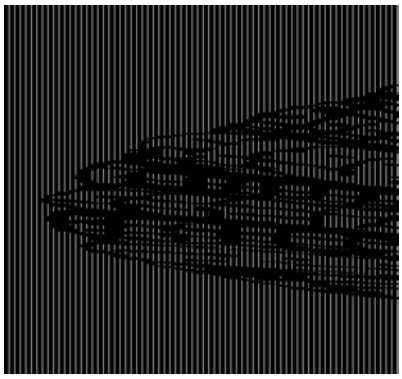
Fishery Management Plan for the Scallop Fishery off Alaska



North Pacific Fishery Management Council
605 W. 4th Avenue, Suite 306
Anchorage, Alaska 99501

PHONE: (907) 271-2809
FAX: (907) 271-2817

June 2005

Table of Contents

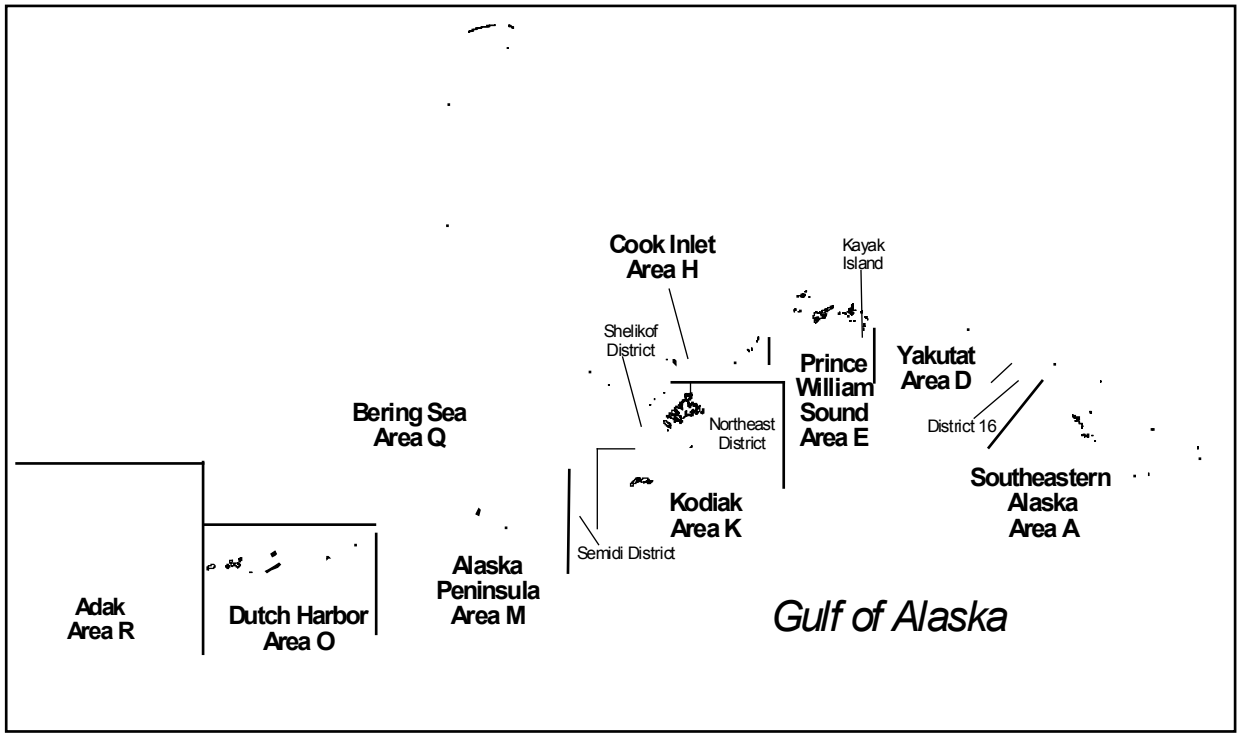
List of Figures

List of Tables

Executive Summary

This Fishery Management Plan (FMP) governs scallop fisheries in federal waters off the State of Alaska. The FMP management unit is the U.S. exclusive economic zone (EEZ) of the Bering Sea, Aleutian Islands, and the Gulf of Alaska, and includes weathervane scallops and other scallop species not currently exploited. The GOA is defined as the U.S. EEZ of the North Pacific Ocean, exclusive of the Bering Sea, between the eastern Aleutian Islands at 170° W longitude and Dixon Entrance at 132° 40'W longitude. The BSAI is defined as the U.S. EEZ south of the Bering Strait to the Alaska Peninsula and Aleutian Islands and extending south of the Aleutian Islands west of 170° W long.

Alaska weathervane scallop fishing registration areas



This FMP was approved on July 26, 1995, which established a 1 year interim closure of federal waters to scallop fishing to prevent uncontrolled fishing. This FMP has since been amended several times, initially in order to establish a State-Federal management regime, then to address several Federal requirements under the Magnuson Stevens Act as well as to address issues such as overcapacity in the fishery. The scallop fishery is jointly managed by the National Marine Fisheries Service (NMFS) and the Alaska Department of Fish and Game (ADF&G) under this FMP.

Management measures in this FMP fall into two categories: Category 1 measures are those delegated to the State for implementation, while Category 2 measures are limited access management measures which are fixed in the FMP, implemented by Federal regulation, and require and FMP amendment to change. Category 1 and 2 measures are listed below.

CATEGORY 1 (Delegated to the State)	CATEGORY 2 (Fixed in FMP, Implemented by Federal Regulation)
Guideline Harvest Levels	License limitation program
Registration Areas, Districts, Subdistricts and Sections	Optimum Yield specification
Gear Limitations	Overfishing specification
Crew and Efficiency Limits	EFH/HAPC designation
Fishing Seasons	
Observer Requirements	
Prohibited Species and Bycatch Limits	
Recordkeeping and Reporting Requirements	
In-season Adjustments	
Closed Areas	
Other	

This version of the FMP has been revised to remove or update obsolete references to management measures, outdated catch information and other scientific information. The FMP has also been reorganized to provide readers with a clear understanding of the Scallop fishery and conservation and management measures promulgated by this FMP.

Chapter 1 Introduction

The scallop fishery in Alaska's Exclusive Economic Zone (EEZ; 3-200 miles offshore) is jointly managed by the state and federal government under the FMP. Most aspects of scallop fishery management are delegated to the State of Alaska, while limited access and other federal requirements are under jurisdiction of the federal government. The FMP was developed by the North Pacific Fishery Management Council under the Magnuson Stevens Act and approved by NMFS on July 26, 1995.

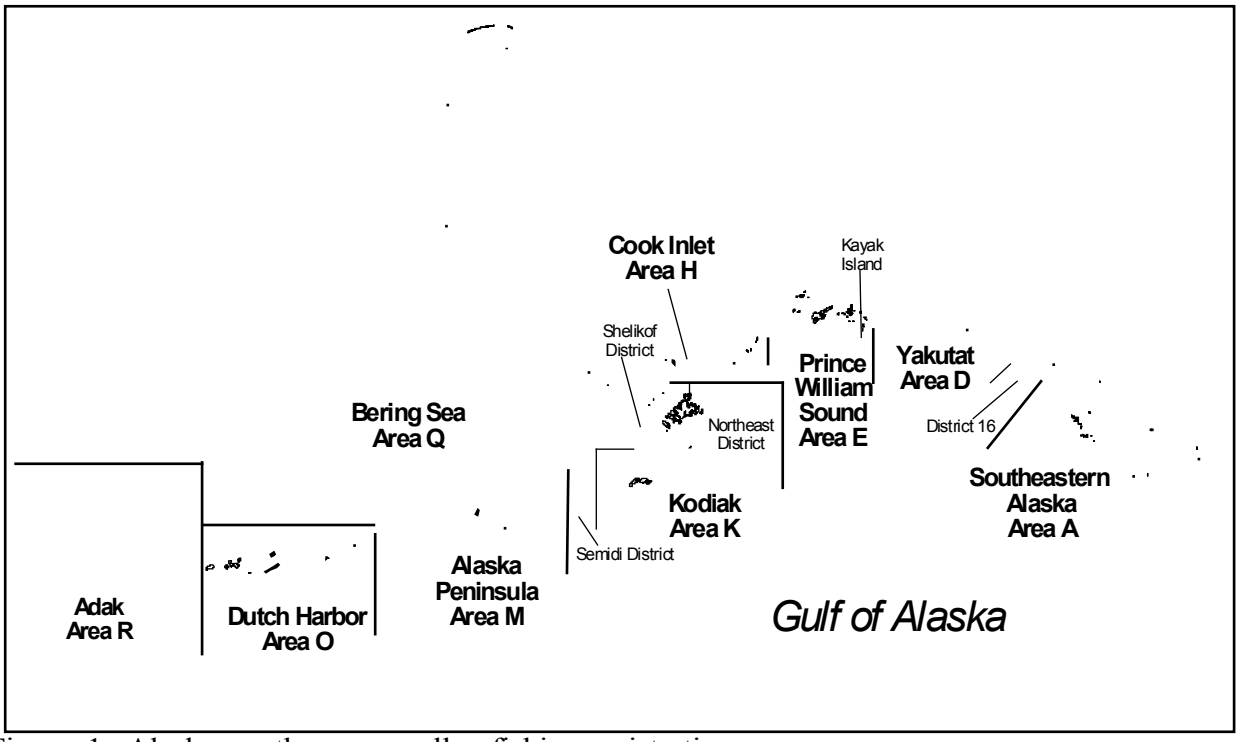


Figure. 1. Alaska weathervane scallop fishing registration areas.

Although the FMP covers all scallop stocks off the coast of Alaska including weathervane scallops (*Patinopecten caurinus*), pink or reddish scallops (*Chlamys rubida*), spiny scallops (*Chlamys hastata*), and rock scallops (*Crassadoma gigantea*), the weathervane scallop is the only commercially exploited stock at this time. Commercial fishing for weathervane scallops occurs in the Gulf of Alaska, Bering Sea, and Aleutian Islands.

1.1 Amendments to the Fishery Management Plan

The original FMP authorized an interim closure of Federal waters to fishing for scallops. The intent of the FMP was to prevent an unregulated and uncontrolled fishery for scallops while a Federal management regime was established to authorize and manage the fishery. Amendments 1 through 3 to the FMP established the specifics of the State-Federal management regime. Subsequent amendments to the FMP established a license

limitation program, refined overfishing levels, designated EFH and AFA sideboard measures and modified aspects of the FMP to better manage the fishery.

Amendment 1: State-Federal Management Regime

Amendment 1 was approved by NMFS on July 10, 1996 (61 FR 38099). Amendment 1 established a joint State- Federal management regime under which NMFS implemented Federal scallop regulations that duplicated most State scallop regulations, including definitions of scallop registration areas and districts, scallop fishing seasons, closed waters, gear restrictions, efficiency limits, crab bycatch limits, scallop catch limits, in-season adjustments, and observer coverage requirements. This joint State-Federal management regime was designed as a temporary measure to prevent unregulated fishing in Federal waters until changes in the Magnuson-Stevens Act would enable the Council to delegate management of the fishery to the State. Federal and State waters were re-opened to fishing for scallops on August 1, 1996.

Amendment 2: Vessel Moratorium

Amendment 2 to the FMP, establishing a temporary moratorium on the entry of new vessels into the scallop fishery in Federal waters off Alaska was approved on April 11, 1997 (62 FR 17749). To qualify its owner for a moratorium permit, a vessel must have made a legal landing of scallops during 1991, 1992, or 1993, or during at least 4 separate years from 1980 through 1990. The moratorium was intended to remain in effect through June 30, 2000, or until replaced by a permanent limited access system. Eighteen vessel owners qualified for moratorium permits under the Federal vessel moratorium.

Amendment 3: Delegate Management Authority to the State

Amendment 3 delegated to the State the authority to manage all aspects of the scallop fishery in Federal waters, except limited access, including the authority to regulate vessels not registered under the laws of the State. The final rule implementing Amendment 3 was published on July 17, 1998 (63 FR 38501). Amendment 3 simplified scallop management in the Federal waters off Alaska by eliminating the unnecessary duplication of regulations at the State and Federal levels.

Amendment 4: License Limitation Program

In December 1996, the Council initiated analysis of a license limitation program for the scallop fishery. An LLP was proposed to limit access to the fishery, because re-entry of latent capacity would adversely affect the economic viability of the current participants in the fishery.

The Council adopted an LLP, which limited the fishery to a total of 9 licenses. Only one license was issued for each qualifying vessel. Only those holders of moratorium permits who made legal landings of scallops from a vessel in two of the three years 1996, 1997, or 1998 received a license. Of the 9 licenses issued, 7 had no gear restrictions outside of Cook Inlet (except to comply with state regulations limiting dredge gear to no more than 2-15ft dredges) while 2 licenses were limited to the use of a single 6ft dredge. The Council further adopted several options from the analysis, including no area endorsements and restrictions and limits on vessel replacement size. NMFS approved the LLP June 8, 2000 (65 FR 78110) and implemented the LLP for the 2001 scallop fishery.

Amendment 5: Description and Identification of Essential Fish Habitat.

On April 26, 1999, NMFS approved Amendment 5 to the FMP which implemented the Essential Fish Habitat (EFH) provisions contains in the Magnuson-Stevens Fishery Conservation and Management Act and 50 CFR 600.815. Amendment 5 describes and identifies EFH fish habitat for scallops and describes and identifies fishing and non-fishing threats to scallop EFH, research needs, habitat areas of particular concern, and EFH conservation and enhancement recommendations.

Amendment 6: Established overfishing levels for weathervane scallops

Amendment 6 established an overfishing level for weathervane scallops as a fishing rate ($F_{overfishing}$) in excess of the natural mortality rate M = 0.13. An Optimum Yield range was specified as 0-1.24 million pounds of shucked scallop meats. The upper bound of this range is the established MSY for weathervane scallops, and is based upon the average catch from 1990-1997 (excluding 1995). This amendment also added additional information to the FMP on bycatch data collection. NMFS approved amendment 6 on March 3, 1999 (64 FR 11390).

Amendment 7: Habitat Areas of Particular Concern (HAPC)

Amendment 7 identified specific sites as habitat areas of particular concern, and established management measures to reduce potential adverse effects of fishing. The sites in the BSAI are: Aleutian Islands Coral Habitat Protection Areas and the Alaska Seamount Habitat Protection Areas, in which the use of bottom contact gear is prohibited; and the Bowers Ridge Habitat Conservation Zone, in which the use of mobile bottom contact gear is prohibited. The sites in the GOA are: the Alaska Seamount Habitat Protection Areas (fourteen sites in the GOA management area listed in Appendix D) and three sites of GOA coral HAPCs (two on the Fairweather Grounds and one off Cape Ommaney) within which five smaller areas comprise the GOA Coral Habitat Protection Areas.

Amendment 8: Sideboard measures for AFA qualified vessels

Amendment 8 established sideboard measures for the AFA qualified vessels, whereby a limited amount of scallops could be taken by a vessel that was qualified as a Bering Sea pollock vessel under the American Fisheries Act. NMFS approved Amendment 8 on February 27, 2002 (67 FR 79692).

Amendment 9: Description and Identification of Essential Fish Habitat (EFH)

Amendment 9 refined and updated the description and identification of EFH for managed species and revised approach for identifying Habitat Areas of Particular Concern within EFH, by adopting a site-based approach. Amendment 9 also established a new area (Aleutian Islands Habitat Conservation Area) in which non-pelagic trawling is prohibited, to protect sensitive habitats from potential adverse effects of fishing.

Amendment 10: Modify License Limitation Program

The Council took final action in October 2004 to modify the existing gear restriction endorsement on two LLP licenses. The Council took final action on this amendment in October 2004, to approve the modification of the two gear restriction to allow the use of two dredges not more that 20 feet total in length. Regulations implementing this amendment were published on July 11, 2005 (70 FR 39965).

Amendment 11: Housekeeping

In April 2005, the Council adopted Amendment 11 to the FMP for the Scallop Fishery off Alaska. This action is a housekeeping amendment to update the FMP text to reflect current management of the scallop fishery and recent biological information.

1.2 Foreign Fishing

Because scallops only have been harvested by U.S. vessels in the past, and effort remains high, it is likely that the OY can be fully harvested by U.S. vessels and fully processed by U.S. processors in future years. Hence, no considerations have been made to allow a foreign fishery on Alaskan scallops.

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 Scallop fishery. This management approach is described in Section 2.2 .

This FMP covers all scallop stocks off the coast of Alaska including weathervane scallops (*Patinopecten caurinus*), pink or reddish scallops (*Chlmys rubida*), spiny scallops (*Chlamys hastata*), and rock scallops (*Crassadoma gigantea*). However, the weathervane scallop is the only commercially exploited scallop in Alaskan waters at this time.

2.1 National Standards for Fishery Conservation and Management

The Magnuson-Stevens Fishery Conservation and Management 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 NPFMC Policy and Objectives

The objective of the FMP is to prevent localized overfishing of scallop stocks and protect the long term productivity of the resource to allow for the achievement of optimum yield on a continuing basis. This objective is based on the premise that uncontrolled fishing for scallops in Federal waters could result in irreversible damage to the resource's ability to recover in a reasonable period of time. Fishing on a stock at a level that severely compromises that stock's future productivity is counter to the goals of the Magnuson Act and seriously jeopardizes the opportunity to harvest optimum yield on a continuing basis under a future management regime that would authorize a regulated fishery for scallops in Federal waters. Conservative management of the scallop resource is warranted given (1) unprecedented activity of vessels fishing for scallops in Federal waters outside the jurisdiction of Alaska State regulations, (2) the harvesting and processing capacity of the scallop fleet, which, if allowed to fish unregulated in Federal waters, could exceed State harvest guidelines by several orders of magnitude, (3) inadequate data on stock status and biology, and (4) the vulnerability of the scallop resource to localized depletion.

