposals to amend the FMP to minimize those adverse effects. Proposals can be submitted during the Council's plan amendment cycle.

## 4.3 Fishing Activities Affecting the Stocks

The Bering Sea and Aleutian Islands management area is utilized primarily by commercial fisheries. The groundfish fisheries have been entirely domestic since 1991 (a history of exploitation is addressed in Section 4.3.1). The commercial fleet is described in Section 4.3.2. There is also subsistence fishing for groundfish species (Section 4.3.3) in the BSAI, although most of this activity takes place within state waters (0-3 nm). Recreational fisheries are addressed in Section 4.3.4. There are no Indian treaty fishing rights for groundfish in the BSAI exclusive economic zone (EEZ).

### 4.3.1 History of Exploitation

The earliest fisheries for groundfish in the BSAI were the native subsistence fisheries. The fish and other marine resources remain an important part of the life of native people, and dependence on demersal species of fish may have been critical to their survival in periods of the year when other sources of food were scarce or lacking. Fishing was primarily in nearshore waters utilizing such species as cod, halibut, rockfish, and other species. These small-scale subsistence fisheries have continued to the present time.

The first commercial venture for groundfish occurred in 1864 when a single schooner fished for Pacific cod in the Bering Sea. This domestic fishery continued until 1950 when demand for cod declined and economic conditions caused the fishery to be discontinued. Fishing areas in the eastern Bering Sea were from north of Unimak Island and the Alaska Peninsula to Bristol Bay. Vessels operated from home ports in Washington and California and from shore stations in the eastern Aleutian Islands. The cod fishery reached its peak during World War I when the demand for cod was high. Numbers of schooners operating in the fishery ranged between 1 and 16 up to 1914 and increased to between 13 and 24 in the period 1915-20. Estimated catches during the peak of the fishery ranged annually between 12,000-14,000 mt.

Another early fishery targeted Pacific halibut. Halibut were reported as being present in the Bering Sea by United States cod vessels as early as the 1800s. However, halibut from the Bering Sea did not reach North American markets until 1928. Small and infrequent landings of halibut were made by United States and Canadian vessels between 1928 and 1950, but catches were not landed every year until 1952. The catch by North American setline vessels increased sharply between 1958 and 1963 and then declined steadily until 1972.

Several foreign countries conducted large scale groundfish fisheries in the BSAI prior to 1991. Vessels from Japan, the USSR (Russia), Canada, Korea, Taiwan, and Poland all plied the waters of the North Pacific for groundfish. In the mid 1950s, vessels from Japan and Russia targeted yellowfin sole, and catches peaked at over 550,000 mt in 1961. In the 1960s, Japanese vessels, and to a lesser extent Russian vessels, developed a fishery for Pacific ocean perch (POP), pollock, Greenland turbot, sablefish, and other groundfish. By the early 1970s, over 1.7 million mt of pollock was being caught by these two countries in the eastern Bering Sea annually. Korean vessels began to target pollock in 1968. Polish vessels fished briefly in the Bering Sea in 1973. Taiwanese vessels entered the fishery in 1977. For more information on foreign fisheries in the BSAI, refer to NPFMC (1995), Megrey and Wespestad (1990), and Fredin (1987).

The foreign fleets were phased out in the 1980s. The transition period from foreign to fully domestic groundfish fisheries was stimulated by a quick increase in joint-venture operations. The American Fisheries Promotion Act (the so-called “fish and chips” policy) required that allocations of fish quotas to foreign nations be based on the nation’s contributions to the development of the U.S. fishing industry. This provided incentive for development of joint-venture operations, with U.S. catcher vessels delivering their catches directly to foreign processing vessels. Joint-venture operations peaked in 1987, giving way to a rapidly developing domestic fleet. By 1991, the entire BSAI groundfish harvest (1,765,397 mt, worth $351 million ex-vessel) was taken by only 391 U.S. vessels. Groundfish harvest has been entirely domestic since that time.

Catch History

Catch statistics since 1954 are shown for the eastern Bering Sea subarea in Table 4-7. The initial target species was yellowfin sole. During the early period of these fisheries, total catches of groundfish reached a peak of 674,000 mt in 1961. Following a decline in abundance of yellowfin sole, other species (principally walleye pollock) were targeted upon, and total catches rose to 2.2 million mt in 1972. Catches have since varied from 1 to 2 million mt as catch restrictions and other management measures were placed on the fishery.

Catches in the Aleutian Islands subarea have always been much smaller than those in the eastern Bering Sea. Target species have also been different (Table 4-8): in the Aleutians, POP was the initial target species. During the early years of exploitation, overall catches of Aleutian groundfish reached a peak of 112,000 mt in 1965. As POP abundance declined, the fishery diversified to other species. Total catches from the Aleutians in recent years have been about 100,000 mt annually.

**Table 4-7a Groundfish and squid catches in the eastern Bering Sea, 1954-2004** (pollock, Pacific cod, sablefish, flatfish), in metric tons.

| Year | Pollock | Pacific Cod | Sablefish | Yellowfin Sole | Greenland Turbot | Arrowtooth flounder | Rock sole[a] | "Other Flatfish"[a] |
|---|---|---|---|---|---|---|---|---|
| 1954 | | | | 12,562 | | | | |
| 1955 | | | | 14,690 | | | | |
| 1956 | | | | 24,697 | | | | |
| 1957 | | | | 24,145 | | | | |
| 1958 | 6,924 | 171 | 6 | 44,153 | | | | |
| 1959 | 32,793 | 2,864 | 289 | 185,321 | | | | |
| 1960 | | | 1,861 | 456,103 | 36,843 | [b] | | |
| 1961 | | | 15,627 | 553,742 | 57,348 | [b] | | |
| 1962 | | | 25,989 | 420,703 | 58,226 | [b] | | |
| 1963 | | | 13,706 | 85,810 | 31,565 | [b] | | 35,643 |
| 1964 | 174,792 | 13,408 | 3,545 | 111,177 | 33,729 | [b] | | 30,604 |
| 1965 | 230,551 | 14,719 | 4,838 | 53,810 | 9,747 | [b] | | 11,686 |
| 1966 | 261,678 | 18,200 | 9,505 | 102,353 | 13,042 | [b] | | 24,864 |
| 1967 | 550,362 | 32,064 | 11,698 | 162,228 | 23,869 | [b] | | 32,109 |
| 1968 | 702,181 | 57,902 | 4,374 | 84,189 | 35,232 | [b] | | 29,647 |
| 1969 | 862,789 | 50,351 | 16,009 | 167,134 | 36,029 | [b] | | 34,749 |
| 1970 | 1,256,565 | 70,094 | 11,737 | 133,079 | 19,691 | 12,598 | | 64,690 |
| 1971 | 1,743,763 | 43,054 | 15,106 | 160,399 | 40,464 | 18,792 | | 92,452 |
| 1972 | 1,874,534 | 42,905 | 12,758 | 47,856 | 64,510 | 13,123 | | 76,813 |
| 1973 | 1,758,919 | 53,386 | 5,957 | 78,240 | 55,280 | 9,217 | | 43,919 |
| 1974 | 1,588,390 | 62,462 | 4,258 | 42,235 | 69,654 | 21,473 | | 37,357 |
| 1975 | 1,356,736 | 51,551 | 2,766 | 64,690 | 64,819 | 20,832 | | 20,393 |
| 1976 | 1,177,822 | 50,481 | 2,923 | 56,221 | 60,523 | 17,806 | | 21,746 |
| 1977 | 978,370 | 33,335 | 2,718 | 58,373 | 27,708 | 9,454 | | 14,393 |
| 1978 | 979,431 | 42,543 | 1,192 | 138,433 | 37,423 | 8,358 | | 21,040 |
| 1979 | 913,881 | 33,761 | 1,376 | 99,017 | 34,998 | 7,921 | | 19,724 |
| 1980 | 958,279 | 45,861 | 2,206 | 87,391 | 48,856 | 13,761 | | 20,406 |
| 1981 | 973,505 | 51,996 | 2,604 | 97,301 | 52,921 | 13,473 | | 23,428 |
| 1982 | 955,964 | 55,040 | 3,184 | 95,712 | 45,805 | 9,103 | | 23,809 |
| 1983 | 982,363 | 83,212 | 2,695 | 108,385 | 43,443 | 10,216 | | 30,454 |
| 1984 | 1,098,783 | 110,944 | 2,329 | 159,526 | 21,317 | 7,980 | | 44,286 |
| 1985 | 1,179,759 | 132,736 | 2,348 | 227,107 | 14,698 | 7,288 | | 71,179 |
| 1986 | 1,188,449 | 130,555 | 3,518 | 208,597 | 7,710 | 6,761 | | 76,328 |
| 1987 | 1,237,597 | 144,539 | 4,178 | 181,429 | 6,533 | 4,380 | | 50,372 |
| 1988 | 1,228,000 | 192,726 | 3,193 | 223,156 | 6,064 | 5,477 | | 137,418 |
| 1989 | 1,230,000 | 164,800 | 1,252 | 153,165 | 4,061 | 3,024 | | 63,452 |
| 1990 | 1,353,000 | 162,927 | 2,329 | 80,584 | 7,267 | 2,773 | | 22,568 |
| 1991 | 1,268,360 | 165,444 | 1,128 | 94,755 | 3,704 | 12,748 | 46,681 | 30,401 |
| 1992 | 1,384,376 | 163,240 | 558 | 146,942 | 1,875 | 11,080 | 51,720 | 34,757 |
| 1993 | 1,301,574 | 133,156 | 669 | 105,809 | 6,330 | 7,950 | 63,942 | 28,812 |
| 1994 | 1,362,694 | 174,151 | 699 | 144,544 | 7,211 | 13,043 | 60,276 | 29,720 |
| 1995 | 1,264,578 | 228,496 | 929 | 124,746 | 5,855 | 8,282 | 54,672 | 34,861 |
| 1996 | 1,189,296 | 209,201 | 629 | 129,509 | 4,699 | 13,280 | 46,775 | 35,390 |
| 1997 | 1,115,268 | 209,475 | 547 | 166,681 | 6,589 | 8,580 | 67,249 | 42,374 |
| 1998 | 1,101,428 | 160,681 | 586 | 101,310 | 8,303 | 14,985 | 33,221 | 39,940 |
| 1999 | 889,589 | 134,647 | 646 | 67,307 | 5,205 | 9,827 | 39,934 | 33,042 |
| 2000 | 1,132,736 | 151,372 | 742 | 84,057 | 5,888 | 12,071 | 49,186 | 36,813 |
| 2001 | 1,387,452 | 142,452 | 863 | 63,563 | 4,252 | 12,836 | 28,949 | 27,693 |
| 2002 | 1,481,815 | 166,552 | 1,143 | 74,956 | 3,150 | 10,821 | 40,700 | 30,229 |
| 2003 | 1,341,352 | 162,827 | 898 | 74,781 | 2,467 | 12,022 | 35,192 | 26,343 |
| 2004 | 1,331,508 | 167,155 | 840 | 69,012 | 1,772 | 16,968 | 46,934 | 29,241 |

[a]Includes flathead sole, Alaska plaice, and "other flatfish"; also, rock sole prior to 1991 is included in catch statistics.
[b]Arrowtooth flounder is included in Greenland turbot catch statistics.
**Note**: Numbers do not include fish taken for research.

**Table 4-7b** **Groundfish and squid catches in the eastern Bering Sea, 1954-2004** (rockfish, Atka mackerel, "other species", total of all species), in metric tons.

| Year | Pacific ocean perch complex[a] | "Other rockfish" | Atka mackerel | Squid | "Other species" | Total (all species) |
|---|---|---|---|---|---|---|
| 1954 | | | | | | 12,562 |
| 1955 | | | | | | 14,690 |
| 1956 | | | | | | 24,697 |
| 1957 | | | | | | 24,145 |
| 1958 | | | | | 147 | 51,401 |
| 1959 | | | | | 380 | 221,647 |
| 1960 | 6,100 | | | | | 500,907 |
| 1961 | 47,000 | | | | | 673,717 |
| 1962 | 19,900 | | | | | 524,818 |
| 1963 | 24,500 | | | | | 191,224 |
| 1964 | 25,900 | | | | 736 | 393,891 |
| 1965 | 16,800 | | | | 2,218 | 344,369 |
| 1966 | 20,200 | | | | 2,239 | 452,081 |
| 1967 | 19,600 | | | | 4,378 | 836,308 |
| 1968 | 31,500 | | | | 22,058 | 967,083 |
| 1969 | 14,500 | | | | 10,459 | 1,192,020 |
| 1970 | 9,900 | | | | 15,295 | 1,593,649 |
| 1971 | 9,800 | | | | 13,496 | 2,137,326 |
| 1972 | 5,700 | | | | 10,893 | 2,149,092 |
| 1973 | 3,700 | | | | 55,826 | 2,064,444 |
| 1974 | 14,000 | | | | 60,263 | 1,900,092 |
| 1975 | 8,600 | | | | 54,845 | 1,645,232 |
| 1976 | 14,900 | | | | 26,143 | 1,428,565 |
| 1977 | 2,654 | 311 | | 4,926 | 35,902 | 1,168,144 |
| 1978 | 2,221 | 2,614 | 831 | 6,886 | 61,537 | 1,302,509 |
| 1979 | 1,723 | 2,108 | 1,985 | 4,286 | 38,767 | 1,159,547 |
| 1980 | 1,097 | 459 | 4,955 | 4,040 | 34,633 | 1,221,944 |
| 1981 | 1,222 | 356 | 3,027 | 4,182 | 35,651 | 1,259,666 |
| 1982 | 224 | 276 | 328 | 3,838 | 18,200 | 1,211,483 |
| 1983 | 221 | 220 | 141 | 3,470 | 15,465 | 1,280,285 |
| 1984 | 1,569 | 176 | 57 | 2,824 | 8,508 | 1,458,299 |
| 1985 | 784 | 92 | 4 | 1,611 | 11,503 | 1,649,109 |
| 1986 | 560 | 102 | 12 | 848 | 10,471 | 1,633,911 |
| 1987 | 930 | 474 | 12 | 108 | 8,569 | 1,639,121 |
| 1988 | 1,047 | 341 | 428 | 414 | 12,206 | 1,810,470 |
| 1989 | 2,017 | 192 | 3,126 | 300 | 4,993 | 1,630,382 |
| 1990 | 5,639 | 384 | 480 | 460 | 5,698 | 1,644,109 |
| 1991 | 4,744 | 396 | 2,265 | 544 | 16,285 | 1,647,455 |
| 1992 | 3,309 | 675 | 2,610 | 819 | 29,993 | 1,831,954 |
| 1993 | 3,763 | 190 | 201 | 597 | 21,413 | 1,674,406 |
| 1994 | 1,907 | 261 | 190 | 502 | 23,430 | 1,818,628 |
| 1995 | 1,210 | 629 | 340 | 364 | 20,928 | 1,745,890 |
| 1996 | 2,635 | 364 | 780 | 1,080 | 19,717 | 1,653,355 |
| 1997 | 1,060 | 161 | 171 | 1,438 | 20,997 | 1,640,590 |
| 1998 | 1,134 | 203 | 901 | 891 | 23,156 | 1,486,739 |
| 1999 | 609 | 135 | 2,008 | 393 | 17,045 | 1,200,387 |
| 2000 | 704 | 239 | 239 | 375 | 23,098 | 1,497,520 |
| 2001 | 1,148 | 296 | 264 | 1,761 | 23,148 | 1,694,678 |
| 2002 | 858 | 401 | 572 | 1,334 | 26,639 | 1,839,169 |
| 2003 | 1,321 | 324 | 5,361 | 801 | 24,288 | 1,687,978 |
| 2004 | 966 | 311 | 7,053 | 1,004 | 24,307 | 1,697,702 |

[a]Includes Pacific ocean perch, and shortraker, rougheye, northern, and sharpchin rockfish.

**Note**: Numbers do not include fish taken for research.

**Table 4-8a Groundfish and squid catches in the Aleutian Islands subarea, 1962-2004** (pollock, Pacific cod, sablefish, flatfish), in metric tons.

| Year | Pollock | Pacific cod | Sablefish | Yellowfin sole | Greenland turbot | Arrowtooth flounder | Rock sole | "Other flatfish"[a] |
|---|---|---|---|---|---|---|---|---|
| 1962 | | | | | | | | |
| 1963 | | | 664 | | 7 | [b] | | |
| 1964 | | 241 | 1,541 | | 504 | [b] | | |
| 1965 | | 451 | 1,249 | | 300 | [b] | | |
| 1966 | | 154 | 1,341 | | 63 | [b] | | |
| 1967 | | 293 | 1,652 | | 394 | [b] | | |
| 1968 | | 289 | 1,673 | | 213 | [b] | | |
| 1969 | | 220 | 1,673 | | 228 | [b] | | |
| 1970 | | 283 | 1,248 | | 285 | 274 | | |
| 1971 | | 2,078 | 2,936 | | 1,750 | 581 | | |
| 1972 | | 435 | 3,531 | | 12,874 | 1,323 | | |
| 1973 | | 977 | 2,902 | | 8,666 | 3,705 | | |
| 1974 | | 1,379 | 2,477 | | 8,788 | 3,195 | | |
| 1975 | | 2,838 | 1,747 | | 2,970 | 784 | | |
| 1976 | | 4,190 | 1,659 | | 2,067 | 1,370 | | |
| 1977 | 7,625 | 3,262 | 1,897 | | 2,453 | 2,035 | | |
| 1978 | 6,282 | 3,295 | 821 | | 4,766 | 1,782 | | |
| 1979 | 9,504 | 5,593 | 782 | | 6,411 | 6,436 | | |
| 1980 | 58,156 | 5,788 | 274 | | 3,697 | 4,603 | | |
| 1981 | 55,516 | 10,462 | 533 | | 4,400 | 3,640 | | |
| 1982 | 57,978 | 1,526 | 955 | | 6,317 | 2,415 | | |
| 1983 | 59,026 | 9,955 | 673 | | 4,115 | 3,753 | | |
| 1984 | 81,834 | 22,216 | 999 | | 1,803 | 1,472 | | |
| 1985 | 58,730 | 12,690 | 1,448 | | 33 | 87 | | |
| 1986 | 46,641 | 10,332 | 3,028 | | 2,154 | 142 | | |
| 1987 | 28,720 | 13,207 | 3,834 | | 3,066 | 159 | | |
| 1988 | 43,000 | 5,165 | 3,415 | | 1,044 | 406 | | |
| 1989 | 156,000 | 4,118 | 3,248 | | 4,761 | 198 | | |
| 1990 | 73,000 | 8,081 | 2,116 | | 2,353 | 1,459 | | |
| 1991 | 78,104 | 6,714 | 2,071 | 1,380 | 3,174 | 938 | n/a | 88 |
| 1992 | 54,036 | 42,889 | 1,546 | 4 | 895 | 900 | 236 | 68 |
| 1993 | 57,184 | 34,234 | 2,078 | 0 | 2,138 | 1,348 | 318 | 59 |
| 1994 | 58,708 | 22,421 | 1,771 | 0 | 3,168 | 1,334 | 308 | 55 |
| 1995 | 64,925 | 16,534 | 1,119 | 6 | 2,338 | 1,001 | 356 | 47 |
| 1996 | 28,933 | 31,389 | 720 | 654 | 1,677 | 1,330 | 371 | 61 |
| 1997 | 26,872 | 25,166 | 779 | 234 | 1,077 | 1,071 | 271 | 39 |
| 1998 | 23,821 | 34,964 | 595 | 5 | 821 | 694 | 446 | 54 |
| 1999 | 965 | 27,714 | 565 | 13 | 422 | 746 | 577 | 53 |
| 2000 | 1,244 | 39,684 | 1,048 | 13 | 1,086 | 1,157 | 480 | 113 |
| 2001 | 824 | 34,207 | 1,074 | 15 | 1,060 | 1,220 | 526 | 97 |
| 2002 | 1,177 | 30,801 | 1,118 | 29 | 485 | 1,032 | 1,165 | 150 |
| 2003 | 1,653 | 32,190 | 1,009 | <1 | 965 | 913 | 964 | 76 |
| 2004 | 1,150 | 28,579 | 924 | 9 | 381 | 779 | 800 | 69 |

[a]Includes flathead sole, Alaska plaice, and "other flatfish".
[B]Arrowtooth flounder included in Greenland turbot catch statistics.
**Note:** Numbers do not include fish taken for research.

**Table 4-8b Groundfish and squid catches in the Aleutian Islands subarea, 1962-2004** (rockfish, Atka mackerel, other species, total of all species), in metric tons.

| Year | Pacific ocean perch complex[a] | "Other rockfish" | Atka mackerel | Squid | "Other species" | Total (all species) |
|---|---|---|---|---|---|---|
| 1962 | 200 | | | | | 200 |
| 1963 | 20,800 | | | | | 21,471 |
| 1964 | 90,300 | | | | 66 | 92,652 |
| 1965 | 109,100 | | | | 768 | 111,868 |
| 1966 | 85,900 | | | | 131 | 87,589 |
| 1967 | 55,900 | | | | 8,542 | 66,781 |
| 1968 | 44,900 | | | | 8,948 | 56,023 |
| 1969 | 38,800 | | | | 3,088 | 44,009 |
| 1970 | 66,900 | | 949 | | 10,671 | 80,610 |
| 1971 | 21,800 | | | | 2,973 | 32,118 |
| 1972 | 33,200 | | 5,907 | | 22,447 | 79,717 |
| 1973 | 11,800 | | 1,712 | | 4,244 | 34,006 |
| 1974 | 22,400 | | 1,377 | | 9,724 | 49,340 |
| 1975 | 16,600 | | 13,326 | | 8,288 | 46,553 |
| 1976 | 14,000 | | 13,126 | | 7,053 | 43,465 |
| 1977 | 8,080 | 3,043 | 20,975 | 1,808 | 16,170 | 67,348 |
| 1978 | 5,286 | 921 | 23,418 | 2,085 | 12,436 | 61,092 |
| 1979 | 5,487 | 4,517 | 21,279 | 2,252 | 12,934 | 75,195 |
| 1980 | 4,700 | 420 | 15,533 | 2,332 | 13,028 | 108,531 |
| 1981 | 3,622 | 328 | 16,661 | 1,763 | 7,274 | 104,199 |
| 1982 | 1,014 | 2,114 | 19,546 | 1,201 | 5,167 | 98,233 |
| 1983 | 280 | 1,045 | 11,585 | 510 | 3,675 | 94,617 |
| 1984 | 631 | 56 | 35,998 | 343 | 1,670 | 147,022 |
| 1985 | 308 | 99 | 37,856 | 9 | 2,050 | 113,310 |
| 1986 | 286 | 169 | 31,978 | 20 | 1,509 | 96,259 |
| 1987 | 1,004 | 147 | 30,049 | 23 | 1,155 | 81,364 |
| 1988 | 1,979 | 278 | 21,656 | 3 | 437 | 77,383 |
| 1989 | 2,706 | 481 | 14,868 | 6 | 108 | 186,494 |
| 1990 | 14,650 | 864 | 21,725 | 11 | 627 | 124,886 |
| 1991 | 2,545 | 549 | 22,258 | 30 | 91 | 117,942 |
| 1992 | 10,277 | 3,689 | 46,831 | 61 | 3,081 | 164,513 |
| 1993 | 13,375 | 495 | 65,805 | 85 | 2,540 | 179,659 |
| 1994 | 16,959 | 301 | 69,401 | 86 | 1,102 | 175,614 |
| 1995 | 14,734 | 220 | 81,214 | 95 | 1,273 | 183,862 |
| 1996 | 20,443 | 278 | 103,087 | 87 | 1,720 | 190,750 |
| 1997 | 15,687 | 307 | 65,668 | 323 | 1,555 | 139,049 |
| 1998 | 13,729 | 385 | 56,195 | 25 | 2,448 | 134,182 |
| 1999 | 17,619 | 630 | 51,636 | 9 | 1,633 | 102,582 |
| 2000 | 14,893 | 601 | 46,990 | 8 | 3,010 | 110,327 |
| 2001 | 15,588 | 610 | 61,296 | 5 | 4,029 | 120,551 |
| 2002 | 14,996 | 551 | 44,722 | 10 | 1,980 | 98,215 |
| 2003 | 17,574 | 401 | 48,918 | 34 | 1,345 | 106,042 |
| 2004 | 14,937 | 318 | 48,910 | 14 | 1,781 | 98,650 |

[a]Includes Pacific ocean perch, and shortraker, rougheye, northern and sharpchin rockfish.

**Note:** Numbers do not include fish taken for research.

### 4.3.2 Commercial Fishery

This section contains a general discussion of the commercial groundfish fisheries in the BSAI, including catch data for recent years. The information in this section comes from the annually updated *Stock Assessment and Fishery Evaluation* (SAFE) report (NPFMC 2003), in particular the *Economic Status of the Groundfish Fisheries off Alaska* appendix (Hiatt *et al.* 2003). This document is available on the Council website, or by request from the Council office. Additionally, catch data are also reported on the NMFS Alaska region website. Website addresses for the Council and NMFS are included in Chapter 6.

In 2002, 343 vessels participated in the groundfish fisheries in the BSAI. Of these, 163 were trawl vessels, 120 hook-and-line vessels, and 64 pot vessels. Total groundfish catch was 1.94 million mt, which represents approximately 92 percent of the total groundfish catch off Alaska. Total ex-vessel value of the BSAI groundfish catch in 2002 was $428.8 million. Pollock accounts for the largest majority of the harvest in terms of both metric tons and ex-vessel value. The groundfish fisheries off Alaska accounted for 49 percent of the weight and 18 percent of the ex-vessel value of total U.S. domestic landings, as reported in Fisheries of the United States (2002).

Walleye (Alaska) pollock (*Theragra chalcogramma*) has been the dominant species in the BSAI commercial groundfish catch. The 2002, pollock catch of 1.48 million mt accounted for 77 percent of the total BSAI groundfish catch. The next major species, Pacific cod (*Gadus macrocephalus*), accounted for 196,700 mt or about 10 percent of the total 2002 catch. The 2002 catch of flatfish, which includes yellowfin sole (*Pleuronectes asper*), rock sole (*Pleuronectes bilineatus*), and arrowtooth flounder (*Atheresthes stomias*), was 162,400 mt. Pollock, Pacific cod, and flatfish comprised 95 percent of the total 2002 BSAI groundfish catch. Other important species are sablefish (*Anoplopoma fimbria*), rockfish (*Sebastes and Sebastolobus* species), and Atka mackerel (*Pleurogrammus monopterygius*).

Trawl, hook-and-line (including longline and jigs), and pot gear account for virtually all the catch in the BSAI groundfish fisheries. There are catcher vessels and catcher processor vessels for each of these three gear groups. From 1998-2002, the trawl catch averaged about 91 percent of the total catch, while catch with hook-and-line gear accounted for 7.6 percent. During the same period, catcher vessels took 42 percent of the catch and catcher/processor vessels took the other 58 percent. Most species are harvested predominately by one type of gear, which typically accounts for 90 percent or more of the catch. The one exception is Pacific cod, where in 2002, 51 percent (103,000 mt) was taken by hook-and-line gear, 39 percent (79,000 mt) by trawl gear, and 10 percent (20,000 mt) by pots. The FMP allocates total allowable catch among gear types for pollock, sablefish, Pacific cod, Atka mackerel, and shortraker and rougheye rockfish (Section 3.2.6).

The discards of groundfish in the groundfish fishery have received increased attention in recent years by NMFS, the Council, Congress, and the public at large. The discard rate is the percent of total catch that is discarded. For the BSAI groundfish fisheries as a whole, the annual discard rate for groundfish decreased from 14.7 percent in 1994 (total discards, 286,200 mt) to 6.1 percent in 2002 (total discards, 118,900 mt) with the vast majority of the reduction occurring in 1998. The 41 percent reduction in the BSAI discard rate from 1997 to 1998 was the result of prohibiting pollock and Pacific cod discards in the BSAI groundfish fisheries beginning in 1998. Since 1998, the discard rate has been reduced from 8.1 percent to 6.1 percent.

The bycatch of Pacific halibut, crab, Pacific salmon, and Pacific herring has been an important management issue in the commercial fishery for more than twenty years. The retention of these species was first prohibited in the foreign groundfish fisheries, to ensure that groundfish fishers had no incentive to target on these species. Estimates of bycatch of these prohibited species are assessed annually in the *Stock Assessment and Fishery Evaluation* report. The FMP establishes catch limits for prohibited species that apply to some or all fisheries, seasons, or areas in the BSAI (Section 3.6.2). Attainment of the catch limit shuts down an area or a fishery for the remainder of the year or season. Other management measures that address prohibited species bycatch include seasonal closure areas, gear modifications, and the modification of fishing patterns as a result of share-based programs such as IFQs or cooperatives. The history of prohibited species bycatch management is reviewed in Witherell and Pautzke (1997).

An extensive at-sea observer program was developed for the foreign fleets and then extended to the domestic fishery once it had all but replaced foreign participation. The observer program resulted in fundamental changes in the nature of the bycatch program. First, by providing good estimates of total groundfish catch and non-groundfish bycatch by species, it eliminated much of the concern that total fishing mortality was being underestimated due to fish that were discarded at sea. Second, it made it possible to establish, monitor, and enforce the groundfish quotas in terms of total catch as opposed to only retained catch. For groundfish fisheries, this means that both retained catch and discarded catch are counted against TACs. Third, it made it possible to implement and enforce bycatch quotas for the non-groundfish species that by regulation had to be discarded at sea. Finally, it provided extensive information that managers and the industry could use to assess methods to reduce bycatch and bycatch mortality. In summary, the observer program provided fishery managers with the information and tools necessary to prevent bycatch from adversely affecting the stocks of the bycatch species. Therefore, bycatch in the groundfish fisheries is principally not a conservation problem, although it can be an allocation problem.

### 4.3.3 Subsistence Fishery

The earliest fisheries for groundfish in the BSAI were the native subsistence fisheries. Fish and other marine resources are an important part of the life of native people, and dependence on demersal species of fish may have been critical to their survival in periods of the year when other sources of food were scarce or lacking. Fishing takes place in nearshore waters utilizing such species as cod, halibut, rockfish, and other species. These small-scale subsistence fisheries have continued to the present time. Although not well estimated, the total catch of groundfish in subsistence fisheries is thought to be minuscule relative to commercial fishery catches.

### 4.3.4 Recreational Fishery

At this time, there are essentially no recreational fisheries for groundfish species covered under this FMP. Recreational catch of groundfish in the BSAI would take place in state waters and likely fall under the classification of subsistence or personal use fisheries as regulated by Alaska state law.

## 4.4 Economic and Socioeconomic Characteristics of the Fishery

This section contains a general discussion of the economic and socioeconomic characteristics of the commercial groundfish fisheries in the BSAI. The information cited in this section is from the annually updated *Economic Status of the Groundfish Fisheries off Alaska* appendix to the SAFE (Hiatt *et al.* 2003). This document is available on the Council website, or by request from the Council office. The website address for the Council is included in Chapter 6.

Estimates of ex-vessel value by area, gear, type of vessel, and species, are included in the annual Economic Status appendix to the SAFE report. The ex-vessel value of the landings in the BSAI groundfish fisheries, excluding the value added by at-sea processing, increased from $280.1 million in 1998 to $428.8 million in 2002. The distribution of ex-vessel value by type of vessels differed by area, gear, and species. In 2002, trawl gear accounted for 86 percent of the ex-vessel value of the groundfish landings compared to 92 percent of the total catch because trawl vessels take larger percentages of lower priced species such as pollock, which was $0.12 per pound in 2002. Catcher vessels accounted for 48 percent of the total ex-vessel value compared to 45 percent of the catch.

Residents of Alaska and of other states, particularly Washington and Oregon, are active participants in the BSAI groundfish fisheries. For the BSAI groundfish fisheries as a whole, 97.6 percent of the 2002 catch was made by vessels with owners who indicated that they were not residents of Alaska, accounting for 96 percent of the 2002 ex-vessel value.

Employment data for at-sea processors (but not including inshore processors) indicate that in 2002, the crew weeks totaled 97,440. The months with the highest employment occurred in February (16,501), March (16,513), and September (15,569). Much of this was accounted for by the BSAI pollock fishery.

There are a variety of at least partially external factors that affect the economic performance of the BSAI groundfish fisheries. They include landing market prices in Japan, wholesale prices in Japan, U.S. imports of groundfish products, U.S. per capita consumption of seafood, U.S. consumer and producer price indexes, foreign exchange rates, and U.S. cold storage holdings of groundfish. Exchange rates and world supplies of fishery products play a major role in international trade. Exchange rates change rapidly and can significantly affect the economic status of the groundfish fisheries.

## 4.5 Fishing Communities

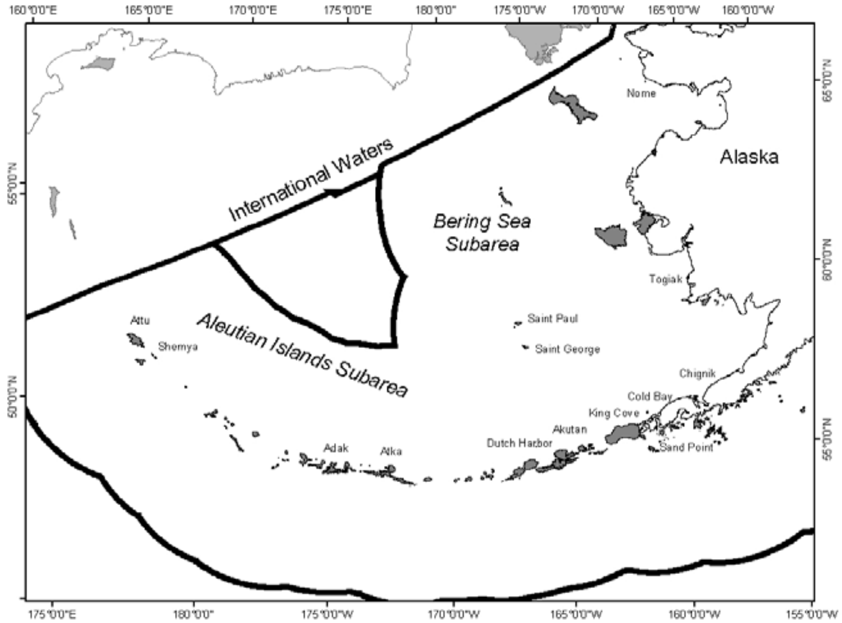
This section contains a general discussion of the fishing communities that depend on the commercial groundfish fisheries in the BSAI. The information in this section is drawn from the *Final Programmatic Supplemental Environmental Impact Statement for the Alaska Groundfish Fisheries* (NMFS 2004). This document is available on the NMFS Alaska Region website, or by request from the NMFS Alaska Region office. Another source of information on BSAI fishing communities is *Faces of the Fisheries*, a publication of community profiles by the Council (NPFMC 1994).

Traditionally, the dependence of BSAI coastal communities on the groundfish fisheries and fisheries affected by the groundfish fisheries has resulted from these communities being one or more of the following: 1) the home ports of vessels that participate in these fisheries; 2) the residence of participants in the harvesting or processing sectors of these fisheries; 3) the port of landings for these fisheries; 4) the location of processing plants; and 5) a service or transportation center for the fisheries. BSAI coastal communities are shown on Figure 4-4.

Many of the participants in the BSAI groundfish fisheries are not from the communities adjacent to the management area. In the BSAI, adjacent communities are small and remote. Even in the case of Unalaska and Akutan, the two BSAI communities with large groundfish processing plants, a large part of the processing plant labor force is accounted for by individuals who are neither local nor Alaska residents.

The fishery dependence of coastal and western Alaska communities was addressed through the creation of the pollock, sablefish, and halibut community development quota (CDQ) programs for the BSAI in the early to mid-1990s and the expansion of those programs into the multispecies CDQ program with the addition of all other groundfish species by 1999. The CDQ program has provided the following for the CDQ communities: 1) additional employment in the harvesting and processing sectors of the groundfish fisheries; 2) training; and 3) income generated by fishing the CDQ allocations. In many cases, CDQ royalties have been used to increase the ability of the residents of the CDQ communities to participate in the regional commercial fisheries, or the CDQ has been fished by residents themselves. The CDQ program is discussed further in Section 4.5.4.

**Figure 4-4 Bering Sea fishing communities.** NOTE: Not all communities are represented.




## 4.5.1 Home Ports

Almost 100 Alaskan communities are listed as home ports. For the vast majority of the Alaska home ports, trawl vessels account for none or a very small part of the vessels and the mean length is less than 50 feet. Many of the Alaska home ports had fewer than 5 vessels. The Alaska home ports with typically more than 50 fishing vessels are as follows: Homer (100+), Juneau (200+), Kodiak (100+), Petersburg (50+), and Sitka (100+). For these five home ports, all but Kodiak had non-trawl vessels account for at least 90 percent of the vessels, and in Petersburg and Sitka almost 100 percent were non-trawl vessels. Sand Point, which typically had more than 30 vessels, was unique among Alaska home ports in that typically trawl vessels accounted for more than 50 percent of its vessels.

Vessels that participated in the BSAI and GOA groundfish fisheries had home ports in nine states other than Alaska. However, only three states had home ports for more than 2 vessels. They were: California with fewer than 20 vessels, Oregon with 42 to 75 vessels, and Washington with 310 to 423 vessels. Almost all of the non-Alaska home ports had fewer than 10 vessels and many had only a few. Seattle, with typically about 300 vessels, was the only non-Alaska port with more than 50 vessels.