The Council, in cooperation with the State, is committed to developing a long-range plan for managing the scallop fishery that will promote a stable regulatory environment for the seafood industry and maintain the health of the resources and environment. The management system conforms to the Magnuson-Stevens Act's national standards as listed in Section 2.1.

2.2.1 Management Goal

The management goal is to maximize the overall long-term benefit to the nation of scallop stocks by coordinated Federal and State management, consistent with responsible stewardship for conservation of the scallop resource and its habitats.

2.2.2 Management Objectives

Within the scope of the management goal, seven specific objectives have been identified. These relate to stock condition, economic and social objectives of the fishery, gear conflicts, habitat, weather and ocean conditions affecting safe access to the fishery, access of all interested parties to the process of revising this FMP and any implementing regulations, and necessary research and management. Each of these objectives requires relevant management measures. Several management measures may contribute to more than one objective, and several objectives may mesh in any given management decision on a case-by-case basis.

1- Biological Conservation Objective: Ensure the long-term reproductive viability of scallop populations.

To ensure the continued reproductive viability of each scallop population through protection of reproductive potential, management must prevent overfishing. Management measures also may be adopted to address other biological concerns such as restricting harvest of scallops during spawning periods and maintaining low bycatch of finfish and crab. The maintenance of adequate reproductive potential in each scallop stock will take precedence over economic and social considerations.

2- Economic and Social Objective: Maximize economic and social benefits to the nation over time.

Economic benefits are broadly defined to include, but are not limited to: profits, income, employment, benefits to consumers, and less tangible or less quantifiable social benefits such as the economic stability of coastal communities. To ensure that economic and social benefits derived for fisheries covered by this FMP are maximized over time, the following will be examined in the selection of management measures:

- The value of scallops harvested during the season for which management measures are considered,
- The future value of scallop stocks,
- Economic impacts on coastal communities.

This examination will be accomplished by considering, to the extent that data allow, the impact of management alternatives on the size of the catch during the current and future seasons and their associated prices, harvesting costs, processing costs, employment, the distribution of benefits among members of the harvesting, processing and consumer communities, management costs, and other factors affecting the ability to maximize the economic and social benefits as defined in this section.

Social benefits are tied to economic stability and impacts of commercial fishing associated with coastal communities. While social benefits can be difficult to quantify, economic indices may serve as proxy measures of the social benefits which accrue from commercial fishing. In 1984, 7 percent of total personal income or 27 percent of total personal income in the private sector in Alaska was derived from commercial fishing industries. On a statewide basis, shellfish accounted for 21 percent of the total exvessel value of commercial fish harvested in Alaska in 1984, however, the bulk of shellfish harvests were king and Tanner crab.

3- Gear Conflict Objective: Minimize gear conflict among fisheries.

Management measures developed for the scallop fisheries will take into account the interaction of those fisheries, and the people engaged in them, with other fisheries. To minimize gear conflict among fisheries, the compatibility of different types of fishing gear and activities on the same fishing grounds should be considered. Scallop fisheries are conducted with dredge gear. Many other fisheries in the fishery management unit are conducted with fixed gear (pot and hook-and-line). Fishing seasons, gear storage, and fishing areas may be arranged to eliminate, insofar as possible, conflicts between gear types and preemption of fishing grounds by one form of gear over another.

4- Habitat Objective: To protect, conserve, and enhance adequate quantities of essential fish habitat (EFH) to support scallop populations and maintain a healthy ecosystem

Habitat is defined as the physical, chemical, geological, and biological surroundings the support healthy, self-sustaining populations of living marine resources. Habitat includes both the physical component of the environment which attracts living marine resources (e.g. salt marshes, sea grass beds, coral reefs, intertidal

lagoons, and near shore characteristics) and the chemical (e.g. salinity, benthic community) and biological characteristics (e.g. scallop life stage histories, oceanography) that are necessary to support living marine resources. The quality and availability of habitat supporting the scallop populations are important. Fishery managers should strive to ensure that those waters and substrate necessary to scallops for spawning, breeding, feeding, or growth to maturity are available. It is also important to consider the potential impact of scallop fisheries on other fish and shellfish populations. Scallop EFH is described in Appendix D of this FMP.

Those involved in both management and exploitation of scallop resources will actively review actions by other human users of the management area to ensure that their actions do not cause deterioration of habitat. Any action by a State or Federal agency potentially affecting scallop habitat in an adverse manner may be reviewed by the Council for possible action under the Magnuson-Stevens Act. The Council will also consider the effect on scallop habitat of its own management decisions in other fisheries.

5- Vessel Safety Objective: Provide public access to the regulatory process for vessel safety considerations.

Upon request, and when appropriate, the Council and the State shall consider, and may provide for, temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safety of vessels.

6- Due Process Objective: Ensure that access to the regulatory process and opportunity for redress are available to all interested parties.

In order to attain the maximum benefit to the nation, the interrelated biological, economic and social, habitat, and vessel safety objectives outlined above must be balanced against one another. A continuing dialogue between fishery managers, fishery scientists, fishermen, processors, consumers, and other interested parties is necessary to keep this balance. Insofar as is practical, management meetings will be scheduled around fishing seasons and in places where they can be attended by fishermen, processors, or other interested parties.

Access to the FMP development and regulatory process is available through membership in a Council work group, testimony on the record before the Council's Advisory Panel or SSC, or before the Council itself, testimony before the Board, conversations with members of the plan team or officials of regulatory agencies, and by commenting on the FMP, any subsequent amendments and any regulations proposed for their implementation.

This FMP defers much of day-to-day scallop management to the State. Means of access to the regulatory process at the State level and of redress of perceived wrongs by the State are necessary.

7- Research and Management Objective: Provide fisheries research, data collection, and analysis to ensure a sound information base for management decisions.

Necessary data must be collected and analyzed in order to measure progress relative to other objectives and to ensure that management actions are adjusted to reflect new knowledge. Achieving the objective will require new and ongoing research and analysis relative to stock conditions, dynamic feedback to market conditions, and adaptive management strategies.

An annual Stock Assessment Fishery Evaluation (SAFE) report discussing current biological and economic status of the fisheries, guideline harvest ranges, and support for different management decisions or changes in

harvest strategies will be prepared by the State (ADF&G lead agency), with NMFS and scallop plan team input when appropriate. Such information will be made available to the public.

The management program authorized under this FMP conforms to the Magnuson Act's national standards as listed in section 2.1. Under this FMP, the prevention of overfishing of the Alaska scallop stocks and the maintenance of adequate reproductive potential for the scallop resource takes precedence over other economic, social, management and research considerations.

2.3 Procedures for FMP Implementation (Federal/State)

A primary objective of the FMP is to establish and maintain consistent management efforts at the State and Federal levels. To the extent practicable, NMFS will coordinate with ADF&G to maintain uniform management measures throughout the EEZ that are consistent with the objectives of the FMP and the Magnuson Act. Nothing in this FMP is intended to preempt State of Alaska scallop regulations set out under Chapter 38 of the Alaska Administrative Code for vessels fishing for scallops in Federal waters off Alaska which are registered under the laws of the State.

The Secretary (through the Council and NMFS) and the State of Alaska have established the following protocol which describes the roles of the Federal and State governments in managing the scallop fishery off Alaska.

1. The Council will maintain the FMP (and develop future amendments) to govern management of the scallop fisheries in Federal waters off Alaska. The FMP prescribes objectives and any management measures found by the Secretary to be necessary for effective management. The State will promulgate regulations applicable to all vessels fishing for scallops in Federal waters that are consistent with the FMP, Magnuson-Stevens Act, and other applicable Federal law. The FMP contains two categories of management measures: (1) Category 1 measures are general management measures delegated to the State for implementation that may be freely adopted or modified by the State, subject to other Federal law, and (2) Category 2 measures are management measures that are fixed in the FMP, implemented by Federal regulation and require an FMP amendment to change.

2. If at any time the Secretary determines that a State law or regulation applicable to a vessel fishing for scallops in Federal waters is not consistent with the FMP, the Secretary shall promptly notify the State and the Council of such determination and provide an opportunity for the State to correct any inconsistencies identified in the notification. If, after notice and opportunity for corrective action, the State does not correct the inconsistencies identified by the Secretary, the delegating of authority granted to the State under this FMP shall not apply until the Secretary and the Council find that the State has corrected the inconsistencies.

3. ADF&G will have responsibility for developing the information upon which to base State fishing regulations, with continued assistance from NMFS. In carrying out this responsibility, ADF&G will consult actively with the NMFS (Alaska Regional Office and Alaska Fisheries Science Center), NOAA General Counsel, the plan team, and other fishery management or research agencies in order to prevent duplication of effort and assure consistency with the Magnuson-Stevens Act, the FMP, and other applicable Federal law.

4. An annual area management report discussing current biological and economic status of the fisheries, guideline harvest ranges, and support for different management decisions or changes in harvest strategies will be prepared by the State (ADF&G lead agency), with NMFS and scallop plan team input incorporated as appropriate. This report will be available for public review.

5. Federal enforcement agents (NOAA) and the U.S. Coast Guard (DOT) shall work in cooperation with the State to enforce scallop fishing regulations in the EEZ off Alaska.

Chapter 3 Conservation and Fishery Management Measures

Two categories of management measures are described in the FMP (Table 1): Category 1 measures are general management measures delegated to the State for implementation. These measures may be freely adopted or modified by the State, subject to other Federal law. Category 2 measures are management measures that are fixed in the FMP, implemented by Federal regulation and require an FMP amendment to change.

The following description of management measures is not intended to limit the State government to only these measures. However, implementation of other management measures not described in the FMP must be consistent with the FMP, the Magnuson-Stevens Act, and other applicable Federal law. Although specific strategies for attainment of objectives in the FMP are not described, management measures described in this chapter are all derived to attain one or more of those objectives.

CATEGORY 1 (Delegated to the State)	CATEGORY 2 (Fixed in FMP, Implemented by Federal Regulation)
Guideline Harvest Levels	License Limitation Program
Registration Areas, Districts, Subdistricts and Sections	Optimum Yield Specification
Gear Limitations	Overfishing specification
Crew and Efficiency Limits	EFH/HAPC designation
Fishing Seasons	
Observer Requirements	
Prohibited Species and Bycatch Limits	
Recordkeeping and Reporting Requirements	
In-season Adjustments	
Closed Areas	
Other	

3.1 Federal Management Measures

Federal management measures under this FMP are considered category 2 measures. These are measures which are fixed in the FMP and require an amendment to change. Since the FMP was implemented it has been amended several times, as described previously in section 1.1. Category 2 measures are implemented by Federal regulation.

3.1.1 Optimum Yield and Overfishing

Under the Magnuson-Stevens Act, a fishery management plan for scallops must specify an optimum yield (OY) for the scallop fishery. The OY for a fishery means the amount of fish which will provide the greatest overall benefit to the nation, with particular reference to food production and recreational activities. The OY is specified on the basis of the maximum sustainable yield from the fishery, as modified by any relevant economic, social, or ecological factors. The national standard 1 guidelines (50 CFR 600.310) state that the most important limitation on the specification of OY is that the choice of OY, and the conservation and management measures proposed to achieve it, must prevent overfishing. If a stock or stock complex becomes overfished, OY provides for rebuilding to the MSY level.

Overfishing is a level of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis. The definition of overfishing for a stock or stock complex may be expressed in terms of maximum level of fishing mortality or minimum stock size threshold. Overfishing must be defined in a way to enable the Council and the Secretary to monitor and evaluate the condition of the stock or stock complex relative to the definition. Overfishing definitions must be based on the best scientific information available and reflect appropriate consideration of risk. Risk assessments should take into account uncertainties in estimating harvest levels, stock conditions, or the effects of environmental factors.

3.1.1.1 Assessment of the available scientific data to determine Optimum Yield

The State of Alaska's draft fishery management plan for scallops (Kruse 1994) summarizes much of the scientific data available on Alaska scallop life history traits and other biological parameters that should be considered in assessing appropriate concepts of MSY, OY, and overfishing for the scallop fishery. Pertinent portions of the State's management plan that address management concerns regarding recruitment overfishing and sustainable yield are incorporated and/or paraphrased in this section of the FMP.

Recruitment Overfishing

Definition. It is widely accepted that fishery harvest levels should be prescribed in ways to prevent "recruitment overfishing", the condition that occurs when stocks are reduced to levels too low to produce adequate numbers of young scallops—the future recruits to the fishery (Gulland 1983). Recruitment is a prerequisite for maintenance of a viable population and is needed for sustainable harvests that support long-term economic benefits from a fishery.

Worldwide History of Scallop Overfishing. Although there are a number of cases of scallop fisheries that have been sustainable over long time periods, overfishing has occurred in many scallop fisheries worldwide. Stock recovery has been either slow or non-existent. Attempts to develop aquaculture in many countries are largely attributable to the collapse of natural populations. Kruse (1994) provides numerous examples of scallop overfishing around the world.

Implications of Stock Structure. Prevention of overfishing requires knowledge about a species' stock structure and the biological productivity of each stock. For species with populations that are well-connected by extensive larval drift, risk of overfishing is relatively low at least on an area-specific level. In such cases, local depletions can be replenished by settlement of larvae carried by ocean currents from spawning stocks located elsewhere. However, a growing body of evidence indicates that many benthic invertebrates such as scallops exist as a number of discrete, self-sustaining populations. To prevent overfishing for species with such a population structure, it is necessary to manage each stock separately (Caddy 1989; Fevolden 1989; Sinclair et al. 1985.)

Unfortunately, the stock structure of weathervane scallops in Alaska is not well understood. Studies of genetic structure and comparative population characteristics (e.g., growth rate, gonadal somatic index) are needed to resolve uncertainties. In the absence of such information, a reasonable and conservative approach is to assume that each major fishing area compromises a separate stock (Caddy 1989; Sinclair et al. 1985). However, even with this approach, the possibility exists that multiple self-sustaining populations exist within a fishing area. For example, the apparent existence of separate self-sustaining populations of sea scallops on the Northern Edge and Northeast Peak of Georges Bank (Tremblay and Sinclair 1992; McGarvey et al. 1993) is somewhat unexpected given prevailing ocean currents and proximity of these areas to other scallop fishing grounds on Georges Bank.

Importance of Spawning Stock Biomass. Even after scallop stocks have been defined, overfishing will occur unless fishing mortality is limited to a level commensurate with the productivity of each stock. Worldwide, scallop populations are characterized by recruitment variability. Often, scallop populations are dominated by a few strong year classes that are separated by long periods of poor recruitment. Potential stock-recruitment relationships have not been well studied for scallops. A study by McGarvey et al. (1993) provides a rare example with evidence of a relationship between spawning stock (total egg production) and recruitment for sea scallops on Georges Bank. In that instance, higher egg production was directly related to higher recruitment.

Conversely, it is often assumed that scallop recruitment is linked to environmental conditions (Hanock 1973). However, even when recruitment of a marine species is primarily driven by environmental effects, it is commonly held that parental spawning biomass affects recruitment, at least at low population sizes. Peterson and Summerson (1992) showed that the bay scallop (*Argopecten irradians concentricus*) was recruitment-limited due to reduced abundance of adults caused by a red tide (*Ptychodiscus brevis*) outbreak. In relating their findings to fishery management, the authors noted that a common assumption of shellfish fisheries management was that fishing pressure on adults did not adversely affect subsequent recruitment. Peterson and Summerson (1992) concluded that this assumption was unjustified.

Sustainable Yield

Ideally, an appropriate harvest rate is developed from yield models based on a species' life history traits and other biological parameters. Annual catches are specified by applying these harvest rates to annual biomass estimates derived from stock assessment surveys. Unfortunately, limited information on biological productivity is available for weathervane scallops to promote the conservation of stocks and sustained yields of the fishery. Biomass estimates are unavailable and yield models have not been developed.

In Alaska, some biological data was collected during the early years of the fishery (Haynes and Powell 1968; Hennick 1970b, 1973), although it has been summarized more recently by Kaiser (1986). In the early 1950s, the Bureau of Commercial Fisheries began systematic surveys to determine whether commercial quantities were available. The only assessment survey conducted between 1972 and 1996 occurred in 1984 in lower Cook Inlet (Hammarstrom and Merritt 1985). Likewise, until implementation of the State's onboard observer program in 1993, there was no routine biological or fishery sampling conducted on weathervane scallops in Alaska.

Implications of Natural Mortality Rate. Natural mortality is one of the biological reference points commonly used in fisheries management to establish appropriate exploitation rates (Clark 1991). The longevity (28 years) of weathervane scallops in Alaska implies that this species experiences a very low natural mortality rate (M = 0.13 or 12% annual mortality). The biological reference point obtained by setting instantaneous fishing mortality F equal to M implies that scallop harvest rates should not exceed 12% annually on any given stock. Unfortunately, other potentially useful benchmarks that would bear on the choice of appropriate exploitation rates for weathervane scallops are not presently available.

The biological reference point, F=M=0.13 implies that weathervane scallop stocks are at greater risk of overfishing than red king crabs (*Paralithodes camtschaticus*) and Tanner crabs (*Chionoecetes bairdi*) for which M=0.2 and M=0.3, respectively (NPFMC 1998). Also, unlike many crab stocks off Alaska, few stock assessments of weathervane scallop biomass have been made. Given these two observations, maintenance of healthy weathervane scallop stocks poses a serious challenge to fishery managers.