## 4.5.2 Owner Residence

Less than 3 percent of the BSAI groundfish catch in 2002 was taken by vesels with owners who indiated that they were residents of Alaska (Hiatt *et al.* 2003). Residents of other states, particularly Washington and Oregon, are active participants in the BSAI groundfish fisheries.

## 4.5.3 Ports

When the fishing ports are ranked, from highest to lowest, on the basis of their 1997 groundfish landings and value, the first five ports account for in excess of 95 percent of the total Alaska (BSAI and GOA) groundfish landings. These are, in rank order:

| Port & Ranking | Metric Tons* | Value | Number of Processors |
|---|---|---|---|
| 1. Dutch Harbor/Unalaska | 224,000 | $59,774,500 | 6 |
| 2. Akutan | <120,000 | NA | 1 |
| 3. Kodiak | 84,000 | $33,488,800 | 9 |
| 4. Sand Point | <45,000 | NA | 1 |
| 5. King Cove | <25,000 | NA | 1 |

* estimated total groundfish landings
NA - data cannot be reported due to confidentiality constraints

The remaining 5 percent or so of total groundfish landings made to Alaska fishing ports is distributed over more than twenty different locations. Very few common characteristics are shared by all these remaining ports. Like virtually every settlement in Alaska (with the exception of Anchorage), these landing ports are all relatively small communities, varying from year-round resident populations of a few hundred people (St. Paul - population 739) to several thousands. The balance of this section will focus on the five primary groundfish ports. Dutch Harbor/Unalaska and Akutan are located on the Bering Sea side of the Alaska Peninsula/Aleutian Island chain, while Sand Point and King Cove are on the Gulf of Alaska side and Kodiak Island, where the port and City of Kodiak are located, is in the Gulf. Nonetheless, a substantial portion of the groundfish processed in Sand Point and King Cove is harvested in the Bering Sea, as is a somewhat lesser share of that landed in Kodiak. Historically, relatively small amounts of groundfish harvested in the GOA have been delivered for processing in Dutch Harbor/Unalaska and Akutan.

### 4.5.3.1 Dutch Harbor/Unalaska

Dutch Harbor/Unalaska is located approximately 800 miles southwest of Anchorage and 1,700 miles northwest of Seattle. Unalaska is the 11th largest city in Alaska, with a reported year-round population of 4,283 in 2000. The name Dutch Harbor is often applied to the portion of the City of Unalaska located on Amaknak Island, which is connected to Unalaska Island by a bridge. Dutch Harbor is fully contained within the boundaries of the City of Unalaska, which encompasses 115.8 square miles of land and 98.6 square miles of water (Alaska Department of Community and Regional Affairs 1998).

Unalaska is primarily non-Native, although the community is culturally diverse. Subsistence activities remain important to the Aleut community and many long-time non-Native residents, as well. Salmon, Pacific cod, Dolly Varden, Pacific halibut, sea bass, pollock, and flounders are the most important marine species, according to Alaska Department of Fish and Game reports. Sea urchins, razor and butter clams, cockles, mussels, limpets, chiton, crabs, and shrimps make up the shellfish and invertebrates most commonly harvested by subsistence users. Marine mammals traditionally harvested include sea lions, harbor and fur seals, and porpoises. Local residents also harvested reindeer, ducks, geese, sea gull eggs and other bird eggs in great numbers in previous years (NPFMC 1994).

Dutch Harbor/Unalaska has been called the most prosperous stretch of coastline in Alaska. With 27 miles of ports and harbors, several hundred local businesses, most servicing, supporting, or relying on the seafood industry, this city is the center of the Bering Sea fisheries. Dutch Harbor is not only the top ranked fishing port in terms of landings in Alaska, but has held that distinction for the Nation, as a whole, each year since 1989. In addition, it ranked at or near the top in terms of the ex-vessel value of landings over the same period.

Virtually the entire local economic base in Dutch/Unalaska is fishery-related, including fishing, processing, and fishery support functions (e.g., fuel, supply, repairs and maintenance, transshipment, cold storage, etc.). Indeed, Dutch Harbor/Unalaska is unique among Alaska coastal communities in the degree to which it provides basic support services for a wide range of Bering Sea fisheries (Impact Assessment Incorporated

1998). It has been reported that over 90 percent of the population of this community considers itself directly dependent upon the fishing industry, in one form or another (NPFMC 1994).

Historically, Dutch Harbor/Unalaska was principally dependent upon non-groundfish (primarily king and Tanner crab) landings and processing for the bulk of its economic activity. These non-groundfish species continue to be important components of a diverse processing complex in Dutch Harbor/Unalaska. In 1997, for example, nearly 2 million pounds of salmon, more than 1.7 million pounds of herring, and 34 million pounds of crabs were reportedly processed in this port.

Nonetheless, since the mid-1980s, groundfish has accounted for the vast majority of total landings in Dutch Harbor/Unalaska. Again, utilizing 1997 catch data, over 93.5 percent of total pounds landed and processed in this port were groundfish.

While well over 90 percent of this total tonnage was groundfish, a significantly smaller percentage of the attributable ex-vessel value of the catch is comprised of groundfish. While equivalent processed product values for non-groundfish production are not readily available, Alaska fish ticket data indicate that the ex-vessel value of these species landed in Dutch Harbor/Unalaska was nearly $43 million, in 1997; or about 60 percent of the reported gross product value of the groundfish output. If the value added through processing of these non-groundfish species were fully accounted for, the total would obviously exceed the ex-vessel value of the raw catch.

As suggested, transshipping is an integral component of the local service-based economy of this community, as well. The port serves as a hub for movement of cargo throughout the Pacific Rim. Indeed, the Great Circle shipping route from major U.S. west coast ports to the Pacific Rim passes within 50 miles of Unalaska. The Port of Dutch Harbor is among the busiest ports on the west coast. The port reportedly serves more than 50 domestic and foreign transport ships per month. Seafood products, with an estimated first wholesale value substantially in excess of a billion dollars, cross the port’s docks each year and are carried to markets throughout the world.

The facilities and related infrastructure in Dutch Harbor/Unalaska support fishing operations in both the BSAI and GOA management areas. Processors in this port receive and process fish caught in both areas, and the wider community is linked to, and substantially dependent upon serving both the on-shore and at-sea sectors of the groundfish industry.

In a profile of regional fishing communities, published by the Council in 1994, the local economy of Unalaska was characterized in the following way:

> If it weren't for the seafood industry, Unalaska would not be what it is today ... In 1991, local processors handled 600 million lbs. of seafood onshore, and 3 billion lbs. of seafood were processed offshore aboard floating processors that use Dutch Harbor as a land base. Seven shore-based and many floating processors operate within municipal boundaries.

While these figures presumably include both groundfish and non-groundfish species, and current sources identify at least eight shore-based processing facilities, they are indicative of the scope of this community’s involvement in, and dependence upon, seafood harvesting and processing.

Detailed data on costs, net earnings, capital investment and debt service for the harvesting, processing, and fisheries support sectors in Dutch Harbor/Unalaska are not available.

While Dutch Harbor has been characterized as one of the world's best natural harbors, it offers few alternative opportunities for economic activity beyond fisheries and fisheries support. Its remote location, limited and specialized infrastructure and transportation facilities, and high cost make attracting non-fishery related industrial and/or commercial investment doubtful (at least in the short-run). Sea floor minerals exploration, including oil drilling, in the region have been discussed. No such development seems likely in the short run, however. Unalaska reportedly also expected nearly 6,000 cruise ship visitors in 1996.

Without the present level of fishing and processing activities, it is probable that many of the current private sector jobs in this groundfish landings port could be lost, or at the very least, would revert to highly seasonal patterns, with the accompanying implications for community stability observed historically in this and other Alaska seafood processing locations dependent upon transient, seasonal work forces. It is likely, for example, that the number of permanent, year-round residents of Dutch Harbor/Unalaska would decline significantly. This would, in turn, alter the composition and character of the community and place new, and different, demands on local government.

The municipal government of the City of Unalaska is substantially dependent upon the tax revenues which are generated from fishing and support activities. Between the State of Alaska's Fisheries Business Tax and Fishery Resource Landings Tax revenues (both of which are shared on a 50/50 basis with the community of origin), local raw fish sales tax, real property tax (on fishery related property), and permits and fees revenues associated with fishing enterprises, the City of Unalaska derives a substantial portion of its operating, maintenance, and capital improvement budget from fishing, and especially groundfish fishing, related business activities.

The local private business infrastructure which has developed to support the needs and demands of the fishery-based population of Dutch Harbor/Unalaska would very clearly suffer severe economic dislocation, should the number of employees in the local plants and fishing fleets decline in response to substantial TAC reductions. While insufficient cost and investment data exist with which to estimate the magnitude of probable net losses to these private sector businesses, it seems certain that a substantial number would fail. With no apparent economic development alternative available to replace groundfish harvesting and processing in Dutch Harbor/Unalaska (at least in the short run), there would be virtually no market value associated with these stranded assets.

#### 4.5.3.2 Akutan

Akutan is located on Akutan Island in the eastern Aleutian Islands, one of the Krenitzin Islands of the Fox Island group. The community is approximately 35 miles east of Unalaska and 766 air miles southwest of Anchorage. Akutan is surrounded by steep, rugged mountains reaching over 2,000 feet in height. The village sits on a narrow bench of flat, treeless terrain. The small harbor is ice-free year-round, but frequent storms occur in winter and fog in summer. The community is reported to have a population of 414 persons, although the population can swell to well over 1,000 during peak fish processing months.

During the 1990 U.S. Census, 34 total housing units existed and 3 were vacant. 527 jobs were estimated to be in the community. The official unemployment rate at that time was .4 percent, with 7.4 percent of all adults not in the work force. The median household income was $27,813, and 16.6 percent of the residents were living below the poverty level.

Akutan ranks as the second most significant landings port for groundfish on the basis of tons delivered and has been characterized as a unique community in terms of its relationship to these BSAI fisheries. According to a recent social impact assessment, prepared for the Council, while Akutan is the site of one of the largest of the shoreside groundfish processing plants in the region, the community is geographically and socially separate from the plant facility.

Indeed, while the village of Akutan was initially judged to be ineligible to participate in the State of Alaska's CDQ program, based largely upon its being associated with "... a previously developed harvesting and processing capability sufficient to support substantial groundfish participation in the BSAI ...", it was subsequently determined that the community of Akutan was discrete and distinct from the Akutan groundfish processing complex.

As a result, Akutan has a very different relationship to the region's groundfish fisheries than does, for example, Dutch Harbor/Unalaska or Kodiak. While the community of Akutan derives economic benefits from its proximity to the large Trident Seafoods shore plant (and a smaller permanently moored processing vessel, operated by Deep Sea Fisheries, which does only crab), the entities have not been integrated in the way other landings ports and communities on the list have.

As a CDQ community, the community of Akutan enjoys access to the BSAI groundfish resource independently of direct participation in the fishery. The CDQ communities as a group will receive CDQs equal to 7.5 percent of each BSAI groundfish TAC, except for the fixed gear sablefish, pollock, and squid TACs. The CDQ communities will receive 20 percent of the fixed gear sablefish and 10 percent of the pollock TACs for the eastern Bering Sea and the Aleutian Islands subareas. Similarly, the economic benefits the community derives from the local 1 percent raw fish tax from landings at the nearby plant are dependent on BSAI groundfish TACs and the resulting ex-vessel value of groundfish landings.

Although this conclusion pertains to the community of Akutan, implications for the groundfish landings port of Akutan are quite different. The Trident plant is the principal facility in the Akutan port and, historically, a number of smaller, mobile processing vessels have operated seasonally out of the port of Akutan. Akutan does not have a boat harbor or an airport in the community. Beyond the limited services provided by the plant, no other opportunity exists in Akutan to provide a support base for other major commercial fisheries. Indeed, alternative economic opportunities of any kind are extremely limited.

While crab processing was a major source of income for the Akutan plant during the boom years of the late 1970s and early 1980s, with the economic collapse of this resource base in the early 1980s, groundfish processing became the primary source of economic activity. In 1997, for example, State of Alaska and NMFS catch records indicate that, while landings of herring and crabs were reported for the Akutan plant, more than 98 percent of the total pounds landed were groundfish, and these made up more than 80 percent of the estimated total value.

No data on cost, net revenues, capital investment and debt structure are available with respect to Trident Seafood's Akutan plant complex. It is not possible, therefore, to quantify probable attributable net impacts to plant owners/operators of a potential reductions in groundfish catches, although as noted above, the Akutan facility is almost completely dependent upon pollock and Pacific cod deliveries. While some adjustment to alternative groundfish species might be possible, in response to a sharp decline in pollock and/or Pacific cod TACs, the fact that the plant has not become more involved with other groundfish species during the times of the year in which pollock and Pacific cod are not available suggests that the economic viability of such alternatives is limited and certainly inferior for the plant.

Whereas the 1990 U.S. Census reported the population of Akutan at just under 600 (and the Alaska Department of Community and Regional Affairs CIS data places the figure at 414, in 1997), the local resident population is estimated at 80, with the remaining individuals being regarded as non-resident employees of the plant.

The permanent residents of the village are, reportedly, almost all Aleut. While some are directly involved in the cash economy (e.g., a small boat near-shore commercial fishery), many depend upon subsistence activities or other non-cash economic activities to support themselves and their families. The species important for subsistence users reportedly include: salmon, halibut, Pacific cod, pollock, flounders, Dolly Varden, greenling, sea lions, harbor and fur seals, reindeer, ducks and geese and their eggs, as well as intertidal creatures (e.g., clams, crabs, mussels). Berries and grasses are also collected as part of the subsistence harvest (NPFMC 1994a).

#### 4.5.3.3 Kodiak

The groundfish landings port of Kodiak is located near the eastern tip of Kodiak Island, southeast of the Alaska Peninsula, in the Gulf of Alaska. The City of Kodiak is the sixth largest city in Alaska, with a population of 6,869 (Alaska Department of Community and Regional Affairs 1998). The City of Kodiak is 252 air miles south of Anchorage. The port and community are highly integrated, both geographically and structurally. The port and community are the de facto center of fishing activity for the western and central Gulf of Alaska.

Kodiak is primarily non-Native, and the majority of the Native population are Sugpiaq Eskimos and Aleuts. Filipinos are a large subculture in Kodiak due to their work in the canneries. During the 1990 U.S. Census, 2,177 total housing units existed and 126 were vacant. An estimated 3,644 jobs were in the community. The official unemployment rate at that time was 4.4 percent, with 23 percent of the adult population not in the work force. The median household income was $46,050, and 6.2 percent of residents were living below the poverty level.

Kodiak supports at least nine processing operations which receive groundfish harvested from the GOA and, to a lesser extent, the BSAI management areas, and four more which process exclusively non-groundfish species. The port also supports several hundred commercial fishing vessels, ranging in size from small skiffs to large catcher/processors.

According to data supplied by the City:

> The Port of Kodiak is home port to 770 commercial fishing vessels. Not only is Kodiak the state's largest fishing port, it is also home to some of Alaska's largest trawl, longline, and crab vessels.

Unlike Akutan, or even Dutch Harbor/Unalaska, Kodiak has a more generally diversified seafood processing sector. The port historically was very active in the crab fisheries and, although these fisheries have declined from their peak in the late 1970s and early 1980s, Kodiak continues to support shellfish fisheries, as well as significant harvesting and processing operations for Pacific halibut, herring, groundfish, and salmon.

Kodiak processors, like the other onshore operations profiled in this section, are highly dependent on pollock and Pacific cod landings, with these species accounting for 43 percent and 36 percent of total groundfish deliveries, by weight, respectively. The port does, however, participate in a broader range of groundfish fisheries than any of the other ports cited. Most of this activity centers on the numerous flatfish species which are present in the GOA, but also includes relatively significant rockfish and sablefish fisheries.

In fact, Kodiak often ranks near the top of the list of U.S. fishing ports, on the basis of landed value, and is frequently regarded as being involved in a wider variety of North Pacific fisheries than any other community on the North Pacific coast.

In 1997, for example, the port recorded salmon landings of just under 44 million pounds, with an estimated ex-vessel value of over $12 million. Approximately 4.3 million pounds of Pacific herring were landed in Kodiak with an ex-vessel value of more than $717 thousand. Crab landings exceeded 1.1 million pounds and were valued at ex-vessel at more than $2.7 million.

While comparable product value estimates are not currently available for groundfish and non-groundfish production (i.e., first wholesale value), it may be revealing to note that groundfish landings accounted for 79 percent of the total tons of fish and shellfish landed in this port, in 1997.

In addition to seafood harvesting and processing, the Kodiak economy includes sectors such as transportation (being regarded as the transportation hub for southwest Alaska), federal/state/local government, tourism, and timber. The forest products industry, based upon Sitka spruce, is an important and growing segment of the Kodiak economy.

The community is, also, home to the largest U.S. Coast Guard base in the Nation. Located a few miles outside of the city center-proper, it contributes significantly to the local economic base. The University of Alaska, in conjunction with the National Marine Fisheries Service, operates a state-of-the-art fishery utilization laboratory and fishery industrial technology center in Kodiak, as well.

Kodiak appears to be a much more mature and diversified economy that those of any other of the five primary groundfish landings ports in Alaska.

The absence of detailed cost, net revenue, capital investment and debt structure data for the Kodiak groundfish fishing and processing sectors precludes a quantitative analysis of the probable net economic impacts. Nonetheless, one may draw insights from history, as when in the early-1980s king crab landings declined precipitously and Kodiak suffered a severe community-wide economic decline. It was largely the development of the groundfish fisheries which reinvigorated the local economy.

#### 4.5.3.4 Sand Point and King Cove

These are two independent and geographically separate groundfish ‘landings ports’ (lying approximately 160 miles from one another), but because each has only a single processor and each community is small and remote, they are described jointly in this section.

Alaska CIS data place Sand Point’s 1998 population at 808, while King Cove’s population is listed as 897. Sand Point is located on Humboldt Harbor, Popof Island, 570 air miles from Anchorage. Sand Point is described by the Alaska Department of Community and Regional Affairs as "a mixed Native and non-Native community," with a large transient population of fish processing workers. During the April 1990 U.S. Census, 272 total housing units were in existence and 30 of these were vacant. A total of 438 jobs were estimated to be in the community. The official unemployment rate at that time was 2.9 percent, with 32.1 percent of all adults not in the work force. The median household income was $42,083, and 12.5 percent of the residents were living below the poverty level.

King Cove is located on the Gulf of Alaska side of the Alaska Peninsula, 625 miles southwest of Anchorage. The community is characterized as a mixed non-Native and Aleut village. In the 1990 U.S. Census, 195 total housing units were in existence, with 51 of these vacant. The community had an estimated 276 jobs, with an official unemployment rate of 1.8 percent and 24.0 percent of all adults not in the work force. The median household income was $53,631, and 10 percent of the residents were living below the poverty level.

Sand Point and King Cove, like Akutan, are part of the Aleutians East Borough. Unlike Akutan, however, neither Sand Point nor King Cove qualify as a CDQ community. Indeed, both Sand Point and King Cove have had extensive historical linkages to commercial fishing and fish processing, and currently support resident commercial fleets delivering catch to local plants. These local catches are substantially supplemented by deliveries from large, highly mobile vessels, based outside of the two small Gulf of Alaska communities.

King Cove boasts a deep water harbor which provides moorage for approximately 90 vessels of various sizes, in an ice-free port. Sand Point, with a 25 acre/144 slip boat harbor and marine travel-lift, is home port to what some have called, "the largest fishing fleet in the Aleutian Islands" (NPFMC 1994a).

For decades, the two communities have principally concentrated on their respective area's salmon fisheries. In 1997, for example, Sand Point and King Cove recorded salmon landings of several million pounds, each. State of Alaska data confidentiality requirements preclude reporting actual quantities and value when fewer than four independent operations are included in a category. Sand Point and King Cove each have one processor reporting catch and production data. In addition, King Cove had significant deliveries of Pacific herring and crabs. Recently, each community has actively sought to diversify its fishing and processing capability, with groundfish being key to these diversification plans.

According to a recent report presented to the Council (Impact Assessment Incorporated 1998):

> In terms of employment, 87 percent of Sand Point's workforce is employed full time in the commercial fishery; for King Cove this figure is more than 80 percent (United States Army Corps of Engineers 1997, and 1998). In both cases, fishing employment is followed by local government (borough and local) and then by private businesses. Seafood processing ranks after each of these other employers, meaning that the vast majority of the workforce at the shore plants are not counted as community residents.

By any measure, these two communities are fundamentally dependent upon fishing and fish processing. In recent years, groundfish resources have supplanted salmon, herring, and crabs as the primary target species-group, becoming the basis for much of each community's economic activity and stability.

Few alternatives to commercial fishing and fish processing exist, within the cash-economy, in these communities by which to make a living. However, subsistence harvesting is an important source of food, as well as a social activity, for local residents in both Sand Point and King Cove. Salmon and caribou are reportedly among the most important subsistence species, but crabs, herring, shrimps, clams, sea urchins, halibut and cod are also harvested by subsistence users. It is reported that Native populations in these communities also harvest seals and sea lions for meat and oil (Impact Assessment Incorporated 1998).

Any action that significantly diminishes the harvest of GOA and BSAI groundfish resources (especially those of pollock and Pacific cod) would be expected to adversely impact these two communities. King Cove is somewhat unique among the five key groundfish ports insofar as it is relatively more dependent upon Pacific cod than pollock, among the groundfish species landed (69 percent and 31 percent, respectively). Sand Point follows the more typical pattern with 69 percent of its groundfish landings being composed of pollock and 29 percent of Pacific cod (in 1997).

No data on cost, net revenues, capital investment and debt structure are available with respect to the Sand Point or King Cove plant complexes.

### 4.5.4 Community Development Quota Program Communities

The purpose of the CDQ program was to provide western Alaska fishing communities an opportunity to participate in the BSAI fisheries that had been foreclosed to them because of the high capital investment needed to enter the fishery. The program was intended to help western Alaska communities to diversify their local economies and to provide new opportunities for stable, long-term employment. The original Council guidance for implementing the CDQ Program focused on using the allocations to develop a self-sustaining fisheries economy.

Although the program was initially proposed for the fixed gear sablefish fishery, it was first implemented for BSAI pollock. The program set aside 7.5 percent of the annual BSAI pollock TAC for allocation to qualifying rural Alaskan communities. The first pollock allocations were proposed for 1992 through 1995, however, the Sustainable Fisheries Act, which amended the Magnuson-Stevens Act, institutionalized the program as part of the BSAI FMP in 1996. CDQ allocations for BSAI sablefish and halibut were added in 1995, and the multi-species groundfish CDQ Program was implemented in late 1998. Ultimately, the program allocates CDQ for pollock, all remaining groundfish species (7.5 percent, except 20 percent for fixed gear sablefish), crab (7.5 percent), and halibut (20 to 100 percent), as well as a pro-rata share of prohibited species. In 1999, the American Fisheries Act increased the pollock allocation to 10 percent.

The purpose of the CDQ program is, essentially, to allow a portion of the economic and social benefits derived from the rich fishery resources of the BSAI management areas to accrue to coastal communities in western Alaska that had not been able to capitalize on their proximity to these commercial fisheries. The CDQ region is historically an area with few economic alternatives. By providing CDQ shares to qualifying communities, these communities are able to invest in capital infrastructure, community development projects, training and education of local residents, and develop regionally based commercial fishing or related businesses.

The eligibility criteria for the CDQ communities is established in the Magnuson-Stevens Act. The CDQ communities are comprised of predominantly Alaska Native residents. They are remote, isolated settlements with few natural assets with which to develop and sustain a viable diversified economic base. As a result, unemployment rates are chronically high, which impedes community instability.

While these communities effectively border some of the richest fishing grounds in the world, they have not been able, for the most part, to exploit their advantageous proximity. The full Americanization of these highly valued offshore fisheries has taken place relatively quickly (i.e., the last participation by foreign fishing vessels ended in the Bering Sea in 1990). But the scale of these fisheries (e.g., 2 million mt groundfish TAC), the severe physical conditions within which the fisheries are prosecuted, and the very high capital investment required to compete in the open-access management environment, all contributed to effectively precluding these villages from participating in this development. The CDQ program serves to extend an opportunity to qualifying communities to directly benefit from the exploitation of these local resources.

The communities that are currently eligible to participate in the CDQ program include 65 coastal Alaska villages, with a combined population estimated at roughly 274,000. The CDQ-qualifying communities have organized themselves into six non-profit groups (with between 1 and 20 villages in each group). The CDQ-villages are geographically dispersed, extending from Atka, on the Aleutian chain, along the Bering Sea coast, to the village of Wales, near the Arctic Circle. The current CDQ groups are listed below.

> Aleutian Pribilof Island Community Development Association (APICDA): The communities represented by APICDA are relatively small and located adjacent to the fishing grounds. Population of the six communities is approximately 1,140.

Bristol Bay Economic Development Corporation (BBEDC): BBEDC represents villages distributed around the circumference of Bristol Bay, including Dillingham, the second-largest CDQ community with approximately 2,470 residents and the location of BBEDC's home office. Total population is approximately 5,930.

Central Bering Sea Fisherman's Association (CBSFA): CBSFA is unusual among CDQ groups in that it represents a single community, St. Paul in the Pribilof Islands, with a population of 530.

Coastal Villages Region Fund (CVRF): CVRF manages the CDQ harvest for its member villages. The villages are located along the coast between the southern end of Kuskokwim Bay and Scammon Bay, including Nunivak Island.

Norton Sound Economic Development Corporation (NSEDC): Approximately 8,500 people make up the region represented by NSEDC, which ranges from St. Michael to Diomede.

Yukon Delta Fisheries Development Association (YDFDA): YDFDA represents the communities, Alakanuk, Emmonak, Grayling, Kotlik, Mountain Village, and Sheldon Point, containing approximately 3,120 people.

One of the criteria for community eligibility in the CDQ Program is that the community could not have previously developed harvesting or processing capability sufficient to support substantial groundfish fisheries participation in the BSAI (unless the community could show that benefits from CDQ allocations would be the only way to realize a return on previous investments). Therefore, to derive economic benefit from their respective allocations, it has been necessary (with the exception of some of the halibut and sablefish CDQs) for each CDQ group to enter into a relationship with one or more of the commercial fishing companies which participate in the fisheries. In this way, the CDQ community brings to the relationship preferential access to the fish and the partnering firm brings the harvesting/processing capacity. The nature of these relationships differs from group to group, but all of the groups are part owners in one or more fishing vessels and companies. In every case, the CDQ community receives royalty payments on apportioned catch shares. Some of the agreements also provide for training and employment of CDQ-community members within the partners' fishing operations, as well as other community development benefits.

## 4.6 Ecosystem Characteristics

Ecosystem characteristics of the Bering Sea and Aleutian Islands are assessed annually in the *Ecosystem Considerations* appendix to the *Bering Sea and Aleutian Islands and Gulf of Alaska Stock Assessment and Fishery Evaluation* report. Since 1995, this document has been prepared in order to provide information about the effects of fishing from an ecosystem perspective, and the effects of environmental change on fish stocks. Since 1999, the section has included information on indicators of ecosystem status and trends, and more ecosystem-based management performance measures.

Since 2003, an annual Ecosystem Assessment has also been included in the appendix to the SAFE. The primary intent of the assessment is to summarize historical climate and fishing effects of the shelf and slope regions of the eastern Bering Sea and Aleutian Islands, and Gulf of Alaska, from an ecosystem perspective and to provide an assessment of the possible future effects of climate and fishing on ecosystem structure and function. The *Ecosystem Considerations* sections from 2000 to the present are available online at www.afsc.noaa.gov/refm/reem/Assess/Default.htm or by request from the Council office.

### 4.6.1 Ecosystem Trends in the Bering Sea and Aleutian Islands Management Area

This section is drawn from the *Final Programmatic Supplemental Environmental Impact Statement for the Alaska Groundfish Fisheries* (NMFS 2004), available on the NMFS Alaska Region website (www.fakr.noaa.gov), or by request from the NMFS Alaska Region office.

In a review of fishery trends and potential fishery-related impacts within the BSAI ecosystem, Livingston *et al.* (1999) examined historical biomass trends of three different trophic guilds to see if there was a relationship between fishing or climate and changes in total guild biomass or changes in species composition within guilds. For example, large fishing removals of one guild species might result in increases in other members of that guild as competitive pressures ease. Similarly, if fishing removes large numbers of a prey species important to all members of the guild, an overall decrease in the abundance of all the guild species might be observed, as well as decreased mean size at age of predators relying on that prey. Alternatively, if the factor inducing the observed change is environmental, trends in abundance or in mean size at age that correlate positively or negatively with temperature or other physical oceanographic factors might be seen. Three trophic guilds were examined:

1. offshore fish, mammals, and seabirds that consume small pelagic fish;
2. inshore fish, crabs, and other benthic epifauna that primarily consume infauna; and
3. a ubiquitous group that feeds on crab and fish (Figure 4-5).

Despite conservative exploitation rates, a variety of species in diverse trophic groups (e.g., arrowtooth flounder, Greenland turbot, some seabirds, and marine mammals) showed either increasing or decreasing long-term trends in abundance, and both fished and unfished species (pollock, cod, crabs, sea stars, and others) showed cyclic fluctuations in abundance over the two decades from 1979 to 1999. No link was found between species declines and prey abundance. The timing of some species declines, e.g., marine birds, was actually correlated with increases in the adult populations of their main prey species – in this case, pollock. Similarly, the timing of increases in some guild member biomass values did not relate to fishing intensity on other guild members (e.g., skate versus cod). The Livingston *et al.* study, however, did not consider spatial changes in prey abundance or availability that could occur, and these factors cannot be ruled out as potential causal links to changes in predator abundance.

Physical oceanographic factors, particularly northward or southward shifts in regional climatic regimes, were correlated with the recruitment of some guild members (see Section 4.6.2), and decreases in individual growth of some species (rock sole) were linked to increases in rock sole biomass. Diversity changes in some trophic guilds were related to increases in a dominant guild member (e.g., pollock in the pelagic fish consumer guild, and rock sole in the benthic infauna consumer guild) rather than to fishing-induced changes in diversity.

The study by Livingston *et al.* (1999) showed a stable trophic level of catch and stable populations overall. The trophic level of the Bering Sea harvest has risen slightly since the early 1950s and appears to have stabilized as of 1994.

<u>Modeling Biological Interactions Among Multiple Species</u>

Livingston and Jurado-Molina (1999) have developed a computer-based model of predator-prey interactions among the dominant groundfish species in the eastern Bering Sea. Three goals have directed the development of this multi-species model: 1) to examine trends in mortality due to predation, 2) to examine the relative importance of predation versus climate in influencing fish recruitment, and 3) to provide a basis for evaluating how future changes in fishing intensity might affect the groundfish community. The model uses information on historical catch estimates and predation among the species to estimate numbers at age and predation mortality of groundfish populations. The following species are modeled as predators: walleye pollock, Pacific cod, Greenland turbot, yellowfin sole, arrowtooth flounder, and northern fur seal. Arrowtooth flounder and northern fur seal are considered “other predators,” which means that population and mortality estimates are not made directly for these species. However, it is feasible to estimate the impact of their predation on other species in the model. Prey species are walleye pollock, Pacific cod, Greenland turbot, yellowfin sole, rock sole, and Pacific herring.

Results from the modeling indicate that most predation mortality occurs on juveniles, particularly juvenile walleye pollock. This juvenile mortality varies over time, and recruitment of juveniles into the adult population also varies. Cannibalism by adult pollock explains some of the recruitment variation, but it appears that much of the variability is related to climatic variation (see Section 4.6.2). Understanding of predation and climate as structuring forces on groundfish communities will be advanced when multi-species predation models like these are linked to climate models that predict survival rates of larval fish before they are vulnerable to predation.

Output from this predation model can be used to evaluate the multi-species implications of various fishing strategies. One question asked about the BSAI by groundfish stock assessment biologists is: What effects might uneven groundfish harvesting rates have on groundfish community dynamics? For example, some species, such as Pacific cod, are fished up to the recommended level of ABC, while others, such as rock sole and yellowfin sole, are fished at levels below ABC for economic and bycatch reasons. Using a multi-species model, Jurado-Molina and Livingston (2000) examined what could happen over the long-term future to groundfish population size if species were harvested more evenly or were not harvested at all. They compared these projected changes with model predictions based on current groundfish fishing rates. They also compared the results with predictions using single-species models that did not consider predation interactions.

In the scenario where groundfish were fished more evenly ($F_{ABC}$) than actually occurs under the present harvesting regime ($F_{REF}$), the single-species models predicted almost the same population changes that the multi-species model did. The biggest differences between multi-species and single-species models were seen in the predictions for prey species biomasses of herring and rock sole, but even these were not very large (Figure 4-6).

Small differences in the predictions are the result of evaluating relatively small changes in fishing intensity. Larger differences between single-species models and the multi-species model are seen when the present fishing strategy ($F_{REF}$) is compared with a no-fishing strategy (Figure 4-7). Here, the main reason for the difference is that the multi-species model predicts that predators increase their consumption of prey when there is no fishing. The model results indicate that when pollock fishing is stopped, the largest beneficiary species is pollock itself. This is because adult pollock consume mostly younger (age 0 and age 1) pollock, while other predators tend to consume mostly older (age 1 and older) pollock. In the long-term, consumers of small pollock get the first opportunity to benefit from the increased abundance of juveniles when fishing stops.

In summary, the results of multi-species predator-prey modeling suggest that implementation of a more even harvesting regime would not produce effects much different from changes predicted by single-species models. The largest difference occurs in predictions under a no-fishing scenario, with the multi-species model predicting smaller increases in prey species such as pollock, rock sole, and herring than those predicted by the single-species models. Increases in predator populations, and thus predation mortality, under a no-fishing scenario are the reason for the lower rate of increase in prey populations in the multi-species model.

Multi-species Technological Interactions

Harvesting can have multi-species implications through technological interactions (i.e., co-occurrence of multiple species in a single target species fishery). When specific fisheries are unable to catch their target species exclusively, their fishing effort imposes some mortality on each species that is taken as bycatch. Bycatch of non-target flatfish species is a particularly important characteristic of several eastern Bering Sea target fisheries, including yellowfin sole, rock sole, flathead sole, and Alaska plaice. These species, along with Pacific halibut, occupy similar habitats on the eastern Bering Sea shelf and co-occur to varying degrees in the harvest. Additionally, the retention of Pacific halibut is prohibited in the federally managed groundfish fishery, and quotas of halibut bycatch—not directed target quotas—have been the main factor in restricting the fishery in recent years.

The total trawling effort for all flatfish fisheries combined imposes a variety of fishing mortality rates on the individual flatfish species. This has been evaluated with a multi-species yield-per-recruit model (Spencer *et al.* 1999). One motivation for such modeling is to consider management options that would increase the total flatfish yield, factoring in the bycatch of flatfish in the various fisheries. A main feature of this model is that a catchability coefficient is computed for each species and fishery, based on recent catch and effort data; the distribution of effort among the various eastern Bering Sea trawl fisheries (defined by species catch composition) is based on the same data. The slope of each line in Figure 4-8 is the total catchability for a particular species, resulting from all fisheries that harvest the species. For example, the catchability of yellowfin sole is higher than other species because a significant proportion of total trawling effort is directed toward this fishery, and this species has relatively high catchabilities in several fisheries.

Reaching halibut bycatch quotas early has resulted in early closures of the flatfish fisheries, thus resulting in large differences between fishing levels that would attain the ABC at $F_{ABC}$ (triangles in Figure 4-8) and recent average $F$ levels (asterisks in Figure 4-8) for most fisheries. One way to manage these species that are caught together would be to derive biological reference points for the complex as a whole. The $F_{40\%}$ level for the group combined (squares in Figure 4-8) would produce higher yields (in the absence of halibut bycatch quotas) than the single-species approach. This approach for managing flatfish as a group, however, would expose the yellowfin sole population to a higher fishing rate than the rate that would be recommended in a single-species management scheme. Therefore, this strategy might not provide optimal protection for yellowfin sole. If the complex were managed to protect the weakest stock (yellowfin sole), the combined flatfish fisheries would be able to increase effort by only a relatively small amount above the current effort levels (to the level of effort that would reach the yellowfin sole ABC at $F_{ABC}$ (triangle in Figure 4-8). There is a relatively small difference between the recent average yellowfin sole F and the yellowfin sole $F_{40\%}$, indicating that there would be no significant change from current practice.

The limitation currently imposed on flatfish fisheries by the halibut bycatch quota has motivated fishermen to develop methods of reducing trawling effort that has high catchability on halibut (Gauvin *et al.* 1995) and also to develop fishing gear with lower halibut catchability (i.e., halibut excluder devices). These gear improvements and the already mandated phasing-in of requirements for retaining flatfish bycatch under the improved retention/improved utilization management approach show promise for producing a fishery management system with increased protection for protected species such as halibut and a large reduction in the levels of flatfish discards in flatfish fisheries. Because the gear improvements and improved retention scheme implementation will change the nature of the effort and multi-species catch characteristics of these target fisheries, the impacts of the improvements must be evaluated before multi-species biological reference points can be developed for target flatfish.