Implications of Recruitment Variability. Large annual fluctuations in recruitment that are typical of scallop populations have management implications. Weathervane scallops spawn annually after reaching maturity at

age 3 or 4. This feature of multiple spawning (*iteroparity*) is likely to be an evolutionary response to environmentally-induced recruitment variations (Murphy 1968). Iteroparous species with highly variable recruitment are particularly vulnerable to overfishing when high levels of harvest create a recruit-only fishery.

Murphy (1967) simulated the effects of fishing on Pacific sardine (*Sarinops sagax*) age structure so that the population approached a single reproducing age class. Compared to an unfished population with a protracted age structure, abundance of the fished population was much lower and more variable. The fished population recovered slowly even when fishing was terminated and had a higher probability of extinction than the unfished population.

These results led Murphy (1967) to assert the need to maintain diverse age structure in populations with long life spans that experience environmentally driven recruitment. The same advice was advanced by Leaman (1991) for long-lived rockfishes (*Sebastes*). By comparison of scallop longevity estimates (Orensanz et al. 1991), weathervane scallops, with a maximum age of 28 (Hennick 1973), may be the longest-lived scallop species in the world. That is, the advice of Murphy (1967, 1968) and Leaman (1991) is apropos.

Sustainability of Weathervane Scallop Harvests. Changes in the Alaskan scallop fishery through 1992 raised concerns that harvests may not be sustainable on a local or regional level for several reasons. First, landings during the early 1990s were 2-3 times higher than the long-term average harvest taken over a 20-year period during the 1970s and 1980s. In fact, these harvests were at levels comparable to those taken in the late 1960s and early 1970s, which proved to not be sustainable by the fishery. Reduced scallop abundance was at least partly responsible for the fishery collapse in the 1970s. Second, high harvests in the early 1990s were at least partly attributable to shifts in fishing effort to new scallop beds. Third, during 1992 limited inseason catch reports from some areas indicated that small scallops constituted an increased portion of landings as had occurred prior to the fishery decline in the mid-1970s. Last, misreporting was suspected; widespread misreporting could seriously compromise historical catch data upon which assessments of sustainable harvests are based.

3.1.1.2 Specification of OY and Overfishing

The following definitions are based on the national standard 1 guidelines (50 CFR 600.310).

Maximum Sustainable Yield (MSY). 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. The long-term average stock size obtained by fishing year after year at this rate under average recruitment may be a reasonable proxy for the MSY stock size, and the long-term average catch so obtained may be a reasonable proxy for MSY

MSY for weathervane scallops is 1.24 million lbs. (562.46 metric tons) of shucked adductor muscles. MSY was estimated based on the average catch from 1990-1997, (1995 data not included as fishery was closed most of the year), which was 1,240,000 lbs. (562.46 metric tons) of shucked meats. The time period from 1990 to 1997 reflects prevailing ecological conditions. The fishery was fully capitalized during this time period, and all areas of the state were where scallops could be harvested were being exploited. Prior to that time period, vessels moved into and out of the scallop fishery, in part in response to economic opportunities available in other fisheries (Shirley and Kruse, 1995). However, since 1993, the fishery has been somewhat limited by crab bycatch limits, closure areas, and season length. As a consequence, a stable period during the history of this fishery does not exist. MSY estimation by averaging catches is problematic, however, a better solution does not exist at this point.

MSY Control Rule (F_{msy}). The MSY control rule is a harvest strategy which, if implemented, would be expected to result in a long-term average catch approximating MSY. The MSY control rule establishes a maximum fishing mortality threshold (MFMT), which may be expressed either as a single number or as a function of spawning biomass or other measure of productive capacity. The MFMT is set at the fishing mortality rate or level associated with the relevant MSY control rule. Exceeding the MFMT for a period of 1 year or more constitutes overfishing

In choosing an MSY control rule, Councils should be guided by the characteristics of the fishery, the FMP's objectives, and the best scientific information available. In any MSY control rule, a given stock size is associated with a given level of fishing mortality and a given level of potential harvest, where the long-term average of these potential harvests provides an estimate of MSY. The MSY control rule is based on natural mortality, using the estimate of M = 0.13, the MSY control rule F_{msy} equals M, or $F_{msy} = 0.13$. No control rule for spiny, pink, or rock scallops is recommended at this time.

MSY Stock Size (B_{msy}). The MSY stock size is the long term average size of the stock or stock complex, measured in terms of spawning biomass or other appropriate units, associated with the production of MSY. It is the stock size that would be achieved under an appropriate MSY control rule. It is also the minimum standard for a rebuilding target when remedial management action is required.

As noted earlier, MSY for weathervane scallops is established at 1.24 million lbs. (562.46 mt) of shucked adductor muscles. Therefore, MSY stock size is estimated as MSY/M = 9.54 million lbs. (4,326.6 mt) of shucked meat biomass. In terms of whole animals (including shells and gurry) B_{msy} would be 95.4 million lbs. (43,273 mt), as expanded by a product recovery rate of 10%. This assumes that the stock was at B_{msy} and that catches were at MSY during 1990-1997, and that the logistic equation holds.

Minimum Stock Size Threshold (MSST). The minimum stock size threshold (MSST), to the extent possible, should equal whichever is greater: one half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years if the stock or stock complex were exploited at the maximum fishing mortality threshold. Should the actual size of the stock or stock complex in a given year fall below MSST, the stock or stock complex is considered overfished. The MSST should be expressed in terms of spawning biomass or other measure of reproductive capacity. Based on the national standard guidelines, a MSST for weathervane scallops is established based on ½ MSY stock size = $½B_{msy}$ = 4.77 million lbs. (2,163.7 mt) of shucked adductor muscles.

Overfishing Control Rule ($F_{overfishing}$). The national standard guidelines define the terms "overfishing" and "overfished" to mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce MSY on a continuing basis. Overfishing is established for weathervane scallop stocks as a fishing rate in excess of the natural mortality rate. Hence, $F_{overfishing} = M = 0.13$.

Optimum Yield (OY). Optimum yield should be established on the basis of MSY. OY is upper bounded by $MSY = F_{msy} B_{msy} = M B_{msy}$ (= 1,240,000 lbs or 562.46 mt.). Hence, a numerical range for OY of 0-1,240,000 lbs. (562.46 mt) can thus be established for Alaska weathervane scallops. Because MSY cannot be estimated for the other scallop species, OY cannot be quantified for rock scallops, pink scallops, or spiny scallops.

Sufficient conservatism is built into establishing an annual OY cap of 1.24 million lbs. (562.46 mt) for the following reasons:

1. the years of averaging include years when no fishing occurred in the Bering Sea, but obviously some sustainable harvest was possible;

2. the period of averaging includes other areas and years when the harvest was constrained by fishery controls, such as recently by bycatch PSCs, and therefore the resulting catch underestimates the productivity of scallop stocks;
3. substantial areas are closed to scallop dredging due to concerns about bycatch, yet these areas have substantial productivity;
4. closed areas can almost be thought of as marine refuges and potential yields from these areas are not factored into MSY estimates;
5. there are years during the history of the fishery when effort was low due to market (not abundance) conditions;
6. $F_{30\%}$ is probably a better estimator of $F_{overfishing}$ than is F=M, yet $M<F_{30\%}$ so the overfishing rule is conservative; and
7. In years of good recruitment, the stocks are likely greater than B_{msy}, thus we will fish at $F<F_{overfishing}$ to achieve OY=MSY (recall $MSY = F_{msy} B_{msy}$, so if $B>B_{msy}$, then $F<F_{msy}$).

In the future, better quantitative estimates of appropriate scallop yields by area may be generated based on observer data analysis. Additional information on biomass and long-term potential yield of pink, spiny and rock scallops also may be available in the future. At such time, MSY and OY would be re-estimated and the FMP amended.

3.1.2 Limited Access Management

A system for limiting access, which is an optional measure under section 303(b) of the Magnuson-Stevens Act, is a type of allocation of fishing privileges that may be used to promote economic efficiency or conservation. For example, "*limited access may be used to combat overfishing, overcrowding, or overcapitalization in a fishery to achieve OY*" (50 CFR 600.330(c)). The Magnuson-Stevens Act (Section 3(28)) further defines"... The "optimum" with respect to the yield from a fishery, means 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 on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant social, economic, or ecological factor; and (C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

As of 2001, a Federal scallop license is required for vessels participating in all scallop fisheries in the EEZ off Alaska. NPFMC created the scallop LLP to limit the number of participants and reduce fishing capacity in the scallop fishery. The LLP license is required on board any vessel deployed in the weathervane scallop fishery in federal waters off Alaska. NMFS granted 7 vessel owners licenses to fish statewide (outside of the Cook Inlet Registration Area) utilizing two 15-foot dredges. Additionally, NMFS granted two vessel owners licenses to fish statewide utilizing a single 6-foot dredge. Amendment 10 to the FMP to modified this restriction such that these vessels are allowed to fish utilizing two 10-foot dredges or two dredges with a combined width of no more than 20 feet. All 9 licenses allow vessel owners to fish inside Cook Inlet with a single 6-foot dredge.

3.1.2.1 Elements of the License Limitation Program

1. Qualification Criteria. A license authorizes the license holder to use a vessel from which directed fishing for scallops can be conducted. A license was issued to a moratorium permit holder who made legal landing of scallops in each of any 2 years in the period from January 1, 1996 through October 9, 1998. Licenses are not vessel specific.

2. License Recipients. Licenses were issued to U.S. Citizens, or U.S. business (corporation, partnership, or other association) that satisfy the above qualification criteria.

3. 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.

4. Area Endorsements. The licenses have no area endorsements. All licenses are statewide. However, some licenses (2) are restricted for use with two dredges with a combined width of no more than 20 feet (6.1 m).

5. Vessel Length. No increases in vessel length will be allowed. A license is designated with a MLOA that limits the length of a vessel that could be used by the license holder.

6. License Ownership Caps. No person could hold more than 2 scallop licenses at once unless that person is initially issued more than 2 licenses, in which case the person can hold the number of licenses initially issued. However, a person who has more than 2 scallop licenses could not receive a scallop license by transfer until the number of scallop licenses which that person has is less than 2. After obtaining transfer eligibility by dropping below 2 licenses, the person could not again exceed 2 licenses, regardless of his or her earlier status of being allowed to exceed 2 licenses on initial issuance.

7. Appeals. The appeals process is established in Federal Regulations at 50 CFR 679.43.

3.1.3 Essential Fish Habitat and Habitat Areas of Particular Concern

3.1.3.1 Description of Essential Fish Habitat

Section 303(a)(7) of the Magnuson-Stevens Act requires FMPs to describe and identify Essential Fish Habitat (EFH), minimize to the extent practicable adverse effects of fishing on EFH, and identify other actions to conserve and enhance EFH. This FMP describes scallop EFH in text, maps EFH distributions, and includes information on habitat and biological requirements for each life history stage of the species. Appendix D contains this required information, as well as identifying an EFH research approach.

3.1.3.2 Description of Habitat Areas of Particular Concern

The EFH regulations at 50 CFR 600.815(a)(8) provide the Councils with guidance to identify habitat areas of particular concern (HAPCs). HAPCs are meant to provide greater focus to conservation and management efforts and may require additional protection from adverse effects. FMPs should identify specific types or areas of habitat within EFH as HAPCs based on one or more of the following considerations:

(i) the importance of the ecological function provided by the habitat;
(ii) the extent to which the habitat is sensitive to human-induced environmental degradation;
(iii) whether, and to what extent, development activities are, or will be, stressing the habitat type; or
(iv) the rarity of the habitat type.

In 2005, the Council identified the following areas as HAPCs within EFH:

- Alaska Seamount Habitat Protection Areas
- Bowers Ridge Habitat Conservation Zone
- GOA Coral

Maps of these HAPCs, as well as their coordinates, are contained in Appendix D.

3.1.3.3 Conservation and Enhancement Recommendations for EFH and HAPC

Appendix D identifies fishing and non-fishing threats to EFH. Conservation and enhancement recommendations for non-fishing threats to EFH and HAPCs are described therein.

In order to protect EFH from fishing threats, the Council established the following areas:

- Aleutian Islands Habitat Conservation Area
- Aleutian Islands Coral Habitat Protection Areas
- GOA Slope Habitat Conservation Areas

Maps of these areas, as well as their coordinates, are contained in Appendix D. In addition, the Council established restrictions for these areas as described below.

Aleutian Islands Habitat Conservation Area
The use of nonpelagic trawl gear, as described in 50 CFR part 679, is prohibited year-round in the Aleutian Islands Habitat Conservation Area, except for the designated areas open to nonpelagic trawl gear fishing.

Aleutian Islands Coral Habitat Protection Areas
The use of bottom contact gear, as described in 50 CFR part 679, and anchoring by federally permitted fishing vessels is prohibited in the Aleutian Islands Coral Habitat Protection Areas.

GOA Slope Habitat Conservation Areas
The use of nonpelagic trawl gear in the GOA Slope Habitat Conservation Areas by any federally permitted fishing vessel, as described in 50 CFR part 679, is prohibited.

In order to minimize adverse effects of fishing, the Council also established restrictions for HAPCs. These restrictions are described below.

Alaska Seamount Habitat Protection Areas
The use of bottom contact gear and anchoring by a federally permitted fishing vessel, as described in 50 CFR part 679, is prohibited in the Alaska Seamount Habitat Protection Area.

Bowers Ridge Habitat Conservation Zone
The use of mobile bottom contact gear, as described in 50 CFR part 679, is prohibited in the Bowers Ridge Habitat Conservation Zone.

GOA Coral Habitat Protection Areas within GOA Coral HAPC
The GOA Coral Habitat Protection Areas are five specific areas within the larger GOA Coral HAPC. Maps of these areas, as well as their coordinates, are in Appendix D. The use of bottom contact gear and anchoring, as described in 50 CFR part 679, is prohibited in these areas.

3.1.3.4 Review of EFH

To address regulatory guidelines for review and revision of EFH FMP components, the Council will conduct a complete review of all the EFH components of the FMP once every 5 years and will amend the FMP as appropriate to include new information.

Additionally, the Council may use the FMP amendment cycle every three years to solicit proposals for

HAPCs and/or conservation and enhancement measures to minimize the potential adverse effects of fishing. Any proposal endorsed by the Council would be implemented by FMP amendment.

3.2 Management Measures Delegated to the State of Alaska

The following Category 1 management measures are measures delegated to the State of Alaska for implementation.

3.2.1 Setting harvest limits

The FMP authorizes the State of Alaska to set guideline harvest ranges (GHRs) under State regulations. Although the term GHR corresponds closely to the term total allowable catch (TAC) used in groundfish FMPs for the Gulf of Alaska and Bering Sea and Aleutian Islands Management Areas, GHRs are expressed as ranges while TACs are not; the term GHR is used in this FMP in lieu of TAC because it corresponds with the State's management program. Each year, the sum of upper end values of the scallop GHRs established for each fishing area will fall within the OY range specified in this FMP.

In scallop Registration Areas D (Yakutat), E (Prince William Sound), H (Cook Inlet), K (Kodiak), M (Alaska Peninsula), Q (Bering Sea), O (Dutch Harbor), and R (Adak), GHRs are established by ADF&G each year prior to the opening of the fishing season. Scallop seasons are not opened in Area A (Southeastern Alaska). Specifiying harvest limits in terms of ranges allows the State to make inseason management decisions based on observer data obtained from the fishery as it occurs. Areas or parts of areas may be closed before the upper end of the GHR is reached due to concerns about fishery performance, bycatch rates, or localized depletion.

In Scallop Registration Areas K, M, O, Q, and R, ADF&G also establishes crab bycatch limits (CBLs) for red king crab and Tanner crab species each year prior to the season. Scallop fishing is closed in any area where these limits are attained regardless of the amount of scallops harvested. Bycatch of crab and other prohibited species is closely monitored by ADF&G in all fishing areas of the state.,

GHRs are the result of a process which includes evaluation of the effects of different harvest levels on the seven objectives of management listed previously in this FMP; however, GHRs will most frequently be used as management measures to achieve the first two objectives. The first concern in setting GHRs is to prevent overfishing. Because the maintenance of adequate reproductive potential takes precedence over economic and social considerations, the upper end of the GHR serves as an upper bound constraint on harvest. Economic benefits such as profits, personal income, employment, benefits to consumers, and less tangible or less quantifiable social benefits such as the economic stability of coastal communities, are considered secondarily to the prevention of overfishing. GHRs reflect uncertainty in stock status and in estimates of socioeconomic benefits.

The process of setting appropriate GHRs which prevent overfishing and maximize socioeconomic benefits includes collection and analysis of biological, economic, social, and other data. Available information on scallop resources in Alaska's different registration areas varies in quantity and in quality, and consequently, procedures for determining GHRs vary as well. Data collected through the State's onboard observer program, which requires 100% coverage outside of Cook Inlet, is a mainstay of information for GHR analyses.

NMFS and the Council will, to the extent possible, coordinate with ADF&G in the establishment of GHRs and CBLs that are consistent with current Federal and State regulations. GHRs and CBLs will apply to both Federal and State waters, so that scallop fisheries in each registration area are managed as a cohesive unit. GHRs and CBLs are periodically reviewed by the Council to assure compliance with this FMP, the Magnuson-Stevens Fishery Conservation and Management Act, and all applicable federal laws.