**Figure 4-5 Biomass trends in Bering Sea trophic guilds, 1979-1998.**

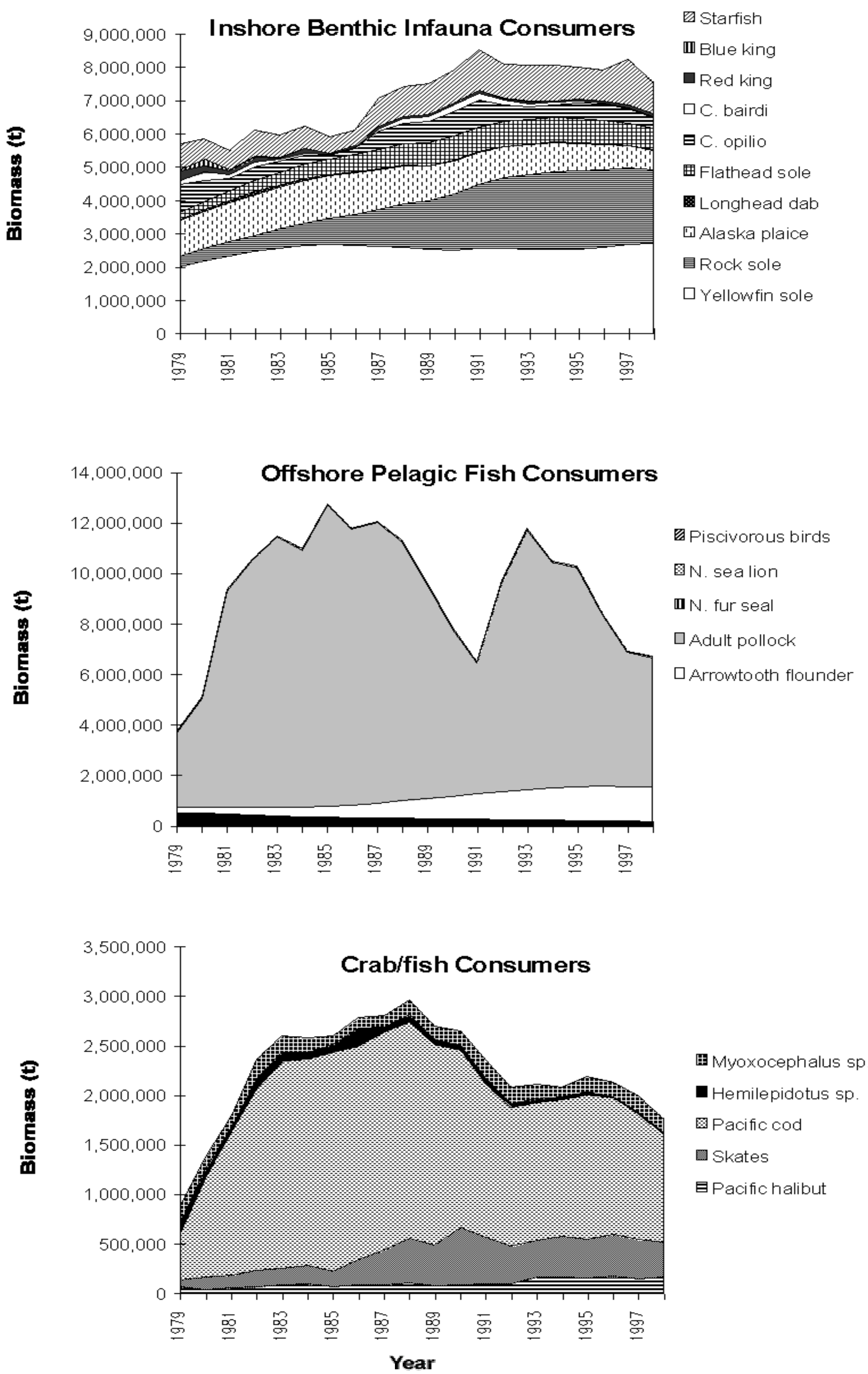


**Figure 4-6** **Multispecies and single-species model results for change in equilibrium biomass between the present fishing rates ($F_{ref}$) and more even harvesting of all species ($F_{abc}$).** Note: plk = pollock, cod = Pacific cod, gtb = greenland turbot, yfs = yellowfin sole, rsol = rock sole, her = herring, SSB = steady state biomass.

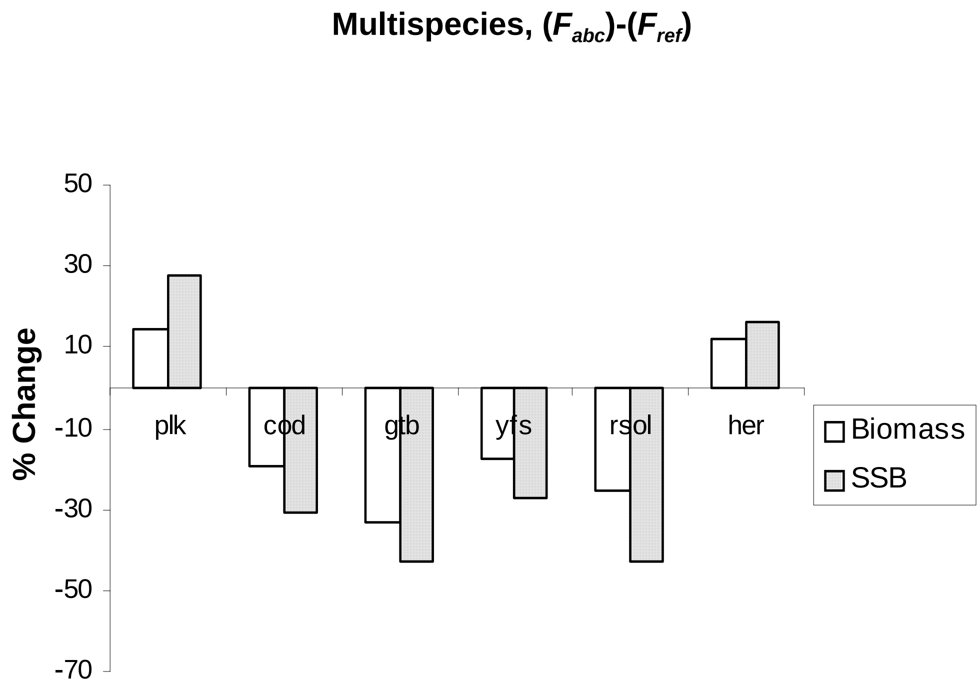



**Figure 4-7** **Percent change in single-species and multispecies model predictions of biomass between the present fishing strategy ($F_{ref}$) and a no-fishing ($F=0$) scenario.** Note: plk = pollock, cod = Pacific cod, gtb = greenland turbot, yfs = yellowfin sole, rsol = rock sole, her = herring, SSB = steady state biomass.

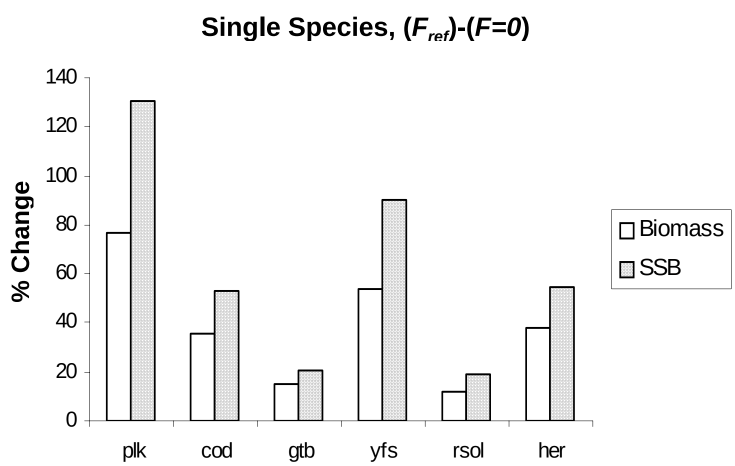
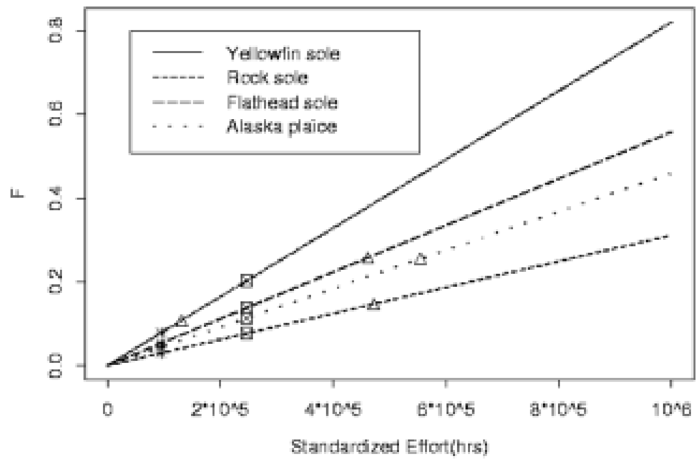


**Figure 4-8 Eastern Bering Sea flatfish instantaneous fishing mortality rates as a function of total standardized trawling effort.** Results were obtained from a multispecies yield per recruit model, and each species incorporates the contribution of all eastern Bering Sea trawl fisheries. Triangles indicate the $F_{40\%}$ single-species reference points, asterisks indicate the recent average *F*s and total trawl standardized effort, and squares indicate the $F_{40\%}$ multi-species reference point for the flatfish complex as a whole. Source: NMFS.




## 4.6.2 Climate-Implicated Change

This section is drawn from the *Final Programmatic Supplemental Environmental Impact Statement for the Alaska Groundfish Fisheries* (NMFS 2004), available on the NMFS Alaska Region website (www.fakr.noaa.gov), or by request from the NMFS Alaska Region office.

Evidence from observations during the past two decades and the results of modeling studies using historical and recent data from the North Pacific Ocean suggest that physical oceanographic processes, particularly climatic regime shifts, might be driving ecosystem-level changes that have been observed in the BSAI and GOA. Commercial fishing has not been largely implicated in BSAI and GOA ecosystem changes, but studies of other ecosystems with much larger fishing pressures indicate that fishing, in combination with climate change, can alter ecosystem species composition and productivity (Jennings and Kaiser 1998, Livingston and Tjelmeland 2000).

During 1997 and 1998, a period of warmer-than-usual ambient air temperatures (Hare and Mantua 2000), a number of unusual species occurrences were observed in the BSAI and GOA, including the following examples:

- In 1998, several warm-water fish species, including Pacific barracuda (*Sphyraena argentea*), were observed and/or caught in the GOA. Ocean sunfish (*Mola mola*) and chub mackerel (*Scomber japonicus*), occasionally recorded in southeast Alaskan waters, were documented there in unusually large numbers. Similarly, Pacific sleeper sharks (*Somniosus pacificus*) were caught (and released) in higher than normal levels in Cook Inlet, and salmon sharks (*Lamna ditropis*) were taken in fairly large numbers off Afognak Island (Kevin Brennan, ADF&G, personal communication).
- Spiny dogfish (*Squalus acanthias*) substantially increased in the Kodiak area and in Prince William Sound (Bill Bechtol and Dave Jackson, ADF&G, personal communication). In

1998, this species' inclusion in collection tows increased by more than 40 percent. A corresponding increase in spiny dogfish has been observed in the International Pacific Halibut Commission's GOA halibut longline bycatch surveys (Lee Hulbert, NMFS, personal communication).

- Individuals of several marine mammal species were seen at unusual times and/or places during 1998, including a Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) near Haines and a northern right whale (*Eubalaena glacialis*) off Kodiak Island.
- Unusual bird sightings in the GOA included a gray-tailed tattler (*Heteroscelus brevipes*) south of the Kenai Peninsula and a mallard (*Anas platyrhynchos*) several miles offshore in the open ocean. Common murre (*Uria aalge*) die-offs were reported in Cook Inlet, Kodiak, the eastern Aleutians, Resurrection Bay, and the eastern Bering Sea.
- Three northern elephant seals (*Mirounga angustirostris)* were spotted in nearshore waters around Unalaska during late June and early July, whereas they are usually found farther offshore and at a different time of year.
- There were poor returns of chinook (*Oncorhynchus tshawytscha*) and sockeye (*Oncorhynchus nerka*) salmon to Bristol Bay during both years.

Research on climate shifts as a forcing agent on species and community structure of the North Pacific Ocean can be found in Francis and Hare (1994), Klyashtorin (1998), McGowan *et al.* (1998), Hollowed *et al.* (1998), and Hare and Mantua (2000). The approach used in these studies assesses correlations between past climatic patterns and changes in biomass or recruitment rate for particular marine species. Because cause-and-effect relationships between temporal and spatial patterns of climate change and corresponding patterns of change in biological populations have not been proven for the BSAI and GOA, the correlations must be considered circumstantial. But there are reasons to expect that causal links do exist. For example, stronger recruitment would be expected under more favorable climatic conditions, because more juveniles would be likely to survive to adulthood, whereas harsh conditions would result in weak recruitment because fewer juveniles would survive. In both cases, the recruitment patterns would be reflected in the strength or weakness of the affected age groups within future fisheries.

Francis and Hare (1994) analyzed historical data supporting a climate shift that caused a precipitous decline in the sardine (*Sardinops sagax*) population off Monterey, California in the 1950s. Although it had been widely concluded that this decline resulted solely from overfishing, the data indicate instead that a change in sea surface temperature was closely correlated with the sardines' disappearance, and this related closely to patterns of sardine numbers in marine sediments off Southern California. Consequently, both climate and fishing are now recognized to be implicated in the sardine population decline.

Francis and Hare (1994) related the intensity of the Aleutian low pressure system (Aleutian low), a weather pattern, with production of salmon and zooplankton. Winter ambient air temperatures at Kodiak and the North Pacific Index, an index tracking the intensity of the Aleutian low during the winter, were used as indicators of climatic severity. Strong correlations were found between long-term climatic trends and Alaskan salmon production. Annual weather patterns were found to be closely correlated with changes in zooplankton populations.

For the northeastern North Pacific Ocean, McGowan *et al.* (1998) showed that interannual climatic variations linked to the ENSO and decadal-scale climate shifts can be detected in physical oceanographic data. For instance, the depth of the mixed layer in the California Current and GOA became shallower over time, whereas the mixed-layer depth in the Central Pacific deepened during the same period. This was not, however, reflected in the mass flow of the California Current. Greater depth of the mixed layer during elevated sea surface temperature events was correlated with decreased nutrient availability, plankton abundance, and shifts in community structure. These researchers concluded that climatic events such as ENSO are correlated with changes in biological populations associated with the California Current. Biological processes in the GOA appear to be more strongly influenced by variations in the Aleutian low.

According to McGowan *et al.* (1998), climate-related changes in the biological communities of the California Current system ranged from declines in kelp forests to shifts in the total abundance and dominance of various zooplankton species. Some fish and invertebrate populations declined, and the distributional ranges of species shifted northward. In addition, seabird and marine mammal reproduction were apparently affected by El Niño-Southern Oscillation (ENSO) conditions. Interdecadal changes in community structure also occurred, with intertidal communities becoming dominated by northward-moving southern species and changes in species proportions occurring in most other sectors of the ecosystem.

Interdecadal shifts observed in the northeastern North Pacific Ocean ecosystem have been of the opposite sign from those in the California Current system, with increases in zooplankton biomass and salmon landings observed in the GOA (McGowan *et al.* 1998, Francis and Hare 1994). These shifts have corresponded to the intensity and location of the winter mean Aleutian low, which changes on an interdecadal time scale.

Klyashtorin (1998) linked catch dynamics of Japanese sardines, California sardines, Peruvian sardines, Pacific salmon, Alaska pollock, and Chilean jack mackerel in the Pacific with an atmospheric circulation index that shows trends similar to the North Pacific Index used by other researchers. Other species, such as Pacific herring and Peruvian anchovy, are negatively associated with this index.

Hollowed *et al.* (1998) analyzed oceanographic and climatic data from the eastern North Pacific Ocean and compared those data with information on recruitment for 23 species of groundfish and five non-salmonid species and with catch data for salmon. The fish recruitment data were compared to environmental factors over various time scales and with varying time lags. Hollowed *et al.* (1998) found that, for species such as pollock, cod, and hake, recruitment was generally stronger during ENSO events. Whereas salmon and large-mouthed flatfish such as arrowtooth flounder, Greenland turbot, and Pacific halibut responded more strongly to longer-term events such as decadal-scale climatic regime shifts. Because both ENSO and decadal-scale ecosystem shifts are environmentally controlled, the results of this analysis support climate change as an important controlling factor in ecosystem dynamics.

There is considerable evidence that decadal and basin-scale climatic variability (Section 3.3.4) can affect fish production and ecosystem dynamics. Sudden basin-wide shifts in climatic regime have been observed in the North Pacific Ocean (Mantua *et al.* 1997), apparently due to changes in atmospheric forcing. Eastward- and northward-propagating storm systems dominate the wind stress on surface waters for short periods (less than one month), mixing the upper layers and altering sea surface temperatures (Bond *et al.* 1994). Because fish are very sensitive to ambient water temperature, even changes in surface temperature, if sufficiently frequent or prolonged, can alter fish distribution and reproductive success as well as recruitment (the number of juveniles that survive to enter the adult, reproducing portion of the population).

In a long-term trends analysis by computer, Ingraham and Ebbesmeyer (Ingraham *et al.* 1998) used the Ocean Surface Current Simulator model to simulate wind-driven surface drift trajectories initiated during winter months (December through February) for the period 1946 to present. The model-generated endpoints of the 3-month drift trajectories shifted in a bimodal pattern to the north and south around the mean. The winter flow during each year was persistent enough to result in a large displacement of surface mixed-layer water. The displacement also varied in a decadal pattern. Using the rule that the present mode is maintained until three concurrent years of the opposite mode occur, four alternating large-scale movements in surface waters were suggested: a southward mode from 1946 to 1956, a northward mode from 1957 to 1963, a southward mode from 1964 to 1974, and a northward mode from 1975 to 1994. As more northern surface water shifts southward, colder conditions prevail farther south, and as southward water moves northward, warmer conditions prevail farther north, both potentially affecting fish distribution and population dynamics.

Real-world evidence that atmospheric forcing alters sea surface temperatures comes from two principal sources: shorter-term ENSO events and longer-term Pacific Decadal Oscillations (Mantua *et al.* 1997). Temperature anomalies in the BSAI and GOA indicate a relatively warm period in the late 1950s, followed by cooling especially in the early 1970s, followed by a rapid temperature increase in the latter part of that decade. Since 1983, the BSAI and GOA have undergone different temperature changes. Sea surface temperatures in the BSAI have been below normal, whereas those in the GOA have been generally above normal. Consequently, the temperature difference between the two bodies of water has jumped from about 1.1° C to about 1.9° C (U.S. GLOBEC 1996).

Subsurface temperatures, potentially an even more important influence on biological processes, have been documented to change in response to climatic drivers. There was a warming trend in subsurface temperatures in the coastal GOA from the early 1970s into the 1980s similar to that observed in GOA sea surface waters (U.S. GLOBEC 1996).