This FMP authorizes the commercial harvest of scallops species listed in Chapter 4.0 of this plan. It is prohibited for a person to take or retain scallops in any registration area unless the season for that species within those waters is open. It is prohibited for a person to possess, purchase, barter, sell, or transport scallops if that person knows or has reason to know that such shellfish were taken or possessed in contravention of this FMP.

3.2.2 Guideline Harvest Ranges (GHRs)

Annual scallop GHRs will be specified by registration area for the time period extending from July 1 through June 30 of the following year. Official announcements on GHRs will be available to the public approximately one month prior to season openings.

3.2.2.1 Registration Areas D, E, H, K, M, Q and O

Annual scallop GHRs for registration areas D, E, H, K, M, Q, O, and R shall be established as a weight in pounds of shucked scallop meats based on a review of the following:

1. Assessments of the biological condition of scallop populations in each area, including where available, assessment survey results, updated estimates of MSY, historical catch trends, recent fishery performance, size and/or age structure of recent harvests, assessments of alternative harvesting strategies, and relevant information relating to changes in scallop markets.

2. Socioeconomic considerations consistent with the goals and objectives of the FMP.

3.2.2 Gear Limitations

Gear limitations may include restrictions on the number and width of dredges that may be deployed by vessels fishing in a particular area and minimum ring sizes for dredges to prevent the taking of undersize scallops. Gear restrictions will be specified in State regulations. The following gear restrictions apply to the taking of scallops under this FMP:

1. A vessel fishing for weathervane scallops (*Patinopectin caurinus*) may use or carry only scallop dredges with rings having an inside diameter of four inches (10.16 cm) or larger.

2. No more than two scallop dredges may be operated at one time from a vessel, and the opening of a scallop dredge may not be more than 15 feet (4.57 meters) wide.

3. In the Kamishak, Southern, and Central Districts of Scallop Registration Area H, scallops may be taken only with a single dredge. The opening of a dredge may not be more than six feet (1.87 meters) in width.

3.2.3 Crew and Efficiency limits

Efficiency limits may be necessary to prevent excess capacity in the Alaska scallop fishery. These limits may include prohibitions on automatic shucking machines and restrictions on the number of crew on board a vessel engaged in fishing for scallops. Efficiency limits currently specified in State regulations include:

1. Scallops may be shucked by hand only. No mechanical shucking machines may be on board any vessel fishing for scallops off Alaska.

2. A vessel fishing for scallops may have on board no more than 12 crew members. Crew members are all

persons involved with vessel operations, including captains, mates, engineers, cooks, deckhands, and processing workers. ADF&G and NMFS onboard fishery observers are not considered crew members for purposes of this limit..

3.2.4 Fishing Seasons

Fishing seasons will be specified in State regulation to achieve various management objectives that may include: (1) limiting fishing during spawning periods; (2) timing fishing seasons to achieve the highest possible product quality; (3) limiting gear conflicts with other fisheries; and (4) increasing vessel safety.

Under current regulations, scallops may be taken in Areas D, E, K, M, Q, O, and R from 12:01 a.m. July 1 to 11:59 p.m. February 15. Scallops may be taken in the Kamishak District of Scallop Registration Area H from 12:01 a.m. August 15 to 11:59 p.m. October 31.

Scallop fishing seasons are subject to changes, closures, and other provisions of the FMP and State regulations.

3.2.5 Inseason Adjustments

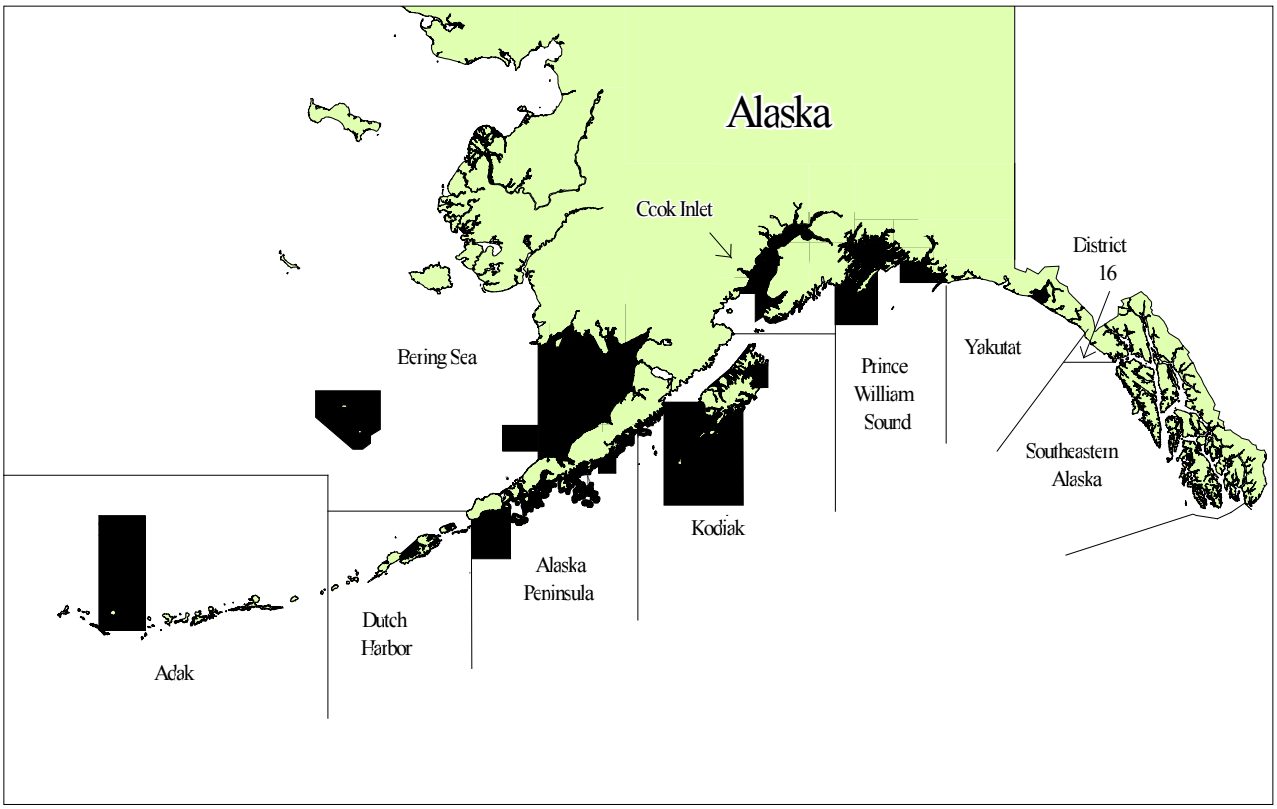
The State may make inseason adjustments to GHRs, fishing seasons, bycatch limits, and may close areas in State and Federal waters to scallop fishing. In making such adjustments, the State may consider all available data on factors such as: (1) overall fishing effort; (2) catch per unit effort and rate of harvest; (3) rate of bycatch; (4) relative scallop abundance; (5) attainment of the upper end of GHRs or bycatch limits; (6) general information on stock condition; (7) timeliness and accuracy of catch reporting; and (8) other factors that affect the State's ability to meet objectives of the FMP.

All inseason adjustments will be recorded and justified in writing. These justifications are attached to the emergency order and will be made available to the public.

3.2.6 Closed areas

State regulations implementing the FMP may include time and area closures designed to minimize bycatch and protect habitat. Existing State regulations close most areas that are also closed to bottom trawling to protect crab and other sensitive habitat. Closed areas will be specified in regulations. Existing closures in Alaskan coastal waters are shown in Figure 2.

Figure 2. Alaska coastal areas closed to scallop fishing.



3.2.7 Notices of closure

When the State determines that the upper end of a GHR or a CBL will be reached, the State will publish an Emergency Order giving notice of season closure.

3.2.8 Prohibited Species and Bycatch Limits

State regulations may prohibit vessels fishing under this FMP from retaining certain species identified as prohibited including salmon, halibut, king crab, Tanner crab, and herring. Species identified as prohibited must be avoided while fishing and must be immediately returned to the sea with a minimum of injury when caught and brought aboard. Prohibited species bycatch limits may be established for specified areas or subareas to limit bycatch of prohibited species in the scallop fishery.

Table 1. Statewide crab bycatch limits, in percent of the crab abundance estimate or number of crab.

Scallop Registration Areas	Red King Crab	C. bairdi	C. opilio
Yakutat (D)			
District 16	NA	NA	NA
Remainder of Area D	NA	NA	NA
Prince William Sound (E)			
Eastern Section of outside District	NA	0.5%[a]	NA
Cook Inlet (H)			
Kamishak District	0.5%[a]	60 crabs[a]	NA
Outer/Easter/Barren Island Districts	NA	NA	NA
Kodiak (K)			
Shelikof District	0.5% or 1.0%	0.5% or 1.0%	NA
Northeast District	0.5% or 1.0%	0.5% or 1.0%	NA
Semidi District	Regulated inseason	Regulated inseason	NA
Alaska Peninsula (M)	0.5% or 1.0%	0.5% or 1.0%	NA
Bering Sea (Q)	500 crabs[a]	Three Tier Approach	Three Tier Approach
Dutch Harbor (O)	0.5% or 1.0%	0.5% or 1.0%	NA
Adak (R)	50[b]	10,000[b]	NA

NA= Not applicable

[a]Fixed CBL

[b]Bycatch limit set to allow scallop fleet adequate opportunity to explore and harvest scallop stocks while protecting the crab resource.

3.2.9 Crab bycatch limits (CBLs)

Annual CBLs may be specified for red king crab and Tanner crab species in each registration area or district thereof. Table 1 details the CBLs by area. These are subject to change by the Board of Fisheries.

3.2.10 Time period for CBLs

Annual CBLs will be specified for the time period from July 1 through June 30 of the following year.

3.2.11 Observer Requirements and At-Sea Catch Sampling

Observer coverage requirements may be specified in State regulations. The State may place observers aboard scallop fishing and/or processing vessels to obtain fishery performance and biological data. Scallop vessels fishing in the GOA or BSAI must carry an ADF&G-certified scallop observer when asked to do so. No one shall forcibly assault, resist, impede, intimidate, or interfere with an observer placed aboard a fishing vessel under this FMP.

The State of Alaska currently requires 100% onboard observer coverage for all vessels fishing for scallops outside the Cook Inlet Registration Area as a condition for obtaining a permit. The focus of the scallop observer program is to monitor bycatch and to collect biological and fishery data relating to the weathervane scallop. The sampling program is designed to answer questions necessary for successful management of the resource.

The scallop observer program collects a variety of biological data on a daily basis. Each fishing day, the observer's goal is to sample a single dredge from one tow for species haul composition and a single dredge from 5 different tows for crab and halibut bycatch and discarded scallop catch. Haul composition sampling documents all species caught in the dredge by weight. For bycatch samples, observers identify, count, measure, classify, and record the number and condition of crab and halibut caught in the dredge. The discarded scallop catch is collected and weighed, and a subsample is examined to determine the weight and number of broken and intact scallops. Shell heights are measured from samples of both retained and discarded scallops, and shells are collected for age determination.

Observers report scallop harvest, number of tows, area fished, and crab bycatch to ADF&G at minimum three times per week during the season by radio or email; these data are used extensively by ADF&G for inseason fishery management. ADF&G Reports summarize all data collected by the observer program and are made available to the public (e.g., Barnhart and Rosenkranz, 2003).

3.2.12 Recordkeeping and Reporting Requirements

The State may implement recordkeeping and reporting requirements as necessary to meet the management objectives of the FMP. As the scallop fishery has grown over the years, so has our knowledge of the species. Information gained through scientific surveys, research, and fishermen's observations have all led to a better understanding of the biology, environmental requirements, and behavior of Alaska's scallop stocks. Because managment decisions are made inseason based on fishery data from the fleet, the State's catch and processing reporting requirements are an important component in achieving the management objectives of the FMP.

NMFS should coordinate with ADF&G to the extent possible to gather data needed to improve understanding of scallop stock dynamics and the effect of exploitation on the stock's capacity to produce MSY on a continuing basis. Useful data would include information on: (1) stock abundance and size/age structure; (2) scallop biology, life history, and stock production parameters; (3) analyses of population thresholds and recruitment overfishing; (4) estimation of optimum dredge ring size or minimum shell height based on studies of rates of growth and mortality; (5) investigations of exploitation rates and alternative management strategies; (6) genetic stock structure; and (7) new gear designs to reduce bycatch and to minimize adverse effects on bottom habitat. These objectives may be attained, in part, through use of data collected by the scallop observer program. However, stock assessments and other scallop research will be dependent on Federal funding, State of Alaska general fund appropriations, or future amendments to the FMP that would authorize experimental fishing under Federal permit conditions.

3.2.13 Other

As previously noted, the State of Alaska is not limited solely to the management measures described in this FMP. However, implementation of additional management measures not described here must be consistent with the FMP, the Magnuson-Stevens Act, and other applicable Federal law.

Chapter 4 Description of Stocks and Fishery

4.1 Geographic description of the management area

The management areas covered under the FMP includes all Federal waters of the Gulf of Alaska (GOA) and the Bering Sea/Aleutian Islands area (BSAI). The GOA is defined as the U.S. exclusive economic zone (EEZ) of the North Pacific Ocean, exclusive of the Bering Sea, between the eastern Aleutian Islands at 170°W. longitude and Dixon Entrance at 132°40'W. longitude. The BSAI is defined as the U.S. EEZ south of the Bering Strait to the Alaska Peninsula and Aleutian Islands and extending south of the Aleutian Islands west of 170° W. longitude.

4.1.1 Registration Areas, District, Subdistrict, and Section Boundaries

This FMP adopts existing State registration areas. The management unit historically has been divided by the State into nine scallop registration areas composed of the Federal waters and adjacent State waters described in each area (Appendix B). Registration areas may be further divided into fishing districts, subdistricts, and sections for purposes of management. For the purpose of scallop management, the State has divided the Yakutat, Cook Inlet, and Kodiak Registration Areas into districts.

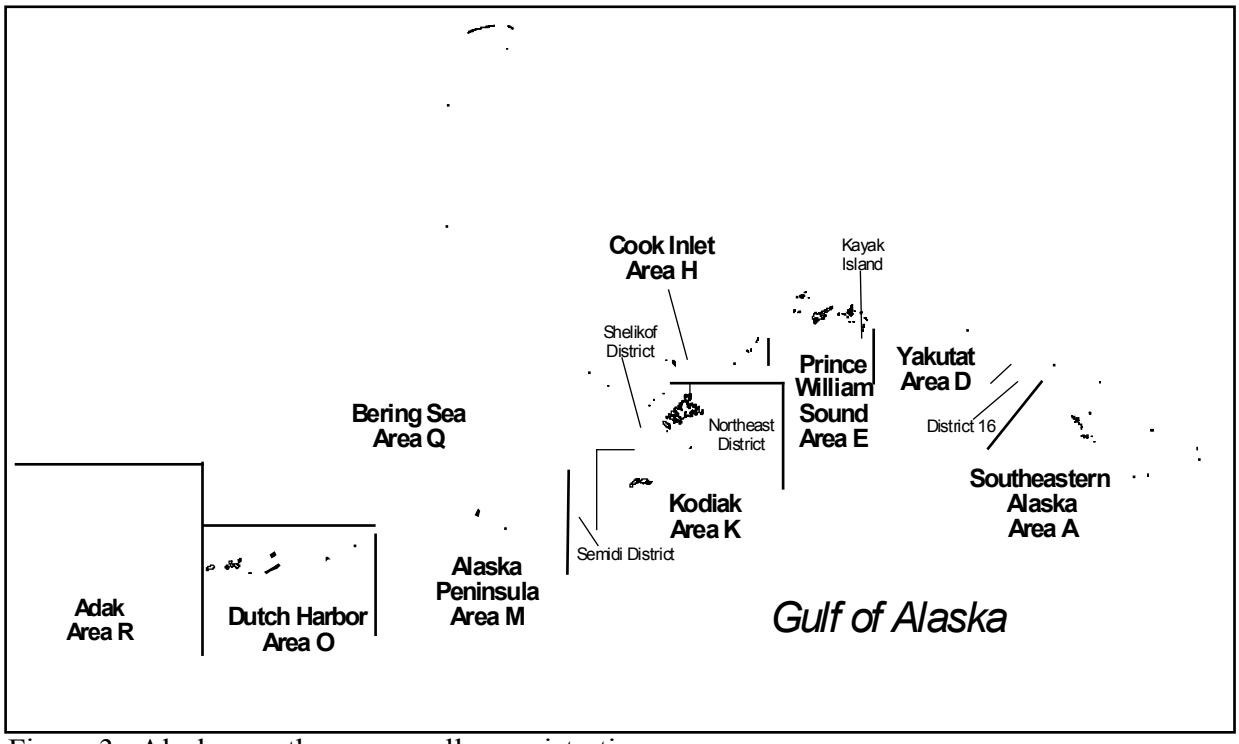


Figure 3. Alaska weathervane scallop registration areas

Registration areas are characterized by relatively homogeneous established fisheries on scallop stocks. State regulations require vessels to register for fishing in these areas, and may require vessels to register for specific fishing districts within a registration area. Registration requirements allow estimation of fishing effort and the rate at which the resource will be harvested. Existing Registration Areas and districts are shown in Figure 3 and defined in Appendix B.