In addition, seawater temperature changes in response to ENSO events occurred, especially at depth, in 1977, 1982, 1983, 1987, and in the 1990s. The 1997-1998 ENSO event, one of the strongest recorded in the twentieth century, substantially changed the distribution of fish stocks off California, Oregon, Washington, and Alaska. The longer-term impacts of the 1997-1998 ENSO event remain to be seen. Francis *et al.* (1998) reviewed the documented ecological effects of this most recent regime shift through lower, secondary, and top trophic levels of the North Pacific Ocean marine ecosystem. Some of the following impacts on higher trophic levels are based on this review:

- Parker *et al*. (1995) demonstrated marked similarities between time series of the lunar nodal tidal cycle and recruitment patterns of Pacific halibut.
- Hollowed and Wooster (1995) examined time series of marine fish recruitment and observed that some marine fish stocks exhibited an apparent preference (measured by the probability of strong year and average production of recruits during the period) for a given climate regime.
- Hare and Francis (1995) found a striking similarity between large-scale atmospheric conditions and salmon production in Alaska.
- Quinn and Niebauer (1995) studied the Bering Sea pollock population and found that high recruitment coincided with years of warm ocean conditions (above normal air and bottom temperatures and reduced ice cover). This fit was improved by accounting for density-dependent processes.

Additional evidence of marine ecosystem impacts linked to climatic forcing comes from Piatt and Anderson (1996), who provided evidence of possible changes in prey abundance due to decadal-scale climate shifts. These authors examined relationships between significant declines in marine birds in the northern GOA during the past 20 years and found that statistically significant declines in common murre populations occurred from the mid- to late 1970s into the early 1990s. They also found a substantial alteration in the diet composition of five seabird species collected in the GOA from 1975 to 1978 and from 1988 to 1991, changing from a capelin-dominated diet in the late 1970s to a diet in which capelin was virtually absent in the later period.

The effects of ten-year regime shifts on the inshore GOA were analyzed using data from 1953 to 1997 (Anderson and Piatt 1999). Three taxonomic groups dominated (approximately 90 percent) the biomass of commercial catches during this period: shrimp, cod and pollock, and flatfish. When the Aleutian low was weak, resulting in colder water, shrimp dominated the catches. When the Aleutian low was strong, water temperatures were higher, and the catches were dominated by cod, pollock, and flatfish. Similar results were reported in very nearshore areas of lower Cook Inlet (Robards *et al.* 1999).

Few patterns were seen in the less-common species over the course of the study. Generally, the transitions in dominance lagged behind the shift in water temperature, strengthening the argument that the forcing agent was environmental. However, different species responded to the temperature shift with differing time lags. This was most evident for species at higher trophic levels, which are typically longer-lived and take longer to exhibit the effects of changes. The evidence suggests that the inshore community was reorganized following the 1977 climate regime shift. Although large fisheries for pandalid shrimp may have hastened the decline for some stocks (Orensanz *et al.* 1998), unfished or lightly fished shrimp stocks showed declines. Both Orensanz *et al.* (1998) and Anderson and Piatt (1999) concluded that the large geographic scale of the changes across so many taxa is a strong argument that climate change is responsible.

Other studies have linked production, recruitment, or biomass changes in the BSAI with climatic factors. For example, a climate regime shift that might have occurred around 1990 has been implicated in a large increase in gelatinous zooplankton in the BSAI (Brodeur *et al.* 1999). Recruitment in both crabs and groundfish in the BSAI has been linked to climatic factors (Zheng and Kruse 1998, Rosenkranz *et al.* 1998, Hollowed *et al.* 1998, Hare and Mantua 2000).

There are indications from several studies that the BSAI ecosystem responds to decadal oscillations and atmospheric forcing, and that the 1976-1977 regime shift had pronounced effects. A peak in chlorophyll concentrations in the late 1970s was closely correlated with an increase in summer mixed-layer stability documented at that time (Sugimoto and Tadokoro 1997). Also, on a decadal time scale, chlorophyll concentrations in the summer were positively correlated with winter wind speeds, indicating a positive response of BSAI phytoplankton to stronger Aleutian lows (Sugimoto and Tadokoro 1997).

Evidence of biological responses to decadal-scale climate changes are also found in the coincidence of global fishery expansions or collapses of similar species complexes. Sudden climate shifts in 1923, 1947, and 1976 in the North Pacific Ocean substantially altered marine ecosystems off Japan, Hawaii, Alaska, California, and Peru. Sardine stocks off Japan, California, and Peru exhibited shifts in abundance that appear to be synchronized with shifts in climate (Kawasaki 1991). These historical 60-year cycles are seen in paleo-oceanographic records of scales of anchovies, sardines, and hake as well. Other examples are salmon stocks in the GOA and the California Current whose cycles are out of phase. When salmon stocks do well in the GOA, they do poorly in the California Current and vice-versa (Hare and Francis 1995, Mantua *et al.* 1997).

In addition to decadal-scale shifts, interannual events such as the ENSO can have significant impacts on fish distribution and survival, and can affect reproduction, recruitment, and other processes in ways that are not yet understood. This is particularly true for higher-latitude regions such as the northern California Current and GOA. As noted above, the 1997-1998 ENSO event significantly changed the distribution of fish stocks off California, Oregon, Washington, and Alaska. A change that has persisted to the present. Predicting the implications of this trend for future fishery management is problematic, in part because ENSO signals propagate from the tropics to high latitudes through the ocean as well as through the atmosphere, and it is difficult to separate these two modes of influence. Information on the dynamics of North Pacific Ocean climate and how this is linked to equatorial ENSO events is not adequate to adjust fisheries predictions for such abrupt, far-reaching, and persistent changes. Warm ocean conditions observed in the California Current during the present regime may be due, in large part, to the increased frequency of ENSO-like conditions.

In conclusion, evidence from past and present observations and modeling studies at the community and ecosystem levels for the BSAI and GOA suggest that climate-driven processes are responsible for a large proportion of the multi-species and ecosystem-level changes that have been documented. Modeling studies have been a valuable tool for elucidating the possible long-term implications of various fishing strategies. As with all computer-based models, these have been sensitive to unproven assumptions about recruitment and its relationship to climate. As the preceding discussion suggests, the models could be improved by incorporating components that include climatic effects on species, particularly with respect to recruitment. However, this approach has not been widely applied yet to species in the BSAI and GOA ecosystems.

### 4.6.3 Interactions Among Climate, Commercial Fishing, and Ecosystem Characteristics

This section is drawn from the *Final Programmatic Supplemental Environmental Impact Statement for the Alaska Groundfish Fisheries* (PSEIS) (NMFS 2004), available on the NMFS Alaska Region weastern Bering Seaite (www.fakr.noaa.gov), or by request from the NMFS Alaska Region office.

Groundfish fishery management in the BSAI and GOA is implemented in a dynamic environment where both commercial fishing and climate-driven physical oceanographic processes interact in complex ways to affect the marine ecosystem. To characterize these interactions, it is necessary to distinguish, where feasible, the separate effects of fishing and climate on biological populations. The following discussion reviews current knowledge regarding these effects and their relationship to ecosystem characteristics.

Three processes underlie the population structure of species in marine ecosystems: competition, predation, and environmental factors. Natural variations in the recruitment, survival, and growth of fish stocks are consequences of these processes. The first process, competition, is a basic concept underlying many ecological theories (e.g., Hairston *et al.* 1960, Welden and Slauson 1986, Yodzis 1978, 1994). It requires an assumption that species in an ecosystem are limited in their access to critical resources such as food, space, reproductive mates, and time for important activities. Predation is important, because it changes prey density, thereby directly or indirectly affecting populations throughout the ecosystem. Finally, environmental factors, particularly climatic processes, are thought to be major agents of change in North Pacific Ocean ecosystems. Climate has the potential to influence the important biological processes of reproduction, growth, consumption and predation, movement, and, ultimately, the survival of marine organisms.

Against this complex and dynamic natural background, human activities such as commercial fishing can influence the structure and function of marine ecosystems. Like competition, predation, and climate change, the effects of commercial fishing can extend over a range of temporal, spatial, and population scales. Large-scale commercial fishing has the potential to influence ecosystems in several ways. It may alter the amount and flow of energy in an ecosystem by removing energy and altering energetic pathways though the return of discards and fish processing offal back into the sea. The recipients, locations, and forms of this returned biomass may differ from those in an unfished system. In addition, the selective removal of species has the potential to change predator-prey relationships and community structures. Fishing gear may alter bottom habitat and damage benthic organisms and communities.

Both climate and commercial fishing activity currently influence the structure and function of the North Pacific Ocean ecosystem (Francis *et al.* 1999). Since climate change and commercial fishing can co-vary, it may be difficult to distinguish the impacts of the two (e.g., Trites *et al.* 1999). The primary way in which complex scientific knowledge is integrated to further the understanding of the influence of natural and human-related processes on marine ecosystems is through the use of models. Models can be as simple as conceptual diagrams that show a picture of how we think a certain ecosystem process operates, or they can be very complicated, with quantitative descriptions of the relationships between various factors and species growth, recruitment, movement, or survival. Reviews of the status of models that have been developed to understand the effects of climate and fishing on ecosystems have been produced by Livingston (1997) and Hollowed *et al.* (2000a). These reviews outline the types of models presently being used and the state of our ability to understand and predict the effects of the two important factors of climate and fishing in marine ecosystems by using models.

Most models that consider more than one species link the species together through knowledge about their feeding (trophic) interactions. Once the trophic linkages among species are understood, questions about impacts of predators and prey on one another (Yodzis 1994), or how natural or human-induced habitat changes affect the food-web structure (Yodzis 1996), can be addressed with a variety of multi-species or ecosystem models. Another model type, called a technical interaction model, may consider the simultaneous capture of groups of species by a particular fishery or type of fishing gear.

With the exception of information on forage fish, which – unlike many marine species – are preyed on as adults and not just mainly as juveniles, most scientific advice from multi-species models is not presently being used in making short-term management decisions. These models are mainly useful for trying to understand the possible medium- (6 to 10 years) and longer-term implications of various management strategies on the ecosystem.

However, long-term predictions from single-species, multi-species, and ecosystem-level models remain uncertain, because the predictions rely heavily on assumptions about recruitment, particularly for predators (Gislason 1991, 1993), which may be strongly influenced by environmental variation. Limitations still exist regarding the ability to predict both future changes in climate and recruitment rates resulting from a particular climate state.

Therefore, as noted by Parkes (2000) and Hall (1999a), predator-prey models are not considered reliable enough to provide directly applicable management advice at the present time. Hall (1999b) notes that ecosystem-based management advice should move toward setting single-species biological reference points for non-target species, developing single-species reference points for localized regions (i.e., spatially explicit management), and using measures of system-level properties (e.g., species diversity, trophic level of the catch, biomass-size distributions) to derive ecosystem-level reference points.

Food web models of the BSAI, specifically, the Eastern Bering Sea shelf, ecosystem have been developed for the 1950s and 1980s (Trites *et al.* 1999). These models use the Ecopath strategy for evaluating mass-balance in marine ecosystems. Ecopath uses estimates of biomass, consumption, diet, and turnover rates of populations or groups of populations to evaluate energy flow and mass-balance in a particular ecosystem (Christensen 1990).

Ecopath creates static biomass flow models of ecosystems and represents a snapshot of the ecosystem for a given time period. Species in these models are linked, so that the biomass transfer resulting from processes such as fecundity, mortality, production, respiration, and predation are in equilibrium (balanced). These types of models provide a way to identify large-scale views of ecosystems and to highlight data gaps (Christensen 1990, 1992, 1994; Pauly and Christensen 1995).

An examination of energy flow within the ecosystem is instructive, although one must be careful in interpreting the inevitable differences among the flow estimates. For instance, although the magnitude of biomass flow from prey to tertiary consumers (e.g., juvenile pollock to seabird predators) is modest relative to that between primary producers and primary consumers (e.g., phytoplankton to crustaceans), it may nonetheless play a significant role in the dynamics of the food web (P. Yodzis, University of Guelph, Ontario, Canada, personal communication). Further, if a food web is composed of few, highly connected species in a trophic sense, removal of a predator may yield a larger ecosystem perturbation than a similar removal from an ecosystem with weaker trophic links among many predators and prey (e.g., Pimm 1982).

The Ecopath models for the Bering Sea were initially developed to see if impacts of intensive whale harvesting that occurred in the 1950s and 1960s were sufficient to explain the ecosystem structural changes that were observed in the 1980s, discussed in Section 3.10.1.3 of the PSEIS. The primary removal of energy in both decades was by harvesting whales and pelagic fishes in the 1950s, and pollock in the 1980s. The production estimate for the 1950s simulation showed baleen whales as the dominant ecosystem component. These whales were classed as a midlevel consumer with a trophic level slightly higher than pollock, due to their consumption of squid. The dominant component in the 1980s simulation was pollock, the dominant fishery. There was a slight drop in trophic level of the catch between the two periods, but this was acknowledged to be an artifact of the volume of squid assumed in the diet of the baleen whales. Without this assumption, there was little change in trophic level of harvest. Trophic level of the catch actually increased from the 1950s to the 1980s, if only fish harvests are considered. This would suggest that harvesting in the Bering Sea at present is at a level that has been sustained over long periods. A further result of this simulation was that whale harvests required an estimated 47 percent of net primary production in the Bering Sea in the 1950s. Fisheries of the 1980s, dominated by pollock, required only 6.1 percent of primary production.

Measures of ecosystem maturity show some differences between the two Bering Sea models. The ratio of primary production to respiration, net system production, and the ratio of biomass to throughput indicate a more mature ecosystem state in the 1950s compared with the 1980s. This is due to the assumption that benthic infauna biomass was lower in the 1980s. However, benthic infaunal surveys used to estimate biomass for the two models used different methods and may not be comparable.

Trophic pyramids are similar for the two time periods, and both indicate that biomass and energy flow were distributed fairly well throughout the system. The steep-sided shape of the pyramids indicates that there is a lot of energy flow at lower trophic levels. One system maturity index, the ratio of primary production to total biomass, actually indicates a more mature system in the 1980s relative to the 1950s. However, this was due to assumptions about the change in primary production between the two time periods, for which there is conflicting evidence. Conclusions about system maturity will be premature until trends in primary production and benthic infauna biomass are better understood.

The Bering Sea appears to be more mature than other modeled ecosystems, particularly with regard to total system throughput, which measures the sum of all energy flows in the system. It has ecosystem measures that indicate it has significant strength in reserve, which makes it more resilient or resistant to perturbations compared with other ecosystems.

Ecosim, a forward-looking simulation coupled to Ecopath, was used to project the results of various scenarios. The model was run in either an equilibrium or dynamic mode. The equilibrium mode assumed that the total biomass of the ecosystem remained stable, and as the biomass of one component declined, others were required to increase to balance it. Dynamic models do not have this requirement.

The equilibrium mode of Ecosim was used to examine the results of changes in a species' abundance on interacting groups. The results of the equilibrium model suggest that changes in baleen whale numbers could significantly affect pollock populations, and that increases in sperm whale numbers could yield decreases in the numbers of Steller sea lions through competition. Reducing pelagic fish numbers reduces the numbers of seabirds that feed on them, as well as numbers of Steller sea lions and large flatfish. Increasing fishing pressure on pollock would have little effect on their biomass, and increasing fishing pressure on large flatfish would result in increased Steller sea lion populations through the removal of a competitor.

In a different approach, the dynamic mode of Ecosim was used to look at possible mechanisms involved in the historical marine biomass changes seen between the 1950s and the 1980s. Scenarios used for the dynamic model were a regime shift that resulted in changes in primary production; a commercial fishery simulation to see if fishing whale could account for the observed changes; three pollock fishing scenarios that project into the future; and scenarios which varied the fishery mortalities on pollock and pelagic fishes.

These simulations suggested that commercial harvesting of fish and whales had little likelihood of producing the changes seen in actual pollock populations since the 1950s. The effect of increasing primary production provided a much more realistic change in the pollock population. While most groupings showed increases, Steller sea lions did not.

There are substantial uncertainties about the abundance of small pelagic fish in both time periods and the abundance of pollock in the 1950s model. Low abundance of pollock and higher abundance of small pelagic fish in the 1950s was assumed. However, although non-standardized surveys by the Soviets during the 1950s showed apparently lower pollock abundance, their research on diet composition of groundfish indicated that pollock was a primary prey item of many species. It is possible that pollock may have been more abundant in the 1950s than has been assumed. Further model testing with this change in assumptions should be done.

Another dynamic simulation showed that, contrary to what might be expected, stopping the commercial pollock harvest had a slight negative effect on Steller sea lions. This is because two of the Steller sea lion prey items, small pelagic fish and juvenile pollock, declined when adult pollock increased. Adult pollock are cannibalistic and compete with small pelagic fish for large zooplankton prey in this model. More recent versions of the model, which changed the assumptions regarding recruitment now show that juvenile pollock actually increase under this scenario, but that Steller sea lions still show a slight negative effect. This is presumably because of the assumption of the dominance of small pelagic fish as a prey item of Steller sea lions. Small pelagic fish still decline under the assumption of increasing pollock, because adult pollock compete with them for large zooplankton prey.

In conclusion, these model simulations indicate uncertainty about the biomass of lower trophic level species in the two time periods. It appears that climate-related shifts in lower trophic level production could partly explain the ecosystem changes that occurred between the 1950s and the 1980s. However, the model only captures predation-related recruitment variability and cannot show climate-related variability in recruitment, which is probably much larger. More detailed scenarios that examine the spatial availability of prey will have to be performed to improve our understanding of the complex interaction between fishery removals and predator-prey interactions.

# Chapter 5 Relationship to Applicable Law and Other Fisheries

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) is the primary domestic legislation governing management of the U.S. marine fisheries. The relationship of the Fishery Management Plan (FMP) for Groundfish of the Bering Sea and Aleutian Islands (BSAI) Management Area with the Magnuson-Stevens Act and other applicable Federal law is discussed in Section 5.1. The relationship of the FMP to international conventions is addressed in Section 5.2. The relationship of the FMP to other Federal fisheries is addressed in Section 5.3, and to State of Alaska fisheries in Section 5.4.

## 5.1 Relationship to the Magnuson-Stevens Act and Other Applicable Federal Law

The FMP is consistent with the Magnuson-Stevens Act (16 USC 1851), including the ten National Standards, and other applicable law.

## 5.2 Relationship to International Conventions

The U.S. is party to many international conventions. Those that directly or indirectly address conservation and management needs of groundfish in the Bering Sea and Aleutian Islands region include:

- Convention for the Preservation of the Halibut Fishery of the North Pacific Ocean and the Bering Sea (basic instrument for the International Pacific Halibut Commission – IPHC)
- Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea (Donut Hole convention)

The Pacific halibut fishery is managed by the International Pacific Halibut Commission. Yet because of the significant interaction between the BSAI groundfish fishery and the halibut fishery, many of the management measures contained herein are for the expressed purpose of mitigating possible adverse effects of the groundfish fisheries on the halibut resource.