4.2 Physical characteristics of the management area

The continental shelf parallels the southeastern Alaska coast and extends around the GOA. Total area of continental shelf in the GOA is about 160,000 square km, which is more than the shelf area in the Washington-California region but less than 25 percent of the eastern Bering Sea Shelf. Between Canada and Cape Spencer the Continental Shelf is narrow and rough. North and west of Cape Spencer it is broader. Although its width is less than 10 miles at some points, it is generally 30 to 60 miles wide. As it curves westerly from Cape Spencer towards Kodiak Island it extends some 50 miles seaward, making it the most extensive shelf area south of the Bering Sea. West of Kodiak Island and proceeding along the Alaska Peninsula toward the Aleutian Islands, the shelf gradually becomes narrow and rough again. More detailed information on the Alaskan shelf can be found in Sharma (1979).

Coastal waters overlying the continental shelf are subject to considerable seasonal influences. Winter cooling, accompanied by turbulence and mixing due to major storms results in a uniform cold temperature in the upper 100 m. Seasonal changes in temperature and salinity diminish with increasing depth and distance from shore. Along the outer shelf and upper slope, bottom water temperatures of 4 to 5° C persist year-round throughout the periphery of the GOA. With further increase in depth, water temperature shows no significant seasonal change but gradually decreases with depth, reaching 2° C or less at greater depths. The water circulation pattern in both the eastern Bering Sea and Gulf of Alaska is a counterclockwise gyre (Sharma 1979). Inshore current flow patterns are affected by weather, tides, and topography.

All commercial fisheries for Alaskan scallops take place in relatively shallow waters (< 200 m) of the continental shelf. Weathervane scallops are found at depths ranging from intertidal waters to depths of 300 m (Foster 1991), but abundance tends to be greatest between depths of 45-130 m on substrates consisting of mud, clay, sand, or gravel (Hennick 1973). Although weathervane scallops are widely distributed along the shelf, the highest densities in Alaska have been found to occur in discrete areas. Areas fished during the 2003/2004 scallop fishery included beds in the Bering Sea, off the Alaska Peninsula, in Shelikof Strait, on the east side of Kodiak Island, and along the Gulf coast from Yakutat to Kayak Island (Figure 4).

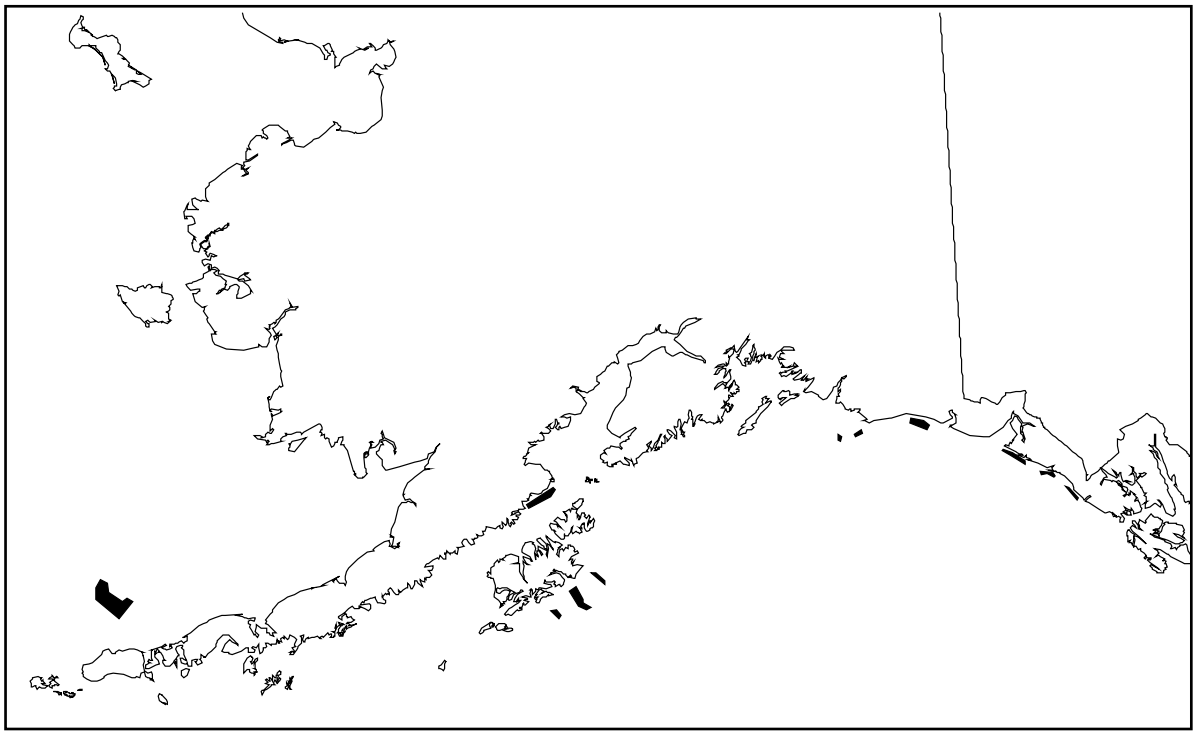


Figure 4. Scallop fishing locations outside Cook Inlet during the 2003/04 season.

4.3 Description of Stocks and Fishery

This FMP covers all scallop stocks off the coast of Alaska including weathervane scallops *Patinopecten caurinus*, rock scallops *Crassadoma gigantea*, pink scallops *Chlamys rubida*, spiny scallops *Chlamys hastata*, *Chlamys behringiana*, and *Chlamys albida*.

4.3.1 General Biology

Weathervane scallops are distributed from Point Reyes, California to the Pribilof Islands, Alaska. The highest densities in Alaska are found along the eastern gulf coast from Cape Spencer to Cape St. Elias, around Kodiak Island, and in the Bering Sea.

The weathervane scallop is a bivalve with a single adductor muscle, a socket-like hinge, and distinct dorsal and ventral valves. Scallops have limited swimming ability achieved through hydraulic water pressure due to clapping the valves together. Numerous eyes (ocelli) are located on stalks along the outer mantle. Scallops are non-burrowing filter feeders that subsist primarily on phytoplankton.

Although weathervane scallops are currently the only species commercially harvested in Alaska, several other scallop species found in the EEZ off Alaska have commercial potential. These scallops are related to the Icelandic scallop *Chlamys islandica* of the North Atlantic and grow to smaller sizes than weathervane scallops; *Chlamys behringiana* inhabit the Chukchi Sea to the Western Bering Sea, *Chlamys albida* are distributed from the Bering Sea and Aleutian Islands to the Japan Sea, pink scallops range from California to the Pribilof Islands, and spiny scallops are found in coastal regions from California to the Gulf of Alaska. Little is known about the biology of these scallop species. *Chlamys* species occupy different habitats and have different growth characteristics than weathervane scallops. Pink scallops are found to depths of 200 m in areas with soft bottom, whereas spiny scallops occur in shallower (<150 m) areas characterized by hard bottoms and strong currents. Spiny scallops grow to slightly larger sizes (75 mm shell height, SH) than pink scallops (60 mm SH). Both species mature at age 2 (~35 mm SH) and are characterized by a high natural mortality rate and maximum age of about 6 years. Spiny scallops are autumn spawners (August–October), whereas pink scallops are winter spawners (January–March; Bourne and Harbo 1987).

Rock scallops *Crassadoma gigantea* range from Mexico to Unalaska Island. The abundance of this species is not known, and a commercial fishery has never been developed. Because they attach themselves to rocks, they cannot be captured efficiently with trawls or dredges. As suggested by the species name, these scallops attain a large size (up to 250 mm SH) and exhibit fast growth rates. Rock scallops are found in relatively shallow areas (0–80 m) with strong currents. Distribution of this species appears to be discontinuous and abundance in most areas is low. Rock scallops may spawn during two distinct periods, one in autumn (October–January) and one during spring–summer (March–August; Jacobsen 1977).

4.3.2 Reproduction and early life history

Scallop sexes are in general separate, although one case of hermaphroditism in weathervane scallops has been observed (Hennick 1971). Mature male and female scallops are distinguishable through gonad coloration, with pink or orange-red gonads in females and white gonads in males (Haynes and Powell 1968; Robinson and Breese 1984). Although spawning times vary with latitude and depth (Robinson and Breese 1984; MacDonald and Bourne 1987; Starr and McCrae 1983), weathervane scallops in Alaska appear to mature in mid-December to late January and spawn in May through July (Hennick 1970a).

Scallops develop through egg, larval, juvenile, and adult life stages. Eggs and spermatozoa are released into the water, where the eggs may be fertilized (Cragg and Crisp 1991). After a few days, eggs hatch and larvae rise into the water column to drift with ocean currents. Larvae are pelagic for about one month until metamorphosis to the juvenile stage (Bourne 1991). Post-larval scallops settle to the bottom and may attach to a hard surface with byssal threads. Young juveniles may remain attached or become mobile; within a few months, the shell develops pigmentation and juveniles resemble adults in appearance.

Most weathervane scallops mature by age 3 at about 76 mm SH, and virtually all scallops are mature by age 4 (Haynes and Powell 1968; Hennick 1970b, 1973). Growth is most rapid during the first 10-11 years (Hennick 1973). However, growth, maximum size, and size at maturity vary significantly within and between beds and geographic areas. For example, average maximum size is about 190 mm SH off the east side of Kodiak Island and only 144 mm SH for the Cape Fairweather-Cape St. Elias area; the largest recorded specimen measured was 250 mm SH (Hennick 1973). Although increasing with age and size, scallop meat weight varies seasonally, with yields declining during the spawning season and increasing during the growing season. Adductor weights of weathervane scallops apparently vary among regions as well, with the west side of Kodiak Island producing the largest meats relative to shell size (Jeff Barnhart, ADF&G, unpublished data).

4.3.3 Longevity and natural mortality

Weathervane scallops can live 28 years or more (Hennick 1973). A median instantaneous natural mortality rate of M=0.13 was estimated by Kruse and Funk (1995). Their estimate was based on data presented in published papers (Kaiser 1986; Hennick 1973) and various methodology, including growth parameter analysis (Alverson and Carney 1975), catch curve analysis (Robson and Chapman 1961), and maximum age (Hoenig 1983; Beverton 1963). Little is known about the causes of natural mortality for scallops. Scallops are likely prey for various fish and invertebrates during the early part of their life cycle. Flounders (*Pleuronectides* spp.) are known to prey on juvenile weathervane scallops, and seastars (Stelleroidea) may also be important predators (Bourne 1991).

4.3.4 Stock Structure and Productivity

The stock structure of weathervane scallops has not been studied. Until recently, benthic ecologists generally believed that invertebrate species such as scallops have open populations that are interconnected between geographically distinct areas through advection of pelagic larvae. However, a growing body of evidence (e.g., Sinclair 1988; Orensanz et al. 1991) suggests that some invertebrate populations are comprised of multiple discrete, self-sustaining units. Sinclair et al. (1985) suggested that populations of 3 species of scallops in the North Atlantic Ocean were organized this way; between Virginia and Newfoundland, at least 19 discrete concentrations of Atlantic scallops were identified. Fevolden (1989) provided strong evidence for restricted gene flow among different concentrations of Iceland scallops in the northeast Atlantic Ocean and concluded that scallops sampled from different areas should be treated as discrete genetic units for management purposes. Caddy (1989) asserted that it is reasonable to assume that historically maintained centers of scallop concentrations are self-sustaining populations. Further, he recommended that these commercially important scallop beds should compose the unit stock upon which management measures are based. He also noted that a scallop fishing ground may contain several beds of high scallop density surrounded by low-density scallop fishing areas.

4.4 Present Condition and Abundance

ADF&G establishes GHRs and manages weathervane scallop harvests conservatively in each fishing area based on the best data currently available. The Scallop Plan Team reviews management practices regularly and updates the scallop SAFE report with recent abundance survey information and fishery performance data. Due to the absence of scallop biomass estimates for many fishing areas, OY and MSY are set for the statewide stock as a whole; harvest levels have averaged 39% to 66% of MSY since inception of the observer program in 1993 (Figure 5), and the stock is not overfished.

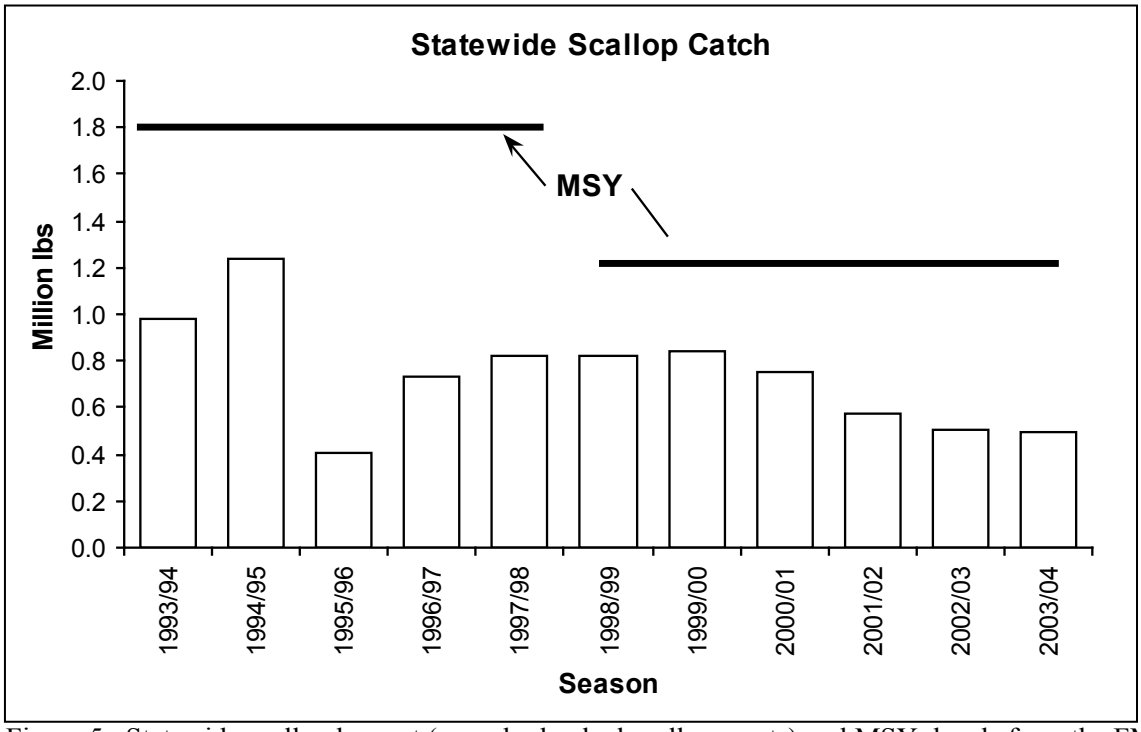


Figure 5. Statewide scallop harvest (pounds shucked scallop meats) and MSY levels from the FMP.

The State of Alaska Scallop Fishery Management Plan established 9 scallop registration areas in Alaska for vessels commercially fishing for scallops (Figure 1). These include the Southeastern Alaska Registration Area (Area A);Yakutat Registration Area (Area D and District 16); Prince William Sound Registration Area (Area E); Cook Inlet Registration Area (Area H); Kodiak Registration Area (Area K), which is subdivided into the Northeast, Shelikof and Semidi Districts; Alaska Peninsula Registration Area (Area M); Dutch Harbor Registration Area (Area O); Bering Sea Registration Area (Area Q); and Adak Registration Area (Area R). Scallop seasons are not opened in Area A, and effort occurred in Area R in 1995 only. Stocks in each area are independently assessed with methods that vary by region.

ADF&G conducts biennial dredge surveys in the Kamishak District of the Cook Inlet Registration Area and near Kayak Island in the Prince William Sound Registration Area. For registration areas without surveys, stocks are assessed and managed based on extensive data sets collected by the scallop observer program. These data consist of scallop catch and fishing effort, including total harvest, CPUE, fishing locations, size structure of the catch, and crab bycatch. Confidential spatially explicit observer data is examined in detail each year when GHRs are set. ADF&G personnel have developed methodology for fishery-independent video surveys of scallop stocks in the highest-producing beds that should provide biomass estimates for additional areas in the future.

GHRs for registration areas where scallop fishing traditionally occurred were first established by the State of Alaska in 1993 under the Interim Management Plan for Commercial Scallop Fisheries in Alaska. The upper limit of the GHR (pounds of shucked meats) from traditional areas included Yakutat (250,000 pounds), Prince William Sound (50,000), Kamishak District of Cook Inlet (20,000 pounds), Kodiak (400,000 pounds), and Dutch Harbor (170,000) pounds. The combined upper limits of the GHRs totaled 890,000 pounds of shucked meats. GHRs for each area were determined by averaging historic catches from 1969 to 1992 excluding years when either no fishing or a "fishing-up effect" occurred (Barnhart 2003). Production may be over-estimated by using data from "fishing-up" periods, when catches exceed sustainable levels as a newly established fishery removes older individuals from a population and exploits marginal beds that may rebuild slowly.

Prior to the August 1, 1996 opening of the weathervane scallop fishery, ADF&G established GHRs for non-traditional registration areas. GHR upper limits were established for the Alaska Peninsula (200,000 pounds), Bering Sea (600,000 pounds), District 16 (35,000 pounds) and Adak (75,000 pounds). Historic high catches for each registration area were established as the GHR upper limit. The combination of GHRs from traditional and non-traditional areas totaled 1.8 million pounds of shucked scallop meats, which was defined as MSY in Amendment 1 to the FMP.

In 1998, the scallop plan team recommended a more conservative approach, defining MSY as 1.24 million pounds of shucked scallop meats based on average landings from 1990–1997, excluding 1995 when the fishery was closed most of the year. Subsequently, MSY was established in Amendment 6 of the FMP at 1.24 million pounds and optimum yield (OY) as a range from 0 to 1.24 million pounds. To accommodate the lower limits the department reduced the upper end of the GHR in Kodiak from 400,000 to 300,000 pounds, in Dutch Harbor from 170,000 to 110,00 pounds, and in the Bering Sea from 600,000 to 400,000 pounds.

Vessel participation and total catch by registration area and year are published in the annually updated Stock Assessment and Fishery Evaluation (SAFE) Report compiled by the Scallop Plan Team of the North Pacific Fishery Management Council. Copies of the SAFE Report are available through the Council office. With the exception of Kodiak, Prince William Sound and Cook Inlet (except recent years), catches have been well below state GHRs for each area. The Alaska Department of Fish and Game has obtained release forms signed by vessel operators in order to display confidential catch information. Whenever possible, unless otherwise indicated as "confidential", catch records have been made available for publication by the State.

4.5 Ecological Relationships

Scallop predators have not been well studied. Scallops are likely prey to various fish and invertebrates during the early part of their life cycle. Flounders are known to prey on juvenile weathervane scallops, and seastars may also be important predators.

4.6 Habitat of managed stocks

Appendix D describes the habitat of the GOA and BSAI management areas for scallops, defines essential fish habitat for scallops, describes habitat areas of particular concerns, and provides habitat conservation and enhancement recommendations.

4.7 Fishing Activities Affecting the Scallop Stocks

4.7.1 History of exploitation

Since the early 1980's, between 4 and 20 vessels annually have participated in the Alaska scallop fishery. Gross earnings experienced by the fleet during this same period of time has ranged from almost $.9 million in

1983 to about $7 million in 1992. Between 1969 and 1991, about 40 percent of the annual landings of scallops from waters off Alaska were comprised of scallops harvested from State waters. Table 3 shows the percent of scallop harvest caught in federal waters versus state waters from 1998/99 through the 2003/04 regulatory season. GHRs are set for a regulatory area, regardless of state or federal jurisdiction within that area. Examining the percentage of harvest between state and federal areas gives an indication of where the harvest is primarily being taken, although this is not necessarily an indication of the biological availability of the resource. The State of Alaska has managed the scallop fishery in State and Federal waters, consistent with section 306(a)(3) of the Magnuson Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.), which allows a state to directly regulate any fishing vessel outside state waters if the vessel is registered under the law of that state.

Table 3. Percent of Scallop Meats Caught in Federal and State Waters

Registration Area	District	Federal/State Waters	Percent of Harvest by State/Federal Water[a,b]					
			1998/99	1999/2000	2000/01	2001/02	2002/03	2003/04
D	**D**	**FED**	**65%**	**70%**	**80%**	**64%**	**78%**	**56%**
		STATE	**35%**	**30%**	**20%**	**36%**	**22%**	**44%**
	D Total		100%	100%	100%	100%	100%	100%
	D16	**FED**	**28%**	**55%**	**13%**	**28%**	**100%**	**83%**
		STATE	**72%**	**45%**	**87%**	**72%**	**-**	**17%**
	D16 Total		100%	100%	100%	100%	100%	100%
E	**E**	**FED**	**68%**	**30%**	**100%**	**100%**	**100%**	**100%**
		STATE	**32%**	**70%**	**-**	**-**	**-**	**-**
	E Total		100%	100%	100%	100%	100%	100%
H	**H**	**FED**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
	H Total		100%	100%	100%	100%	100%	100%
K	**KNE**	**FED**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
	KNE Total		100%	100%	100%	100%	100%	100%
	KSH	**FED**	**69%**	**74%**	**70%**	**51%**	**61%**	**70%**
		STATE	**31%**	**26%**	**30%**	**49%**	**39%**	**30%**
	KSH Total		100%	100%	100%	100%	100%	100%
	Semidi	**FED**	**56%**	**-**	**-**	**-**	**-**	**-**
		STATE	**44%**	**100%**	**-**	**-**	**-**	**-**
	Semidi Total		100%	100%	-	-	-	-
M	**M**	**FED**	**100%**	**100%**	**100%**	**-**	**-**	**-**
		STATE	**0%**	**0%**	**-**	**-**	**-**	**-**
	M Total		100%	100%	100%	-	-	-
O	**O**	**FED**	**0%**	**4%**	**-**	**-**	**4%**	**-**
		STATE	**100%**	**96%**	**-**	**-**	**96%**	**-**
	O Total		100%	100%	-	-	100%	-
Q	**Q**	**FED**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
	Q Total		100%	100%	100%	100%	100%	100%

[a]0% indicates some fishing occurred, an insignificant amount was caught

[b]- designation indicates no fishing occurred

The Alaska Department of Fish and Game (ADF&G) initiated development of a management plan for the scallop fishery in response to overfishing concerns resulting from recent changes in the weathervane scallop fishery off Alaska. Weathervane scallops possess biological traits (e.g., longevity, low natural mortality rate, and variable recruitment) that render them vulnerable to overfishing. Record landings occurred in the late 1960's (about 1.8 million pounds shucked scallop meat), followed by a significant decline in catch through the 1970's and 1980's when landed catch ranged between 0.2 and 0.9 million pounds. The ADF&G believes this decline is due, in part, to reduced abundance of scallop stocks (Kruse, 1994). Landings since 1989 have increased to near record levels. During this period, the number of vessels fishing for scallops has not increased (about 10 - 15 vessels annually), although an increase in fishing power is evidenced by a substantial increase in

average vessel length (from 84 feet registered length in 1981 to 110 feet in 1991), a predominance of full-time scallop vessels, and an increased number of deliveries. Until 1993, the State did not have a data collection program, although some indication exists that overfishing, or at least localized depletion may have occurred. Data voluntarily submitted by participants in the scallop fishery during the early 1990's showed that an increase in meat counts per pound has occurred, indicating that smaller scallops now account for a greater proportion of the harvest. These data also suggest that catch per unit of effort in traditional fishing grounds has decreased.

Limited age data suggest that the scallop stock historically exploited off west Kodiak Island experienced an age-structure shift from predominately age 7 and older scallops in the late 1960's to an age structure predominated by scallops less than age 6 during the early 1970's. This shift indicated that harvest amounts had exceeded sustainable levels. Changes in fleet distribution from historical fishing grounds primarily in State waters to previously unfished grounds in the EEZ compounded management concerns.

In response to these concerns, the ADF&G implemented a management plan for the scallop fishery in 1993-94 that established a total of nine fishery registration areas corresponding to the Southeastern, Yakutat, Prince William Sound, Cook Inlet, Kodiak, Alaska Peninsula, Dutch Harbor, Adak, and Bering Sea portions of the State. To prevent overfishing and maintain reproductive potential of scallop stocks, ADF&G established a guideline harvest range (GHR) for each of the traditional weathervane scallop fishing areas. In the absence of biomass estimates needed to implement an exploitation rate harvest strategy, the upper limit of the GHRs are specified as the long-term productivity (catch) from each of the traditional harvest areas. The ADF&G may adjust GHRs based on changes in stock status, such as shifts in population size/age structure coupled to changes in area-specific catch-per-unit-effort. If a GHR for a registration area is not specified, ADF&G may authorize fishing for weathervane or other scallop species under special use permits that generally include location and duration of harvests, gear limitations and other harvest procedures, periodic reporting or logbook requirements, requirements for onboard observers, and scallop catch or crab bycatch limits.

The ADF&G also has implemented king and Tanner crab bycatch limits to constrain the mortality of Tanner crab and king crab incidentally taken by scallop dredge gear. Generally, crab limits are set at 1 percent of total crab population for those management areas where crab stocks are healthy enough to support a commercial fishery. In areas closed to commercial fishing for crab, the crab bycatch limits for the scallop fishery are set at 0.5 percent of the total crab population.

Specified waters are closed to fishing for scallops to prevent scallop dredging in biologically critical habitat areas, such as locations of high bycatch of crab or nursery areas for young fish and shellfish. State regulations also require each vessel to carry an observer at all times to provide timely data for monitoring scallop catches relative to GHRs and for monitoring crab bycatch. Observers also collect scientific data on scallop catch rates, size distribution and age composition. This information is required by ADF&G for potential adjustment of GHRs based on changes in stock status and productivity.

Last, ADF&G regulations establish gear specifications to minimize the catch of undersized scallops and efficiency controls to reduce the economic feasibility of harvesting scallops much smaller than sizes associated with optimum yield. Current efficiency controls include a ban on automatic shucking machines and a crew limit of 12 persons.

4.7.2 Commercial Fishery

The weathervane scallop fishery is prosecuted with standard New Bedford style scallop dredges. On average, fully-rigged[1] dredges weigh the following: a 6ft dredge weighs between 900-1200 pounds (J. Barnhart, ADF&G pers. comm.); an 8ft dredge weights between 1500-1600 pounds (J. Barnhart, ADF&G, pers. comm.); and a 15ft dredge weighs approximately 2,600 pounds. The frame design provides a rigid, fixed dredge opening. Attached to and directly behind the frame is a steel ring bag consisting of 4-inch (inside diameter) rings connected with steel links. A sweep chain footrope is attached to the bottom of the mesh bag. The top of the bag consists of 6-inch stretched mesh polypropylene netting which helps hold the bag open while the dredge is towed along the ocean floor. A club stick attached to the end of the bag helps maintain the shape of the bag and provides for an attachment point to dump the dredge contents on deck. Steel dredge shoes that are welded onto the lower corners of the frame bear most of the dredge's weight and act as runners, permitting the dredge to move easily along the substrate. Each dredge is attached to the boat by a single steel wire cable operated from a deck winch.

All vessels fishing inside the Cook Inlet Registration Area are limited to a single dredge not more than 6 feet in width. Unless otherwise restricted by the LLP, vessels fishing in the remainder of the state may simultaneously operate a maximum of 2 dredges that are 15 feet or less in width. Vessels used in the weathervane scallop fishery range in size from 58 feet to 124 feet length overall with a maximum of 850 horsepower.

Federal LLP permits have been voluntarily consolidated by the fleet through an industry cooperative. Three larger vessels with LLP permits, including one limited by American Fisheries Act (AFA) sideboards, participate in the federal water portion of the fishery and harvest the majority of the scallop quota in the federal (statewide) fishery outside of Cook Inlet. Three smaller vessels with LLP permits participate primarily in the Cook Inlet fishery. Occasionally, one of the smaller vessels participates in the scallop fishery outside of Cook Inlet.

In 1997, the Alaska legislature approved legislation (AS 16.43.906) establishing a scallop vessel moratorium in state waters (0-3 miles). In 2001, the legislature authorized a 3-year extension of the moratorium, due to expire July 1, 2004. During the 2002 legislative session, passage of HB206 resulted in changes to the state's limited entry statutes. These changes authorized use of a vessel-based limited entry program in the weathervane scallop fishery. However, vessel entry permits issued for the statewide weathervane scallop fishery will expire on December 31, 2008 unless statutory authority is extended. Prior to the July 1, 2004 expiration of the state vessel moratorium, a vessel permit limited entry system for the statewide weathervane scallop fishery was in place. Eight vessel owners received permits to fish for weathervane scallops in state waters.

4.7.2.1 Voluntary Scallop Cooperative

In May 2000, six of the nine LLP owners formed the North Pacific Scallop Cooperative under authority of the Fishermen's Cooperative Marketing Act, 48 Stat. 1213 (1934), 15 U.S.C. Sec. 521. The cooperative regulates individual vessel allocations within the GHR and caps under the terms of their cooperative contract. The purpose of the cooperative was to slow the race for fish enabling participants to develop better techniques for bycatch avoidance, as well as to improve efficiency in targeting scallops.

According to members of the cooperative, the cooperative members negotiate allocations of scallops and crab bycatch among members annually and enforce those allocations through provisions in the cooperative contract.

[1] Fully-rigged dredge ready to fish includes ring bag, club stick and attachments

Participants must stop fishing once they have reached either their scallop allowance or crab caps. The cooperative contract gives co-op members the authority to seek injunctive relief if a member fails to cease fishing once their allocation is met.

According to cooperative members, some owners opted to remove their boats from the fishery due to decreased profitability in the scallop fishery in recent years. The catch history associated with those permits is then fished by the remaining vessels in the cooperative. Since formation of the cooperative, fewer vessels participate and fishing effort occurs over a longer time period each season.

4.7.3 Subsistence Fishery

There has been no known subsistence fishery for scallops.

4.7.4 Recreational Fishery

Anecdotal reports by ADF&G managers have indicated that some limited fishing for scallops by scuba divers in Southeast has occurred. Scallop dredges are legal personal use gear. Limited recreational harvest by longline fishermen, and by a personal use dredge in Prince William Sound has occurred.

4.8 Economic and Socioeconomic Characteristics

An overview of historic Alaska weathervane scallop harvest and wholesale revenue is presented in Table 4. This data is reprinted from Kruse et al. (in press). Vessel participation and numbers of landings in this fishery have varied considerably over time. Participation increased rapidly from an historic low of 2 vessels in 1967 to 19 in both 1968 and 1969. Similarly, only 6 landings occurred in 1967 but by 1969, 157 landings were made and that year is the historical peak in participation, landings, and catch and among the years with highest first wholesale gross revenue.

Following 1969, participation, landing, and catch trended downward through 1976. In 1977 and 1978 the fishery was open but fishermen opted not to fish. In 1980 there were 8 participants making 56 landings totaling more than 600,000 pounds of scallop meats. In the following years, participation, landings, and catch trended upwards until 1983 before cycling downward. There followed an upward trend in landings and catch through the mid 1990's. Since the mid 1990's, participation, landings, and catch have stabilized somewhat with catch consistently between 500,000 lbs and 850,000 pounds each year. Vessel participation has been limited in recent years by the formation of the voluntary cooperative in May 2000 and the implementation of the LLP in 2001. The federal LLP limits the participation to 9 permit holders. Since 2000 no more than 8 vessels have participated and in recent years it has been even fewer.

Table 4 also provides historical statewide average price per pound of landed scallop meats as well as a consumer price index based inflation adjusted price. Total gross revenue is then calculated using landed pounds of meats multiplied by the adjusted price. Adjusted price converts the landed prices by year to year 2002/03 values so that comparisons can be made in present day dollar values, after accounting for inflation. It is important to note that landed scallop meats have been processed (shucked) and frozen at sea. Thus, although landed price is often referred to as an ex-vessel price, it is actually a first wholesale price in that the landed product is a primary processed product. Thus, gross revenue is identified as first wholesale value here.

Table 4: Historic Statewide Commercial Weathervane Scallop Revenue Statistics, 1967-2002/03

Year	Number of Vessels	Number of Landings[a]	Catch (lbs meats)[b]	Average Price/lb.	Inflation Factor	Adjusted Price	1st Wholesale Value
1967	2	6	778[c]	$0.70	0.219	$3.20	$2,487
1968	19	125	1,677,268	$0.85	0.228	$3.73	$6,252,973
1969	19	157	1,849,947	$0.85	0.238	$3.57	$6,606,954
1970	7	137	1,440,338	$1.00	0.249	$4.02	$5,784,490
1971	5	60	931,151	$1.05	0.260	$4.04	$3,760,418
1972	5	65	1,167,034	$1.15	0.268	$4.29	$5,007,795
1973	5	45	1,109,405	$1.20	0.285	$4.21	$4,671,179
1974	3	29	504,438	$1.30	0.313	$4.15	$2,095,110
1975	4	56	435,672	$1.40	0.339	$4.13	$1,799,235
1976	7	21	264,788	$1.59	0.359	$4.43	$1,172,738
1977, 1978				**No Effort**			
1979	1	4	24,826	NA	NA	NA	NA
1980	8	56	616,717[c]	$3.60	0.484	$7.44	$4,587,151
1981	18	101	924,441	$4.00	0.529	$7.56	$6,990,102
1982	13	120	913,996	$3.25	0.561	$5.79	$5,294,986
1983	5	30	192,310	$5.00	0.584	$8.56	$1,646,490
1984	6	52	383,512	$4.00	0.607	$6.59	$2,527,262
1985	7	47	615,564	$4.00	0.627	$6.38	$3,927,043
1986	8	74	667,258	$4.25	0.639	$6.65	$4,437,944
1987	4	54	599,947[d]	$3.45	0.661	$5.22	$3,131,342
1988	4	47	341,070	$3.68	0.685	$5.37	$1,832,318
1989	7	55	534,763	$3.87	0.714	$5.42	$2,898,505
1990	9	144	1,481,136	$3.43	0.750	$4.57	$6,773,729
1991	6	136	1,136,649	$3.82	0.777	$4.92	$5,588,159
1992	8	136	1,785,673	$3.96	0.796	$4.97	$8,883,499
1993[e]	7	51	568,077	$5.15	0.816	$6.31	$3,585,290
1993/94	15	111	984,583	$5.15	0.816	$6.31	$6,213,974
1994/95	15	104	1,240,775	$5.79	0.833	$6.95	$8,624,354
1995/96	10	29	410,743[d]	$6.05	0.853	$7.09	$2,910,834
1996/97	9	30	732,424	$6.30	0.876	$7.19	$5,267,433
1997/98	9	31	818,913	$6.50	0.895	$7.26	$5,947,413
1998/99	8	35	822,096	$6.40	0.908	$7.05	$5,794,509
1999/00	10	22	837,971	$6.25	0.927	$6.74	$5,649,751
2000/01	8	20	750,617	$5.50	0.958	$5.74	$4,309,388
2001/02	6	26	572,838	$5.25	0.984	$5.34	$3,056,300
2002/03	6	28	509,455	$5.25	1.000	$5.25	$2,674,639

Notes: a: Prior to and including 1995, number of landings equals number of fish tickets. After 1995, the number of landings equals number of deliveries (off-loads). A delivery typically includes multiple tickets, normally one per week. b: Pounds of shucked scallop meats. c: Unshucked scallop deliveries were converted to shucked meats using a 10% conversion factor. d: Harvest includes those taken by a single vessel outside the jurisdiction of the State of Alaska in excess of the allowable limit. e: January 1 through June 30

Adjusted price generally trended upwards during the late 1960's and through the 1970s. Following the three years of closure, prices rose dramatically to nearly $7.5 per pound, possibly in response to shortage caused by the closures. Historic prices peaked in 1983 at $8.56 per pound before trending downward through the mid 1990's, upward during the late 1990's and then back downward from 1999 through 2002-03 when adjusted prices averaged $5.25 per pound. This trend may be directly related to U.S. east coast scallop stock conditions and related market prices and the dependence of market prices in the Alaska scallop fishery on east coast markets is a topic for further research.