International Pacific Halibut Commission

The IPHC was created to conserve, manage, and rebuild the halibut stocks in the Convention Area to those levels which would achieve and maintain the maximum sustainable yield from the fishery. The halibut resource and fishery have been managed by the IPHC since 1923. The IPHC was established by a Convention between the United States and Canada, which has been revised several times to extend the Commission's authority and meet new conditions in the fishery. "Convention waters" are defined as the waters off the west coasts of Canada and the United States, including the southern as well as the western coasts of Alaska, within the respective maritime areas in which either Party exercises exclusive fisheries jurisdiction. Under the Protocol to the Convention, the Commission retains a research staff and recommends, for the approval of the Parties, regulations regarding: 1) the setting of quotas in the Convention Area, and 2) joint regulation of the halibut fishery in the entire Convention Area under Commission regulations. Neither U.S. nor Canadian halibut fishing vessels are presently allowed to fish in the waters of the other country.

The fishery for Pacific halibut in the BSAI is conducted under an Individual Fishing Quota (IFQ) program, in conjunction with the FMP-managed sablefish resource. A realized benefit of the IFQ program is the reduction in halibut bycatch mortality. Much of the longline bycatch of halibut occurred in sablefish fisheries. To the extent that sablefish fishers have halibut IFQ, this halibut is now retained and counted against target quotas.

As long as Council and IPHC objectives concerning halibut utilization remain similar, coordination between the two organizations is easily affected. Should halibut management philosophies diverge – for example, because the broader-based Council constituency objects to constraints on fishery development caused by overriding halibut-saving measures – a major social, political, and, perhaps, diplomatic (because of Canadian involvement in IPHC and in the halibut fishery) confrontation could be precipitated. Furthermore, management actions taken in the Bering Sea that adversely affect halibut are likely to have a significant impact on the Gulf of Alaska halibut stock and fishery because of the interchange of halibut between the two regions.

Donut Hole Convention

The development, in the mid to late 1980s, of an extensive pollock fishery in the central Bering Sea (donut hole) area of the Aleutian Basin, beyond the U.S. and Russian 200-mile zones, was of great concern to U.S. and Russian fishing interests. The U.S. closed a domestic fishery as a result of the adverse impact this unregulated fishery, which was being prosecuted mostly by distant-water fishing nations, was having on U.S. pollock stocks. Concern also extended to bycatch problems associated with the fishery. The donut hole fishery was being conducted by trawl vessels from Japan, the Republic of Korea, Poland, the People's Republic of China, and the former Soviet Union. Catch data submitted by these countries indicated that annual harvests in the donut area rose to approximately 1.5 million mt in the years leading up to 1989. Largely due to drastic declines in catch and catch-per-unit-effort from 1990, leading to a total catch of under 300,000 mt in 1991 and under 11,000 mt in 1992, the governments involved agreed to a voluntary suspension of fishing in the area for 1993-94. During the 2 year suspension of fishing, an agreed scientific monitoring program was carried out that showed no evidence of the recovery of the resource.

On February 11, 1994, the Parties completed 3 years of negotiations and initialed the Convention on the Conservation and Management of Pollock Resources in the central Bering Sea. Its major principles include: no fishing permitted in the donut hole unless the biomass of the Aleutian Basin stock exceeds a threshold of 1.67 million mt (if the parties cannot agree on an estimate of the biomass, the estimate of the Alaska Fisheries Science Center and its Russian counterpart will be used); allocation procedures; 100 percent observer and satellite transmitter coverage; and prior notification of entry into the donut hole and of transshipment activities. The Convention entered into force in December 1995 (January 1996 for the Republic of Korea).

Despite a moratorium on commercial fishing in the central Bering Sea for the past 10 years, the pollock stocks have not rebuilt. The Aleutian Basin total biomass estimate continues to be low, and trial fishing results continue to show little or no pollock in the central Bering Sea.

## 5.3 Relationship to Other Federal Fisheries

The North Pacific Fishery Management Council (Council) has implemented four other FMPs in the Alaska exclusive economic zone (EEZ). These FMPs govern groundfish fishing in the Gulf of Alaska (GOA), king and tanner crab fishing in the BSAI, and scallop and salmon fishing in the Alaska EEZ. The relationship of the BSAI groundfish FMP with these other management plans is discussed below.

Gulf of Alaska Groundfish FMP

The BSAI and GOA groundfish fisheries are managed in close connetion with one another. While many of the same groundfish species occur in both the BSAI and GOA management areas, they are generally considered to be separate stocks. There is some overlap between participants in the BSAI and GOA groundfish fisheries. Many of the management measures and much of the stock assessment science are similar for the two areas. Management measures proposed for the BSAI groundfish fisheries are analyzed for potential impacts on GOA fisheries. Where necessary, mitigation measures are adopted to protect one area or the other (for example, sideboard measures in the AFA pollock cooperatives, Section 3.7.2).

BSAI King and Tanner Crab FMP

Domestic fishing for crab for the most part predates the domestic groundfish fishery, and since the inception of the BSAI Groundfish FMP the consideration of crab bycatch in the groundfish fisheries has been paramount. The crab species are considered prohibited in the BSAI groundfish fisheries, with any catch required to be returned immediately to the sea with a minimum of injury so as to discourage targeting on those species. Other management measures have also been instituted to minimize the bycatch of crab in the groundfish fisheries, including area closures, gear modifications, and catch limits. Some participants in the BSAI crab fishery also target groundfish. The crab FMP contains sideboard measures constraining AFA pollock fishery participants from increasing their participation in the crab fishery.

Scallop FMP

There is very little interaction between the scallop FMP and the BSAI groundfish FMP. Virtually none of the vessels in the scallop fishery target groundfish. The scallop FMP contains sideboard measures constraining AFA pollock fishery participants from participating in the scallop fishery.

Salmon FMP

Pacific salmon are also a prohibited species in the BSAI groundfish FMP. There is no fishing of salmon allowed in the EEZ, therefore there is no overlap of participants or grounds conflicts. The BSAI groundfish FMP includes management measures to reduce the bycatch of salmon in federal waters, including catch limits and area closures.

## 5.4 Relationship to State of Alaska Fisheries

The Constitution of the State of Alaska states the following in Article XIII:

Section 2 General Authority. The legislature shall provide for the utilization, development, and conservation of all natural resources belonging to the State, including land and waters, for the maximum benefit of the people.

Section 4 Sustained Yield. Fish, forest, wildlife, grasslands, and all other replenishable resources belonging to the State shall be utilized, developed, and maintained on the sustained yield principle, subject to preferences among beneficial uses.

Section 15 No Exclusive Right of Fishery, has been amended to provide the State the power "to limit entry into any fishery for purposes of resource conservation" and "to prevent economic distress among fishermen and those dependent upon them for a livelihood".

The relationship of the BSAI Groundfish FMP with State of Alaska fisheries is discussed below.

State groundfish fishery

A parallel groundfish fishery occurs where the State allows the federal species TAC (total allowable catch) to be harvested in State waters. Parallel fisheries occur for pollock, Pacific cod, and Atka mackerel species, for some or all gear types. In addition, the State also has state managed fisheries for Pacific cod and rockfish species. Opening state waters allows the effective harvesting of fishery resources because many fish stocks straddle State and Federal jurisdiction and in some cases a significant portion of the overall federal TAC is harvested within State waters. Although the State cannot require vessels fishing inside state waters during the Federal fishery to hold a Federal permit, it can adopt regulations similar to those in place for the Federal fishery if those regulations are approved by the Board of Fisheries and meet State statute. An example of Federal fishery regulations that were concurrently adopted by the Board of Fisheries are the Steller sea lion protection measures implemented in 2001.

State shellfish fishery

King and tanner crab species are considered prohibited species in the BSAI groundfish fisheries, with any catch required to be returned immediately to the sea with a minimum of injury so as to discourage targeting on those species. Other management measures have also been instituted to minimize the bycatch of crab in the groundfish fisheries, including area closures, gear modifications, and catch limits.

State salmon fishery

Pacific salmonids are prohibited species in the BSAI groundfish FMP, and must be immediately returned to the sea with a minimum of injury. Some controversy exists regarding the degree to which salmon bycatch in the groundfish fisheries affects State salmon runs, particularly in times of declining returns. The Council has established and reduced salmon bycatch limits in the BSAI groundfish trawl fisheries in response to increased salmon bycatch concerns.

State herring fishery

Pacific herring are considered a prohibited species in the groundfish fishery, and must be immediately returned to the sea with a minimum of injury. Historically, bycatch of herring was high in the Bering Sea pollock fishery. But, in the early 1990s the Council adopted a catch limit of 1 percent of the herring biomass. Once reached, the cap triggers closure of a predetermined "herring savings area" for the remainder of the season. This measure has succeeded in limiting herring bycatch in the pollock fishery. Herring bycatch in other target groundfish fisheries is very low.

State water subsistence fishery

Subsistence fisheries in Alaska are managed by the State, and take place primarily in state waters. Groundfish fishery participants and fishing communities engage in subsistence activities, however groundfish are a minor target of subsistence fishing (see Section 4.3.3 for a description of the subsistence groundfish fishery). Where appropriate, subsistence groundfish harvests are accounted for in annual groundfish stock assessment.

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# Chapter 6 References

This chapter contains references for the Fishery Management Plan (FMP) for the Groundfish of the Bering Sea and Aleutian Islands management area (BSAI). Section 6.1 describes the sources of available data regarding the BSAI groundfish fisheries, including annually updated reference material. Section 6.2 provides management and enforcement considerations for the BSAI groundfish fisheries. A list of the literature cited in the FMP is included in Section 6.3.

## 6.1 Sources of Available Data

Although every effort is made to keep the FMP updated with recent descriptions of the stocks and fisheries, the availability of new data far exceeds the ability of the Council and National Marine Fisheries Service (NMFS) to amend the FMP. As a result, in some cases, it may be more expeditious to access the regularly updated reference material directly in order to gain a current picture of the status of the groundfish fisheries. The North Pacific Fishery Management Council (Council) (Section 6.1.1), the NMFS Alaska Fisheries Science Center (AFSC) (Section 6.1.2), and NMFS Alaska Region office (Section 6.1.3), each produce an abundance of reference material that is useful for understanding the groundfish fisheries. The sections below provide an overview of the types of reports and data available through the various organizations and their websites.

### 6.1.1 North Pacific Fishery Management Council

#### 6.1.1.1 Stock Assessment and Fishery Evaluation Report

The *Stock Assessment and Fishery Evaluation* (SAFE) report is compiled annually by the BSAI Groundfish Plan team, which is appointed by the Council. The sections are authored by AFSC and State of Alaska scientists. As part of the SAFE report, a volume assessing the *Economic Status of the Groundfish Fisheries off Alaska* is also prepared annually, as well as a volume on *Ecosystem Considerations*.

The SAFE report provides information on the historical catch trend, estimates of the maximum sustainable yield of the groundfish complex as well as its component species groups, assessments on the stock condition of individual species groups; assessments of the impacts on the ecosystem of harvesting the groundfish complex at the current levels given the assessed condition of stocks, including consideration of rebuilding depressed stocks; and alternative harvest strategies and related effects on the component species groups.

The SAFE report annually updates the biological information base necessary for multispecies management. It also provides readers and reviewers with knowledge of the factual basis for total allowable catch (TAC) decisions, and illustrates the manner in which new data and analyses are used to obtain individual species groups' estimates of acceptable biological catch and maximum sustainable yield.

Copies of the most recent SAFE report are available online (see below), and by request from the North Pacific Fishery Management Council, 605 W. 4th Avenue, Suite 306, Anchorage, Alaska, 99501.

#### 6.1.1.2 Website

Much of the information produced by the Council can be accessed through its website, to be found at:

http://www.fakr.noaa.gov/npfmc

The information available through the website includes the following.

- FMPs: summaries of the FMPs as well as the FMPs themselves are available on the website.
- Meeting agendas and reports: annual quota specifications, amendments to the FMPs or implementing regulations, and other current issues are all discussed at the five annual meetings of the Council. Meeting agendas, including briefing materials where possible, and newsletter summaries of the meeting are available on the website, as well as minutes from the meetings.
- Current issues: the website includes pages for issues that are under consideration by the Council, including amendment analyses where appropriate.

### 6.1.2 NMFS Alaska Fisheries Science Center

Much of the information produced by the AFSC can be accessed through its website, to be found at:

http://www.afsc.noaa.gov/

The information available through the website includes the following.

- Species summaries: a summary of each groundfish species is available online, including AFSC research efforts addressing that species where applicable.
- Issue summaries: a summary of major fishery issues is also available, such as bycatch or fishery gear effects on habitat.
- Research efforts: a summary of the research efforts for each of the major AFSC divisions is provided on the website.
- Observer Program: the homepage describes the history of the program and the sampling manuals that describe, among other things, the list of species identified by observers.
- Survey reports: the groundfish stock assessments are based in part on the independent research surveys that are conducted annually, biennially, and triennially in the management areas. Reports of the surveys are made available as NMFS-AFSC National Oceanic and Atmospheric Administration (NOAA) Technical Memoranda, and are available on the website; the data maps and data sets are also accessible.
- Publications: the AFSC Publications Database contains more than 4,000 citations for publications authored by AFSC scientists. Search results provide complete citation details and links to available on-line publications.
- Image library: the website contains an exhaustive library of fish species.

### 6.1.3 NMFS Alaska Region

#### 6.1.3.1 Programmatic SEIS for the Alaska Groundfish Fisheries

Published in 2004, the *Final Programmatic Supplemental Environmental Impact Statement for the Alaska Groundfish Fisheries* (NMFS 2004) is a programmatic evaluation of the BSAI and GOA groundfish fisheries. The document includes several alternative management policies for the fisheries, and provides the supporting analysis for Amendment 81 to the BSAI FMP, which changed the FMP management policy.

The document contains a detailed evaluation of the impact of the FMP on groundfish resources, other fish and marine invertebrates, habitat, seabirds, marine mammals, economic and socioeconomic considerations, and the ecosystem as a whole. The impacts are evaluated in comparison to a baseline condition (for most resources this is the condition in 2002) that is comprehensively summarized and includes the consideration of lingering past effects. Additionally, sections of the document describe the fishery management process in place for the Alaska federal fisheries, and the changes in management since the implementation of the FMP in 1982.

#### 6.1.3.2 Website

Much of the information produced by NMFS Alaska region can be accessed through its website, to be found at:

http://www.fakr.noaa.gov/

The information available through the website includes the following.

- Regulations: the FMP's implementing regulations can be found on the Alaska region website, as well as links to the Magnuson-Stevens Act, the American Fisheries Act, the International Pacific Halibut Commission, and other laws or treaties governing Alaska's fisheries
- Catch statistics: inseason and end of year catch statistics for the groundfish fisheries can be found dating back to 1993, or earlier for some fisheries; annual harvest specifications and season opening and closing dates; and reports on share-based fishery programs (such as the individual fishing quota program for fixed-gear sablefish)
- Status of analytical projects: the website includes pages for the many analytical projects that are ongoing in the region
- Habitat protection: maps of essential fish habitat, including a queriable database; status of marine protected areas and habitat protections in Alaska
- Permit information: applications for and information on permits for Alaska fisheries; data on permit holders
- Enforcement: reports, requirements, and guidelines
- News releases: recent information of importance to fishers, fishery managers, and the interested public.

The NMFS Alaska region website also links to the national NMFS website, which covers national issues. For example, NMFS-wide policies on bycatch or improving stock assessments, may be found on the national website. Also, NMFS produces an annual report to Congress on the status of U.S. fisheries, which can be accessed from this website.

## 6.2 Management and Enforcement Considerations

This section provides information about management and enforcement of the groundfish fisheries off Alaska. Management and enforcement responsibilities include the following:

- Data collection, research, and analysis to prepare annual stock assessments;
- The annual groundfish specifications process through which TAC limits and prohibited species catch (PSC) limits are established;
- The ongoing process of amending the FMPs and regulations to implement fishery management measures recommended by the Council or NMFS;
- Monitoring of commercial fishing activities to estimate the total catch of each species and to ensure compliance with fishery laws and regulations;
- Actions to close commercial fisheries once catch limits have been reached; and
- Actions taken by NMFS Enforcement, the U.S. Coast Guard (USCG), and NOAA General Counsel to identify, educate, and, in some cases, penalize people who violate the laws and regulations governing the groundfish fisheries.

Management of the groundfish fisheries in the BSAI and enforcement of management measures governing those fisheries comprise a complex system for overseeing fisheries that range geographically over an extensive area of the North Pacific Ocean and Bering Sea.

NMFS manages the fisheries off Alaska based on TAC amounts for target species and PSC amounts for species that may not be retained. The TAC and PSC amounts are further subdivided by gear type, area, and season. As the complexity of the management regime has grown, the number of TAC and PSC subdivisions has grown as well. For example, in 1995 for the BSAI there were 40 TAC allocations, 38 PSC allocations and two community development quota (CDQ) allocations. In 2003 for the BSAI, there were 152 TAC allocations, 78 PSC allocations, and 34 CDQ allocations. Each allocation represents a possible need for NMFS to take management actions, such as closing fisheries, reallocating incidental catch amounts, or investigating overages. When a directed fishery in one area is closed, the boats that participated in the fishery often move to another area or change to another target. This, in turn, often leads to the need for additional management actions.

Though the number of allocations has increased, the overall amount of fish harvested has not, and NMFS is required to manage increasingly small blocks of fish. To do this adequately requires the use of increasingly sophisticated catch-monitoring tools, such as observer coverage, electronic reporting, vessel monitoring systems, and the use of at-sea scales. Though these tools increase the quantity, quality, and timeliness of the data available to NMFS management, they also increase the demands on staff to effectively make use of a larger and more complex data system.

Current fishery management recognizes that a meaningful enforcement program must accompany management measures for them to be effective. As management becomes more complex, the difficulty of adequately enforcing the regulations grows. As the size and complexity of the regulatory environment increases, the burden on enforcement personnel to fully understand the nuances and implications of regulations increases as well. NMFS/Alaska Region enforcement maintains approximately 36 agents and officers stationed in nine Alaskan ports for monitoring groundfish landings: Juneau, Anchorage, Dutch Harbor, Homer, Ketchikan, Kodiak, Petersburg, Seward, and Sitka. In addition, enforcement personnel regularly travel to other Alaskan ports to monitor landings and conduct investigations. Enforcement personnel associated with NMFS Northwest Region assist in the monitoring of Alaska Region groundfish harvest, primarily individual fishing quota sablefish, landed at ports in the Northwest Region. Also, USCG personnel conduct enforcement activities, monitor vessel activity, conduct at-sea boardings and aircraft overflights, and assist NMFS enforcement personnel in monitoring dockside landings.

A key component of management and enforcement is education and outreach. Complex management programs are accompanied by a regulatory structure that can be difficult for the fishing industry to understand and comply with. This is exacerbated when regulations change rapidly. When fishermen believe that regulations are unduly burdensome or unnecessary, they are less likely to comply voluntarily. Thus, successful implementation of the regulations is dependent on outreach programs that explain the goal of regulations and why they are necessary. NMFS Management, NMFS Enforcement, and the USCG all conduct extensive outreach and education programs that seek not only to explain the regulations, but to help the fishing industry understand the rationale for those regulations.