First wholesale revenue in this fishery has varied considerably over the years as both price and landings have varied. The peak value in the fishery occurred in 1992 when about $8.8 million was earned. Since that time, total first wholesale revenue in the fishery has trended downward along with landings, catch, and prices. In 2002-03, the fishery yielded about $2.7 million in total first wholesale revenue.

4.9 Fishing Communities

Table 5 lists the landings (in number of offloads) of weathervane scallops by ports from 1990-2003. Alaskan ports which have landed scallops during this time period are: Cordova, Dutch Harbor, Homer, Kodiak, Ketchikan, Petersburg, Pelican, Seldovia, Seward, Sitka, Sand Point and Yakutat. Communities outside of Alaska include Bellingham, WA and Seattle, WA.

An overview of major demographic characteristics of these communities as well as their connections with North Pacific fisheries are provided in Appendix F. Additional information may be found in Sepez et al. 2004.

Table 5: Statewide weathervane scallop landings by port, 1990 through 2003
(Landings are indicated by the number of offloads at a specific port)

Port	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Landings
Bel/Sea, WA												1	3	1	5
Cordova	1		6	1		1		1	1	1	8				20
Dutch Harbor	12	13	8	32	27	1		14	4	3	2	4	4	3	127
Homer	2			15	12	2	11	7	12	4	8	6	7	13	99
Kodiak	70	48	49	64	44	6	15	14	15	12	6	8	9	10	370
Ketchikan	1														1
Petersburg	2														2
Pelican				3											3
Seldovia														1	1
Seward	5		1	3	4	2	7	5	20	21	10	3			81
Sitka	8	24	15	6	2	2								1	58
Sand Point										1					1
Yakutat	22	16	34	3	5	3	4	6	10	3	3	12	7	2	130
At Sea												1	1	4	6
Total Landings	123	101	113	127	94	17	37	47	62	45	37	35	31	35	904

Chapter 5 Relationship to Applicable Law and Other Fisheries

This FMP is consistent with the Magnuson-Stevens Act (16 USC 1851), including the ten National Standards and other applicable law. Under the Federal FMP initiated in 1995, all management measures, except limited access and MSA requirements, are delegated to the State of Alaska. ADF&G management of the weathervane scallop fishery covers both state and federal waters off Alaska.

Chapter 6 Reference Material

6.1 Sources of Available Data

Additional sources of information on Scallop fisheries may be found on the following web sites:

National Marine Fisheries Service:

http://www.fakr.noaa.gov/sustainablefisheries/scallop/default.htm

North Pacific Fishery Management Council:

http://www.fakr.noaa.gov/npfmc/fmp/scallop/scallop.htm

Alaska Department of Fish and Game, Division of Commercial Fisheries:

http://www.cf.adfg.state.ak.us/geninfo/shellfsh/shelhome.php

6.2 Management & Enforcement Considerations

This section provides information on the management and enforcement considerations for the scallop fishery off Alaska. Management and enforcement consideration include the personnel included in managing the fisheries, data collection, research and stock evaluation and assessment, and the related costs of each. Additional information on the management of the fishery may be obtained from ADF&G.

Enforcement of regulations in the scallop fishery is accomplished by a range of state and federal responsibilities. This includes the NOAA enforcement of federal LLP permits, the role of the U.S. Coast Guard as well as the service provided in monitoring compliance by trained scallop observers.

The Alaska Board of Fisheries has specific findings and regulations with respect to the scallop observer program and the role of observers in monitoring and data collection during the fishery. These are laid out in 5 AAC 39.141 and are excerpted below:

(a) The Board of Fisheries finds that in particular fisheries observers on board fishing vessels would generally enhance primarily by facilitating information gathering, and by improving regulatory compliance. Onboard observers may be the only practical fishery monitoring, data gathering, or enforcement mechanism in some Alaska fisheries where a large component of vessels, such as catcher-processors and floating processors, rarely or never enter Alaskan ports.

(b) Every onboard observer shall have free and unobstructed access to inspect the catch, equipment, gear, or operations of the fishing vessel or tender to which the observer is assigned.

(d) Onboard observes are not required to obtain criminal or administrative search warrants to conduct their duties.

(e) Onboard observers shall carry out such scientific and other duties as deemed necessary or appropriate to manage, protect, maintain, improve, and extend the fish and aquatic plant resources of the state.
(f) Onboard observers shall have free and unobstructed access to loran or GPS coordinates, at random, at least twice in each 24-hour period. However, an observer shall have access to loran or GPS coordinates at any time if the observer suspects illegal activities. These loran or GPS observations are not to interfere with normal operations of the vessel.

Observers are not enforcement agents. They are trained to document the incident in writing and with photographs and turn it over to ADF&G as soon as they return to port. Observers may be required to testify in court.

6.2.1 Management and Enforcement Activities: Description and Cost Estimates

6.2.1.1 Cooperative Management of Statewide Weathervane Scallop Fisheries

This project is funded by a NOAA grant for the continued Cooperative management between the Council, NMFS, the BOF and ADF&G for the weathervane scallop fishery in the EEZ off Alaska under a federal FMP.

Federal support is provided to the state to cover additional costs incurred to meet federal oversight and FMP objectives. This includes management and reporting responsibilities required by the FMP. These additional requirements, beyond those required under a wholly state managed program, require additional staff to coordinate with Council and NMFS personnel, travel to public meetings, aid in FMP amendment analyses, provide information to assure public process, achievement of OY and meet compliance with federal laws. Alaska has developed a comprehensive system for managing the scallop fisheries both within state waters and the U.S. EEZ. This system represents the acquired expertise of numerous state employees across the management regions of the state. The benefits of cooperative management provides: 1) some financial relief to the state for incurred costs of federal compliance; 2) significant cost savings to the NMFS, which does not have to duplicate and develop an extensive new management program to meet FMP requirements needed if they were to assume management under the federal program; and 3) scallop fisheries managed to optimum yields.

Cost: $259,000 including indirect charges

6.2.1.2 Scallop Stock Assessment

Central Region. Cook Inlet and Prince William Sound weathervane scallop stock assessment.
Cost: $83,000 including indirect charges

Statewide. Three year rotating schedule between the Yakutat Registration Area, Kodiak Registration Area and Bering Sea Registration Area.
Cost: $72,000

6.2.1.3 Other Management-related Costs

Approximately 11 biologists and technicians, in three administrative regions of Alaska, whose salaries, office space and associated costs are not covered in the Cooperative Management grant, are involved with some aspect of the weathervane scallop fishery. This includes briefing and debriefing onboard observers, management of the fishery, preparing for and attending Alaska Board of Fisheries meetings, and other duties.

6.2.1.4 Enforcement Costs

The primary purpose of the onboard scallop observer program is to collect biological and fishery-based data, monitor bycatch, and provide for regulatory enforcement. Beyond that, the Alaska State Troopers have been involved with enforcement activities involving scallop vessels. These activities range from routine inspections to case work.

Cost: The cost range is 1 man-hour to 35 man-hours per year.

6.3 Literature Cited

Alverson, D.L., and M.J. Carney. 1975. A graphic review of the growth and decay of population cohorts. Journal du Conseil, Conseil International pour lExploration de la Mer 36(2):133-143.

Baker, J.E., T.M. Church, S.J. Eisenreich, W.F. Fitzgerald, and J.R. Scudlark. 1993. Relative atmospheric loadings of toxic contaminants and nitrogen to great waters. Report to U.S. Environmental Protection Agency Great Waters Program Coordinator. 142p

Berg, R. J. 1977. An updated assessment of biological resources and their commercial importance in the St. George Basin of the eastern Bering Sea. OCSEAP Research Unit #437, NMFS, Juneau, Alaska, 116p.

Beverton, R.J.H. 1963. Maturation, growth, and mortality of clupeid and engraulid stocks in relation to fishing. International Council for the exploration of the Sea, Rapports et Proces-Verbaux de Reunions 154:44-67.

Bourne, N. 1991. Fisheries and Aquaculture: West Coast of North America. In: S.E. Shumway, (ed.), Scallops: biology, ecology, and aquaculture. Elsevier, N.Y. 1991.

Caddy, J.F. 1968. Underwater observations on scallop (Placopecten magellanicus) behavior and drag efficiency. Journal of the Fisheries Research Board of Canada 25: 2123-2141.

Caddy, J.F. 1989. A perspective on the population dynamics and assessment of scallop fisheries, with special reference to the sea scallop, Placopecten magellanicus Gmelin. Pages 559-589 in J.F. Caddy, editor. Marine invertebrate fisheries: their assessment and management. John Wiley and Sons, New York.

Clark, W.G. 1991. Groundfish exploitation rates based on life history parameters. Canadian Journal of Fisheries and Aquatic Sciences 48: 734-750.

Cragg, S.M. and D.J. Crisp. 1991. The biology of scallop larvae. Pages 75-132 in S.E. Shumway, editor. Scallops: biology, education and aquaculture. Developments in Aquaculture and Fisheries Science 21, Elsevier, New York.

Favorite, Felix and Taivo Laevastu, 1981. Finfish and the environment. *In* Hood, D.W. and J.A. Calder (eds.): The eastern Bering Sea shelf: oceanography and resources, Vol. 1. Univ. of Washington Press, Seattle, Washington: 597-610.

Fevolden, S. E. 1989. Genetic differentiation of the Iceland scallop Chlamys islandica (Pectinidae) in the northern Atlantic Ocean. Mar. Ecol. Prog. Ser. 51:77-85.

Garison, K. J. and B. S. Miller 1982, Review of the early life history of Puget Sound fishes. Fish. Res. Inst. University of Washington, Seattle, WA. 729p.

Gershanovich, D.E., 1963. Bottom relief of the main fishing grounds (shelf and continental slope) and some aspects of the geomorphology of the Bering Sea. Tr. Vses. Nauchno-issled. Inst. Morsk., Rybn. Khoz. Okeanogr. 48 (Izv. Tikhookean. Nauchno-issled. Inst. Morsk. Rybn. Khoz. Okeanogr. 50). (Transl. in Soviet Fisheries Investigations in the Northeast Pacific, Part I, p. 9-78 by Israel Program Sci. Transl., 1968. Avail. Natl. Tech. Inf. Serv., Springfield, VA as TT67-51203.)

Gershanovich, D.E., N.S. Fadeev, T.G. Lyubimova, P.A. Moiseev, and V.V. Natanov, 1974. Principal results of Soviet oceanography investigations in the Bering Sea. In D. W. Hood and E. J. Kelley (eds.): Oceanography of the Bering Sea. Inst. Mar. Sci., Univ. Alaska, pp. 363-370.

Goldsborough, W.J. 1997. Human impacts on SAV – a Chesapeake Bay case study. In: Aquatic Coastal Submerged Aquatic Vegetation. ASMFC Habitat Management Series #1. Washington, D.C.

Gould, E., Greig, R.A., Rusanowsky, D., and B.C. Marks. 1985. Metal-exposed sea scallops, Placopecten magellanicus: A comparison of the effects and uptake of cadmium and copper. In F.J. Thurberg, A. Calabrese, and W.B. Vernberg (Eds), Marine Pollution and Physiology: Recent Advances. Univ. South Carolina Press, Columbia S.C. pp. 157-186.

Gould, E., and B.A. Fowler. 1991. Scallops and Pollution. In: Sandra E. Shumway, (Ed), Scallops: biology, ecology, and aquaculture. Elsevier, N.Y. 1991.

Hamilton, K., and L.A. Mysak, Possible effects of the Sitka eddy on sockeye and pink salmon migration off Southeast Alaska. Can. J. Fish. Aquatic Sci. 43:498-504.

Hancock, D.A. 1973. The relationship between stock and recruitment in exploited invertebrates. Pages 113-131 in B.B. Parrish, editor. International Council for the Exploration of the Sea, Rapoorts et Proces-Verbaux des Reunions. 164.

Hartman, G., J.C. Scrivener, L.B. Holtby, and L. Powell. 1987. Some effects of different streamside treatments on physical conditions and fish population processes in Carnation Creek, a Coastal rain forest stream in British Columbia. IN: Streamside Management: Forestry and Fishery Interactions. Edited by E. O. Salo and T. W. Cundy. University of Washington, Institute of Forest Resources. Contribution No. 57.

Haynes, E.B., and G.C. Powell. 1968. A preliminary report on the Alaska sea scallop - fishery exploration, biology, and commercial processing. Alaska Department of Fish and Game, Division of Commercial Fisheries, Informational Leaflet 125, Juneau.

Hennick, D.P. 1970. Reproductive cycle, size at maturity, and sexual composition of commercially harvested weathervane scallops (Patinopecten caurinus) in Alaska. Journal of the Fisheries Research Board of Canada 27: 2112-2119.

Hennick, D.P. 1973. Sea scallop, Patinopecten caurinus, investigations in Alaska. Alaska Department of Fish and Game, Division of Commercial Fisheries, Completion Report 5-23-R, Juneau.

Hoenig, J.M. 1983. Empirical use of longevity data to estimate mortality rates. Fishery Bulletin 82(1): 898-902.

Hood, D.W. and E.J. Kelly, 1974. Introduction. *In* D. W. Hood and E. J. Kelly (eds.). Oceanography of the Bering Sea. Inst. Mar. Sci., Univ. Alaska, pp. XV-XXI.

Hood, D.W., and Zimmerman, S.T., eds. 1986. The Gulf of Alaska: Physical Environmental and Biological Resources, U.S.DOC, NOAA and Department of the Interior, MMS, pp.93-143.

Hunt, G. L. and P. J. Stabeno. 2002. Climate change and the control of energy flow in the southeastern Bering Sea. Progress in Oceanography 55:5-22.

Kaiser, R.J. 1986. Characteristics of the Pacific weathervane scallop (Pecten [Patinopecten] caurinus, Gould 1850) fishery in Alaska, 1967-1981. Alaska Department of Fish and Game, Division of Commercial Fisheries (Unpublished Report, Catalog RUR-5J86-01), Juneau.

Kinder, T. and J.D. Schumacher. 1981a. Hydrographic structure over the continental shelf of the southeastern Bering Sea. In *The Eastern Bering Sea Shelf: oceanography and resources.* Vol. 1. D.W. Hood and J.A. Calder, editors. OMPA?NOAA, Distributed by University of Washington Press, Seattle, WA.

Kinder, T.H., and J.D. Schumacher. 1981b. Circulation over the continental shelf of the southeastern Bering Sea. In: *Eastern Bering Sea Shelf: Oceanography and Resources*, D.W. Hood and J.A. Calder (eds.), *1*(5), 53–75, USDOC/NOAA/OMPA.

Klein, D.H., and E.D. Goldberg. 1970. Mercury in the marine environment. Env. Sci. Tech. 4(9):765-768.

Kruse, G.H. 1994. Fishery Management Plan for Commercial Scallop Fisheries in Alaska. ADF&G Draft Special Publication No. 5.

Kruse, G.H., Barnhart, J.P., and G.E. Rosenkrant. In press. Management of the data-limited weathervane scallop fishery in Alaska. Alaska Sea Grant, University of Alaska Fairbanks.

Kruse, G.H., and F.C. Funk. 1995. Biological Reference Points for Weathervane Scallops in Alaska, a poster presented to North Pacific Symposium on Invertebrate Stock Assessment and Management, Nanaimo, British Columbia, March 1995

Kruse, G.H., P.R. Larson, and M.C. Murphy. 1992. Proposed interim management measures for commercial scallop fisheries in Alaska. ADF&G Regional Information Report No. 5J92-08.

Kruse, G.H., E. Krygier, R.D. Mecum, and M.C. Murphy. 1993. Synopsis of the ADF&G scallop meeting, Anchorage, Alaska, July 15, 1993. ADF&G Regional Information Report No. 5J93-07.

LaPerriere, J.D., S.M. Wagener, and D.M. Bjerklie. 1985. Gold mining effects on heavy metals in streams, Circle Quadrangle, Alaska. Water Resources Bulletin 21:245-252.

Larsen, P.F., and R.M. Lee. 1978. Observations on the abundance, distribution, and growth of postlarval sea scallops, Placopecten magellanicus, on Georges Bank. The Nautilus 92:112-115.

Leaman, B.M. 1991. Reproductive styles and life history variables relative to exploitation and management of *Sebastes* stocks. Environmental Biology of Fishes 30:253-271.

Leibovitz, L., Schott, E.F., and R.C. Karney. 1984. Diseases of wild, captive, and cultured scallops. In: J.M. Capuzzo (Ed), Bay scallop fishery: Problems and management. Woods Hole Oceanographic Institution Tech. Rep. 84-38, pp. 8.