### 6.2.1 Expected costs of groundfish management

Estimates of the costs of BSAI and GOA groundfish management are summarized in Table 6-1 below. For reasons discussed in the table, it has not been possible to make accurate estimates of exact expenditures on groundfish management, nor, in some cases, to distinguish between the two groundfish fisheries. An examination of the Table 6-1 suggests that the BSAI and GOA groundfish fisheries appear to cost the U.S. in excess of $60 million, annually, in management and related research efforts. A larger share of this appears to be spent in the BSAI than the GOA.

A comparison of the costs reported in this section with estimates of revenues generated by the groundfish fisheries does not constitute a cost-benefit analysis of this management effort. There are a number of reasons for this:

- The gross revenues from fishing are not a measure of the value of the commercial groundfish fisheries. On one hand, they ignore the private costs (the opportunity costs of labor and capital) used to catch and process the fish resources. On the other hand, they ignore the appropriate measure of benefits to consumers - the “consumers’ surplus” or the value that consumers would be willing to pay for consuming the fish, over and above what they actually have to pay.
- Management costs are only imperfectly identified. Many costs are incurred for multiple purposes, and it is difficult to determine what costs were incurred for which function. Research into ecosystem dynamics may support groundfish management, as well as many other goals. Agency staff often had difficulty determining what portion of an agency budget was spent on groundfish management; staff were often unable to make the even more detailed cost assignment to GOA or BSAI management. This is a problem inherent in the nature of the joint or fixed costs that are often involved. There often simply is no logical way to make these allocations. Even when cost estimates are provided, they are generally very rough approximations.
- The comparison would imply that the management activity was related to the revenues in a specific way. However, specific causal relationships have not been analyzed here. Moreover, even if a causal relationship were implied, it would only be an evaluation of whether or not management at the given level had higher benefits than costs. It would not involve an evaluation of alternative approaches or levels of management. It would thus be of very limited use for policy decisions.

- The BSAI and GOA groundfish fisheries produce a range of social and ecological services beyond the commercial production and consumption of groundfish products. Groundfish support sport and subsistence fisheries and are an integral part of the North Pacific ecosystem. For example, groundfish provide forage for other fish species, seabirds, and marine mammals. The commercial values above only represent one "use" of the groundfish resources.

Table 6-1 presents the estimated cost of groundfish fishery management in a "typical" year in the period 2002-2006. Often the cost estimates are based on operations in the 2003 Federal year, the most recently completed fiscal year at the time the estimates were completed (May 2004). In some instances they incorporate projections; for example, the estimates for the NMFS Alaska Region's Restricted Access Management Program are estimates of anticipated costs following implementation of the new Crab Rationalization Program. Almost all of the agencies listed here have multiple functions. Often an activity - such as a USCG patrol - will carry out a wide range of tasks in addition to supporting groundfish management. It has therefore often been impossible for agency staff to separate groundfish management costs from overall expenditures, or to separate out GOA and BSAI groundfish management expenditures from groundfish expenditures. Where agency staff did not feel they had a basis on which to make an estimate, no estimate has been provided. In general, estimates are provided to the hundred thousand dollar level. This convention may reasonably approximate costs in some instances where budgets are relatively small and well defined criteria exist for making estimates. In other instances, the reader should be aware that they may provide an undue sense of precision. In general, these estimates are very rough.

The general procedure has been to get budget information from the various departments and to allocate that to groundfish, GOA groundfish, and BSAI groundfish drawing on agency expertise. There are a number of problems inherent with this process. Many activities produce multiple outcomes and it is difficult or impossible to assign their costs to one of those outcomes. Often there is no clear bright line between fishery management activities and other activities. In many cases, the appropriate criteria for allocating costs to one activity or another were not well defined. Much of this analysis depends on the judgement of agency analysts, and the use of different analysts for each agency means that differing judgements might have been used by different agencies. For all of these reasons, the reader should be aware that these estimates can only be treated as rough approximations.

**Table 6-1 Estimated cost of fishery management by government agencies.** Estimates are expressed in millions of dollars. Note: These estimates are rough approximations.

| Agency | Function | Overall Alaska region expenditures | Groundfish fisheries | GOA | BSAI |
|---|---|---|---|---|---|
| **North Pacific Fishery Management Council** | The Council is one of eight regional councils established by the Magnuson Fishery Conservation and Management Act in 1976 (which has been renamed the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act)) to oversee management of the nation's fisheries. With jurisdiction over the 900,000 square mile Exclusive Economic Zone (EEZ) off Alaska, the Council has primary responsibility for groundfish management in the GOA and BSAI, including cod, pollock, flatfish, mackerel, sablefish, and rockfish species harvested mainly by trawlers, hook and line longliners and pot fishermen. The Council also makes allocative and limited entry decisions for halibut, though the U.S. - Canada International Pacific Halibut Commission is responsible for conservation of halibut. Other large Alaska fisheries such as salmon, crab and herring are managed primarily by the State of Alaska. The Council budget is about $3 million, annually. Staff reports that groundfish takes about 80% of their effort, with a 1 to 2 ratio of GOA to BSAI concerns. | $3.0 | $2.4 | $0.8 | $1.6 |

| Agency | | Function | Overall Alaska region expenditures | Groundfish fisheries | GOA | BSAI |
|---|---|---|---|---|---|---|
| **National Marine Fisheries Service (Alaska Region)** | | | Estimates below by division | | | |
| | Sustainable Fisheries Division (SFD) | The SFD implements the intent of the Council and NMFS approved management programs consistent with the Magnuson-Stevens Act and other applicable law. SFD coordinates with the State of Alaska on the development of management programs, including halibut subsistence, and the International Pacific Halibut Commission on the development of regulations governing the Pacific halibut fishery off Alaska. SFD collects and manages catch data from North Pacific groundfish fisheries, develops and maintains information systems for integrating catch and observer data for estimating species specific total catch and uses those data to manage fisheries in an orderly and safe manner while maintaining harvest amounts within specified total allowable catch and prohibited species catch limits. SFD staff provides current and historic fishery statistics to other government agencies and the public, maintaining the confidentiality of protected statistics; and providing guidance to the Council and other management agencies on implementation and monitoring considerations of proposed management measures. The SFD administers and manages the Western Alaska Community Development Program so that allocations of groundfish, crab, and halibut quotas to the CDQ groups are accomplished consistent with applicable law and are harvested within established administrative and fishery management regulations to provide the maximum economic benefits to western Alaska communities. | $3.6 | $2.9 | $0.9 | $2.0 |
| | Protected Resources Division (PRD) | The PRD is responsible under the Endangered Species Act (ESA) for consultations on Federal actions that may affect listed marine mammal species for which NMFS has trust responsibility. NMFS is also responsible for recovering listed protected species to the point that they are no longer in danger of extinction and may be removed from listing under the ESA. | $2.2 | $0.8 | No estimate provided | |
| | Habitat Conservation Division (HCD) | The HCD carries out NMFS' statutory responsibilities for habitat conservation in Alaska under the Magnuson-Stevens Act, Fish and Wildlife Coordination Act, National Environmental Policy Act (NEPA), Federal Power Act, and other laws. HCD has two principal programs: identification and conservation of Essential Fish Habitat (EFH) through fishery management, and environmental review of non-fishing activities that may adversely affect EFH or other habitats for living marine resources. HCD also supports habitat restoration projects in conjunction with the NMFS Restoration Center. HCD has staff located in the Alaska Regional Office in Juneau and a field office in Anchorage. | $1.6 | $0.4 | $0.2 | $0.2 |
| | Restricted Access Management (RAM) | RAM implements the Alaska Region's licensing and permitting programs. Specific duties within that broad mandate include calculation and issuance of IFQ permits in the halibut and sablefish IFQ program, together with annual issuance of related permits and licenses, cost recovery activities mandated by the Magnuson-Stevens Act, and determinations on applications for transfers, hired skippers, and other program elements. Additionally, RAM oversees implementation of several other licensing programs, including the North Pacific groundfish and crab License Limitation program, the Federal Fisheries and Processing Permit program, and vessel, processor, and cooperative permitting under the American Fisheries Act (AFA). During Federal Year 2003, RAM assumed responsibilities for implementation of the subsistence halibut program. | $1.9 | $0.4 | $0.3 | $0.1 |

| Agency | Function | Overall Alaska region expenditures | Groundfish fisheries | GOA | BSAI |
|---|---|---|---|---|---|
| Other NMFS Alaska Region organizational units: Regional Directorate, Operations, Management & Information | Fulfills a variety of Regional leadership & coordination roles. Includes: workload competence, quality, and management. Information technology support, grants administration, administrative appeals. Finance & logistical support. NEPA coordination & compliance, preparation of NEPA, E.O. 12866, and Reg Flex analyses for other divisions. | $6.2 | $3.5 | $1.0 | $2.5 |
| Grants administered by the Alaska Region | The Alaska Region dispenses millions of dollars in grants for fishery management administration and research. Grants to the State of Alaska to assist with groundfish related activity are discussed below, under the line for the State of Alaska. In general, there are few other funds distributed for groundfish related projects. Considerable funding is used for marine mammal related projects, and in recent years large sums have been dispensed for Steller sea lion (SSL) research. In Federal Year 2003, total marine mammal related grants were about $13 million, of which about $11 million were for SSL research. While much of this marine mammal work will have implications for groundfish management, it serves many other purposes as well, and cannot be considered primarily a groundfish management cost item. It is therefore not listed in the summary columns. | Grants to the state are described below. No additional significant grants specifically for groundfish. | | | |
| **Alaska Fisheries Science Center** | | Estimates below by division | | | |
| Resource Assessment and Conservation Engineering Division (RACE) | RACE conducts fishery surveys to measure the distribution and abundance of approximately 40 commercially important fish and crab stocks in the eastern Bering Sea, GOA, and marine waters off California, Oregon, and Washington. Data derived from these surveys are analyzed by Center scientists and supplied to fishery management agencies and to the commercial fishing industry. | $17.7 | $13.6 | $5.8 | $7.8 |
| Resource Ecology and Fisheries Management (REFM) | The REFM Division conducts research and data collection to support management of Northeast Pacific and eastern Bering Sea fish and crab resources. Groundfish and crab stock assessments are developed annually and used by the Pacific and North Pacific Fishery Management Councils to set catch quotas (based on assessments). Division scientists also evaluate how fish stocks and user groups might be affected by fishery management actions. | $11.2 | $10.7 | $3.2 | $7.5 |
| Auke Bay Lab (ABL) | ABL has housed federal fisheries research in Alaska since 1960. The laboratory is located 12 miles north of Juneau and consists of six research programs. | $12.0 | $3.9 | $2.9 | $1.0 |
| **NOAA Office of General Counsel - Alaska Region** | The NOAA General Counsel serves as the chief legal officer for NOAA of the U.S. Department of Commerce. The position of the NOAA General Counsel was established in section 2(e)(1) of Reorganization Plan No. 4 of 1970 that created NOAA. The General Counsel is appointed by the Secretary of Commerce, with the approval of the President. The Office of the General Counsel provides legal service and guidance for all matters that may arise in the conduct of NOAA's missions. The Office of the Alaska Regional Counsel (GCAK)s co-located with the Alaska Region of NMFS in Juneau, Alaska. GCAK provides legal advice and assistance on issues related to the administration of NOAA programs in Alaska. | $2.0 | No estimates provided | | |

| Agency | Function | Overall Alaska region expenditures | Groundfish fisheries | GOA | BSAI |
|---|---|---|---|---|---|
| **NOAA Office of Law Enforcement - Alaska Region** | NMFS Office for Law Enforcement is dedicated to the enforcement of laws that protect and conserve our nation's living marine resources and their natural habitat. NMFS special agents and enforcement officers have specified authority to enforce over 100 legislative acts under 32 statutes, as well as numerous treaties related to the conservation and protection of marine resources and other matters of concern to NOAA. These are projected Federal Year 2004 costs. They do not include costs of sablefish IFQ enforcement. IFQ halibut and IFQ sablefish enforcement were so interlinked, staff was unable to break out the costs. Total IFQ enforcement expenditures were projected to be $1.73 million. | $5.0 | $2.4 | $1.8 | $0.6 |
| **United States Coast Guard - 17th District (USCG)** | The USCG supports the groundfish fisheries by providing at-sea enforcement of all domestic fishery regulations. The numbers provided cannot capture the accurate cost of domestic fishery enforcement. Because all USCG ships and aircraft are multi-mission platforms, counting all fishery resources hours expended will overestimate the cost. The USCG does not conduct patrols that strictly examine fishery regulations nor does any boarding conducted by the USCG look only for compliance with fishery regulations. All federal laws and regulations are enforced on every boarding. Because of that, the true cost of at-sea enforcement is something less than the number provided but a more accurate number is intangible. Many of the resource hours used to build these numbers would have been conducted in the absence of FMP requirements for enforcement. Such patrols would enforce safety regulations and/or drug laws, and interdict alien migration. Currently all of these are being enforced concurrently with fishery regulations. The numbers provided include resources from the USCG budget in Alaska and the Pacific Area headquarters budget. This is necessary because some USCG ships patrolling in Alaska come from the lower 48 or Hawaii, and are not funded from the Alaskan USCG budget. The numbers are therefore not conducive to comparing amount spent on enforcement in Alaska to overall the USCG budget in Alaska. | | < $40.2 | < $13.9 | < $26.3 |
| **Alaska Department of Fish and Game (ADF&G)** | The groundfish fisheries in the EEZ are a source of jobs and income for many residents of Alaska; groundfish stocks and fishing operations move across the line dividing state from federal jurisdiction; a large proportion of groundfish harvests from the EEZ are delivered to state ports and are recorded on state fish landings records. For all these reasons, the State of Alaska has a significant role in the management of groundfish stocks and fisheries in the EEZ. The state spends money to support the Council process. State managers are particularly important in the management of the demersal shelf rockfish fishery in the eastern GOA. The state spends money on port sampling of groundfish landings, collecting landings records, and data processing and analysis of landings records. The Alaska Board of Fisheries interacts with the Council and considers management proposals to better coordinate federal and state regulations. State ADF&G offices provide local sources of information on EEZ management rules for the public. A significant part of the state's contribution is supported with federal funding. The figure for groundfish represents the value of federal grants awarded to the state. This understates ADF&G expenditures. | | >$2.5 | No estimates provided | |
| **Other agencies of the State of Alaska** | The Alaska Commercial Fisheries Entry Commission processes landings records and Commercial Operators' Annual Reports reports and is an important source for price information for shoreside landings; the Alaska Department of Commerce monitors CDQ group activity and is involved in the process of allocating CDQ among the groups; the Alaska Division of Measurement Standards checks scales for shoreside plants. | No estimate provided | | | |

| Agency | Function | Overall Alaska region expenditures | Groundfish fisheries | GOA | BSAI |
|---|---|---|---|---|---|
| **Fish and Wildlife Service (USFWS)** | A representative of the USFWS serves on the Council and on the Ecosystem and Steller Sea Lion Mitigation committees. The USFWS is also represented on the Groundfish Planning Team. USFWS seabird and marine mammal expertise help provide a broader ecological perspective on fisheries management. In addition to long-term seabird and marine mammal population monitoring programs in the GOA and BSAI, USFWS staff are actively engaged with industry and NMFS to develop strategies and technologies to reduce the incidental take of seabirds in groundfish fisheries. | No estimate provided | | | |
| **Alaska Fisheries Information Network (AKFIN)** | AKFIN is a cooperative data program of the Pacific States Marine Fishery Commission, ADF&G, Commercial Fisheries Entry Commission, North Pacific Fisheries Management Council, and NMFS. AKFIN transfers, analyzes, and processes agency fishery data for reporting. AKFIN integrates and aggregates all state and federal harvest and value to produce data sets for FMP analyses and reports such as *Fisheries of the US.* | $0.8 | $0.7 | $0.4 | $0.3 |
| **North Pacific Research Board (NPRB)** | The NPRB's mission is to develop a comprehensive science program of the highest caliber to enhance understanding of the North Pacific, Bering Sea, and Arctic Ocean ecosystems and fisheries. It conducts its work through science planning, prioritization of pressing fishery management and ecosystem information needs, coordination and cooperation among research programs, competitive selection of research projects, increased information availability, and public involvement. The NPRB will seek to avoid duplicating other research. The NPRB expects to support $5 to $6 million in new research each year. Its annual administrative budget is about $0.85 million budget. The groundfish estimate includes NPRB 2003 expenditures for groundfish projects already funded, matching funds provided by grantees, and a third of the agency's annual budget. Costs associated with the NPRB may also be reflected in budgets for other agencies. For example, the ABL has used funds from the NPRB for Aleutian Islands coral investigations. The NPRB reports the $0.8 was expended on this project in 2003, and that there were $0.3 in matching funds. | | $5.5 | Not estimated | |
| **Costs incurred by the private sector** | The private sector incurs costs that could fairly be described as management costs. These include the costs of the paperwork associated with the management system, the private costs associated with the observer program, the costs of operating various cooperative or CDQ catch management programs, and the costs of participating in the Council and regulatory processes[1]. | for paperwork:<br>for observers: | $3.7<br>>$10.8 | <br>> $1.1 | <br>> $9.7 |

[1] The line between the costs of management and the costs associated with advocacy in the Council process, or with the normal management of an independent business, can be hard to draw. Some of the more important components of this cost item include:

- Costs incurred by private citizens, fisheries organizations, environmental organizations, and other private parties for participation in the Council process.
- Costs of meeting observer requirements (about $10.8 million per year - using 2002 observer days and a cost of $365/day). These provide a low estimate of the total cost of the observer program to fishing operations because fishing operations incur economic and operational impacts that are not directly reflected in the money they must spend on observer coverage. Fishing vessel operators may have to alter their travel plans and schedules to pick up or drop off observers; the observers take up limited space on vessels. Provisions must be made to accommodate the necessary work of the observer on deck (e.g., observing gear setting and retrieval, recording and sampling of catch and bycatch). The observer also occupies "living space" aboard, which otherwise could have housed additional crew members. These operational impacts may be reflected in both increased operating expenses and reduced harvests and revenues. It is not possible, with available information, to quantify these effects, but they may represent a substantial additional cost of operation.
- CDQ groups have significant responsibilities for managing target and non-target quotas. This quota management function may involve personnel and data processing contracts. AFA cooperatives similarly are involved in quota management.
- CDQ groups and AFA cooperatives, and other fishermen, contract with private firms to provide fishing companies with rapidly updated information about the location of PSC bycatch hotspots. Fishing companies are then able to

alter their fishing behavior so as to avoid areas with high PSC bycatch. By reducing PSC bycatch, companies are able to extend fishing seasons and avoid other constraints on fishing activity.

- NMFS collects fees from fishermen to offset the costs of managing sablefish IFQ programs. In 2003, NMFS collected an estimated $1.0 million in sablefish cost recovery fees. These costs are already reflected in NMFS spending described above, and should not be counted a second time. However, they do represent a management cost incurred by industry, and are reported here to capture this distributive effect.

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