Lloyd, D.S., J. P. Koenings, J.D. LaPerriere. 1987. Effects of turbidity in fresh waters of Alaska. North American Journal of Fisheries Management 7:18-33.

MacDonald, B.A., and N.F. Bourne. 1987. Growth, reproductive output, and energy partitioning in weathervane scallops, *Patinopecten caurinus*, from British Columbia. Canadian Journal of Fisheries and Aquatic Sciences 44: 152-160.

McGarvey, R., F.M. Serchuk, I.A. McLaren. 1993. Spatial and Parent-Age Analysis of Stock-Recruitment in the Georges Bank Sea Scallop (Placopecten magellanicus) Population, Can. Journ. Fish. Aquat. Sci., 50:564-574.

Mearns, A.J., and D.R. Young. 1977. Chromium in the marine environment. In: C.S. Giam (Ed), Pollutant effects on marine organisms. Lexington Books: Lexington MA pp. 43-44.

Morris, B.F., Alton, M.S., and Braham, H.W. 1983. "Living Marine Resources of the Gulf of Alaska." NOAA Technical Memorandum, NMFS F/AKR-5, U.S. DOC.pp.1-232.

Murphy, G.I. 1967. Vital statistics of the Pacific sardine (*Sardinops caerulea*) and the population consequences. Ecology 48:731-736.

Murphy, G.I. 1968. Pattern in life history and the environment. American Naturalist 102:391-403.

Musgrave, D.L., Weingartner, T.J., and Royer, T.C. 1992."Circulation and hydrography in the northwest Gulf of Alaska." Deep-Sea Research, 39, pp.1499-1519.

National Marine Fisheries Service. 1979. Living marine resources, commercial fisheries and potential impacts of oil and gas development in the St. George Basin, eastern Bering Sea. Northwest and Alaska Fisheries Center, 133p.

National Marine Fisheries Service. 1980. Living marine resources and commercial fisheries relative to potential oil and gas Development in the northern Aleutian shelf area. NWAFC, Auke Bay Laboratory, Alaska Region, Juneau, Alaska, Juneau, Alaska, 92p.

Nelson, C.H., D.E. Pierce, K.W. Leong, and F.F. H. Wang, 1975. Mercury distribution in ancient and modern sediment of northeastern Bering Sea. Marine Geology 18:91-104.

NPFMC. 1998. Environmental Assessment for Amendment 6 to the Fishery Management Plan for the

Scallop Fishery off Alaska to 1. Revise Definitions of Overfishing, MSY, and OY and 2. Add Additional Information on Bycatch Data Collection to FMP. North Pacific Fishery Management Council, Anchorage, AK. 99506.

Oresanz, J.M., A.M. Parma, and O.O. Iribarne. 1991. Population dynamics and management of natural stocks. Pp. 625-713. In S.E. Shumway (ed.). Scallops: Biology, Ecology and Aquaculture. Developments in Aquaculture and Fisheries Science, 21. Elsevier, Amsterdam.

Pesch, G.G., Stewart, N.E., and C. Pesch. 1979. Copper toxicity to the bay scallop (Argopecten irradians). Bull. Environ. Contam. Toxicol. 23(6):765-769.

Peterson, C.H. & Summerson, H.C. 1992. Basin-scale coherence of population dynamics of an exploited marine invertebrate, the bay scallop: implications of recruitment limitation. *Mar.Ecol.Progr.Ser.,* 90: 257-272.

Potocsky, G.J., 1975. Alaska area 15- and 30-day ice forecasting guide. Naval Ocean. Office, Spec. Publ. 263: 190 p.

Rice, S.D., Moles, A., Taylor, T.L., and J.F. Karinen. 1979. Sensitivity of 39 Alaskan marine species to Cook Inlet crude oil and No. 2 fuel oil. In: Proceedings, Oil Spill Conference 19 Mar 1979, Los Angeles, CA (pp. 549-554). NOAA/NMFS Auke Bay Lab.

Rice, S.D., D.A. Moles, J.F. Karinen, S. Korn, M.G. Carls, C.C. Brodersen, J.A. Gharrett, and M.M. Babcock. 1984. Effects of petroleum hydrocarbons on Alaskan aquatic organisms: a comprehensive review of all oil-effects research on Alaskan fish and invertebrates conducted by the Auke Bay Laboratory, 1970-1981. NOAA Tech. Mem., NMFS F/NWC-67, Seattle, Washington, 128p.

Robinson, A.M., and W.P. Breese. 1984. Spawning cycle of the weathervane scallop *Pecten (Patinopecten) caurinus* Gould along the Oregon coast. Journal of Shellfish Research 4: 165-166.

Sease, J.L. and D.G. Chapman. 1988. IN: Selected marine mammals of Alaska: species accounts with research and management recommendations. Lenifer, Jack W., Ed. Marine Mammal Commission, Washington, D.C. pp 17-38.

Sedell, J.R. and F.J. Swanson. 1984. Ecological characteristics of streams in old-growth forests of the Pacific Northwest, Pages 9-16 IN: M.R. Meehan, T.R. Merrill, Jr. and Ta. Hanley, eds. Fish and wildlife relationships in old-growth forests. American Institute of Fishery Research Biologists.

Sharma, G.D. 1979. The Alaskan shelf: hydrographic, sedimentary, and geochemical environment, Springer-Verlag, New York.498.

Sharma, G.D., 1974. Contemporary depositional environment of the eastern Bering Sea. Part I. Contemporary sedimentary regimes of the eastern Bering Sea. *In* D. W. Hood and E. J. Kelly (eds.). Oceanography of the Bering Sea. Inst. Mar. Sci., Univ. Alaska, pp. 119-136.

Shirley, S.M., and G.H. Kruse. 1995. Development of the fishery for weathervane scallops, Patinopecten caurinus (Gould 1850), in Alaska. Journal of Shellfish Research 14:71-78.

Shumway, S.E. 1990. A review of the effects of algal blooms on shellfish and aquaculture. Journal World Aquaculture Society.

Sinclair, M. 1988. Marine populations: an essay on population regulation and speciation. University of Washington Press, Seattle, WA.

Sinclair, M.R., R.K. Mohn, G. Robert, D.L. Roddick. 1985. Considerations for effective management of the Atlantic scallops, Can. Tech. Rep. Fish. Aquat. Sci. 1382, 113p.

Sindermann, C.J. 1979. Environmental stress in oceanic bivalve mollusc populations. Proc. Nat. Shellfisheries Assoc. 69:147-156.

Spies, R. B., S. D. Rice, D. A. Wolfe, and B. A. Wright. 1996. The effects of the Exxon Valdez oil spill on the Alaskan coastal environment. American Fisheries Society Symposium 18:1-16.

Starr, R.M., and J.E. McCrae. 1983. Weathervane scallop (*Patinopecten caurinus*) investigations in Oregon, 1981-1983. Oregon Department of Fish and Wildlife, Information Reports 83-10, Newport.

Tabata, S., 1982. The anticyclonic baroclinic eddy off Sitka, Alaska in the northeast Pacific. In Journal of Physical Oceanography, Vol. 12, No. 11: pp. 1260-1282.+

Thorsteinson, F.V., and L.K. Thorsteinson. 1982. Finfish resources. In Proceedings of a synthesis meeting: the St. George Basin environment and possible consequences of planned offshore oil and gas development, OCSEAP, U.S. Departments of Commerce and Interior, Juneau, Alaska, pp 11-139.

Tremblay, M.J., and M. Sinclair. 1992. Planktonic sea scallop larvae (*Placopecten magellanicus*) in the Georges Bank region: broadscale distribution in reltation to physical oceanography. Canadaian Journal of Fisheries and Aquatic Sciences. 49:1597-1615.

University of Aberdeen. 1978. A physical and economic evaluation of loss of access to fishing grounds due to oil and gas installations in the North Sea, Aberdeen, 152p.

U.S. Department of Commerce (USDOC). 1978. Commercial Tanner crab fishery off the Coast of Alaska, fishery management plan and proposed regulations, Federal Register Vol. 43 No. 95, 21170-21251.

U.S. Department of Commerce (USDC). 1997. General description of non-fishing threats to essential fish habitat in the mid-Atlantic region (draft). NOAA/NMFS Unpublished document 20 p.

U.S. Environmental Protection Agency (USEPA). 1993. Guidance for specifying management measures for sources of nonpoint pollution in coastal waters. Office of Water. 840-B-92-002. 500+ p.

Vattuone, G.M., Griggs, K.S. McIntire, D.R. Littlepage, J.L. and F.L. Harrison. 1976. Cadmium concentrations in rock scallops in comparison with some other species. Lawrence Livermore National Laboratory, UCRL-52022. 31 pp.

Wassman, R., and J. Ramus. 1973. Seaweed invasion. Natural History 82(10): 25-36.

Weber, D.D., 1965. Growth of immature king crab Paralithodes camtschatica (Tilesius). University of Washington, Masters Thesis, 100p

Wood, J.M. 1974. Biological cycles for toxic elements in the environment. In Science, No. 4129, Vol. 183, 1049-1052.

Zheng, J. and G.H. Kruse (MS). ICES International Symposium on Recruitment Dynamics of Exploited Marine Populations: Physical-Biological Interactions. September 22-24, 1997, Baltimore, Maryland.

Appendix A: History of the Alaska Scallop Fishery and FMP

Alaskan weathervane scallop *Patinopecten caurinus* populations were first evaluated for commercial potential in the early 1950s by both government and private sector research. However, it was not until the late 1960s as catches declined in the U.S. and Canadian scallop fisheries on Georges Bank that interest in a fishery off Alaska began to take shape. Initial commercial fishing effort took place in 1967 when two vessels harvested weathervane scallops from fishing grounds off the eastside of Kodiak Island. By the following year, 19 vessels consisting of New England type scallop vessels, converted Alaskan crab boats, salmon seiners, halibut longliners, and shrimp trawlers entered the fishery.

From the inception of the fishery in 1967 through mid May 1993, the scallop fishery was passively managed employing minimal management measures. Closed waters and seasons were established to protect crabs and crab habitat. As catches declined in one bed vessels moved to better grounds. While this may have been generally acceptable for a sporadic low intensity fishery, increased participation led to boom and bust cycles (Barnhart 2003).

In the early 1990s, the Alaska weathervane scallop fishery expanded rapidly with an influx of scallop boats from the East Coast of the United States. Concerns about bycatch (in particular crab bycatch) and overharvest of the scallop resource prompted the Commissioner of ADF&G, under 5 AAC 39.210, to designate the weathervane scallop fishery a high impact emerging fishery on May 21, 1993. This action required ADF&G to close the fishery and implement an interim management plan prior to reopening. The interim management plan contained provisions for king and Tanner crab bycatch limits (CBLs) for most areas within the Westward Region. Since then, crab bycatch limits have been established for the Kamishak District of the Cook Inlet Registration Area and the Prince William Sound Registration Area. The commissioner adopted the regulations and opened the fishery on June 17, 1993, consistent with the measures identified in the interim management plan. The interim management plan included a provision for 100% onboard observer coverage to monitor crab bycatch and to collect biological and fishery-based data. In March 1994, the Alaska Board of Fisheries (BOF) adopted the interim regulations identified as the Alaska Scallop Fishery Management Plan, 5 AAC 38.076.

From 1967 until early 1995, all vessels participating in the Alaska scallop fishery were registered under the laws of the State of Alaska. Scallop fishing in both state and federal waters was managed under state jurisdiction. In January 1995, the captain of a scallop fishing vessel home-ported in Norfolk, Virginia returned his 1995 scallop interim use permit card to the State of Alaska Commercial Fisheries Entry Commission in Juneau and proceeded to fish scallops in the EEZ with total disregard to harvest limits, observer coverage, and other management measures. In response to this unanticipated event, federal waters in the EEZ were closed to scallop fishing by emergency rule on February 23, 1995. The initial emergency rule was in effect through May 30, 1995, and was extended for an additional 90 days through August 28, 1995. The intent of the emergency rule was to control the unregulated scallop fishery in federal waters until an FMP could be implemented closing the fishery. Prior to August 28, NPFMC submitted a proposed FMP which closed scallop fishing in the EEZ for a maximum of one year, with an expiration date of August 28, 1996. The final rule implementing Amendment 1 to the FMP was filed July 18, 1996 and published in the Federal Register on July 23, 1996. It became effective August 1, 1996, allowing the weathervane scallop fishery to reopen in the EEZ. Scallop fishing in state waters of the Westward Region was delayed until August 1, 1996 to coincide with the opening of the EEZ. The state continued as the active manager of the fishery with in-season actions duplicated by the federal system (Barnhart 2003).

In March 1997, the NMFS approved Amendment 2, a vessel moratorium under which 18 vessels qualified for federal moratorium permits to fish weathervane scallops in federal waters off Alaska. The vessel moratorium

remained in effect until June 30, 2000. A vessel qualified for inclusion in the moratorium program if it made a legal landing of scallops during 1991, 1992 or 1993; or during at least 4 separate years from 1980 through 1990. The moratorium permit program was superseded by the scallop license limitation program.
By February 1999, the Council recommended replacing the federal moratorium program with an LLP, which became Amendment 4 to the FMP. The Council's goal was to reduce capacity to approach a sustainable fishery with maximum net benefits to the Nation, as required by the Magnuson-Stevens Act.

NPFMC's preferred alternative created a total of nine licenses with no area endorsements; each vessel permitted to fish statewide. However, vessels that fished exclusively in the Cook Inlet Registration Area during the qualifying period are limited to fishing a single 6-foot dredge, which was the existing gear restriction in Cook Inlet during the qualifying period. This gear restriction has recently been reevaluated by the Council under Amendment 10 to the FMP.

Appendix B: Geographical Coordinates of Areas Described in the FMP

B.1 Scallop Registration Areas

For the purpose of managing the scallop fishery, the FMP area is divided into nine scallop registration areas (Figure 4) composed of the Federal waters and adjacent State waters described in each area. These areas are identical to the State of Alaska scallop registration areas set out at 5 AAC 38.076(b). The Yakutat, Cook Inlet, and Kodiak Registration Areas are further divided into districts.

Registration Area A (Southeastern Alaska) has as its southern boundary the International Boundary at Dixon Entrance, and as its northern boundary Loran-C line 7960-Y-29590, which intersects the western tip of Cape Fairweather at 58° 47' 58" N. lat., 137° 56' 30" W. long., except for ADF&G District 16 defined as all waters north of a line projecting west from the southernmost tip of Cape Spencer and south of a line projecting southwest from the westernmost tip of Cape Fairweather.

Registration Area D (Yakutat) has as its western boundary the longitude of Cape Suckling (143° 53' W. long.), and as its southern boundary Loran-C line 7960-Y-29590, which intersects the western tip of Cape Fairweather at 58° 47' 58" N. lat., 137° 56' 30" W. long., and ADF&G District 16 defined as all waters all waters north of a line projecting west from the southernmost tip of Cape Spencer and south of a line projecting southwest from the westernmost tip of Cape Fairweather.

Registration Area E (Prince William Sound) has as its western boundary the longitude of Cape Fairfield (148° 50' W. long.), and its eastern boundary the longitude of Cape Suckling (143° 53' W. long.).

Registration Area H (Cook Inlet) has as its eastern boundary the longitude of Cape Fairfield (148° 50' W. long.) and its southern boundary the latitude of Cape Douglas (58° 52' N. lat.).

Northern District: north of a line extending from Boulder Point at 60 46' 23" N. lat., to Shell Platform C, then to a point on the west shore at 60° 46' 23" N. lat.

Central District: all waters between a line extending from Boulder Point at 60° 46' 23" N. lat., to Shell Platform C, to a point on the west shore at 60° 46' 23" N. lat., and the latitude of Anchor Point Light (59° 46' 12" N. lat.).

Southern District: all waters enclosed by a line from Anchor Point Light west to 59° 46' 12" N. lat., 152° 20' W. long., then south to 59° 03' 25" N. lat., 152° 20' W. long., then in a northeasterly direction to the tip of Cape Elizabeth at 59° 09' 30" N. lat., 151° 53' W. long., then from the tip of Cape Elizabeth to the tip of Point Adam at 59° 15' 20" N. lat., 151° 58' 30" W. long.

Kamishak Bay District: all waters enclosed by a line from 59° 46' 12" N. lat., 153° 00' 30" W. long., then east to 59° 46' 12" N. lat., 152° 20' W. long., then south to 59° 03' 25" N. lat., 152° 20' W. long., then southwesterly to Cape Douglas (58° 52' N. lat.). The seaward boundary of the Kamishak Bay District is three nautical miles seaward from the shoreline between a point on the west shore of Cook Inlet at approximately 59° 46' 12" N. lat., 153° 00' 30" W. long., and Cape Douglas at approximately 58° 52' N. lat., 153° 15' W. long., including a line three nautical miles seaward from the shorelines of Augustine Island and Shaw Island, and including the line demarking all state waters shown on National Oceanic and Atmospheric Administration nautical chart number 16640, 21st Ed., May 5, 1990.

Barren Island District: all waters enclosed by a line from Cape Douglas (58° 52' N. lat.) to the tip of Cape Elizabeth at 59° 09' 30" N. lat., 151° 53' W. long., then south to 58° 52' N. lat., 151° 53' W. long., then west to Cape Douglas.

Outer District: all waters enclosed by a line from the tip of Point Adam to the tip of Cape Elizabeth, then south to 58° 52' N. lat., 151° 53' W. long., then east to the longitude of Aligo Point (149° 44' 33" W. long.), then north to the tip of Aligo Point.

Eastern District: all waters east of the longitude of Aligo Point (149° 44' 33" W. long.), west of the longitude of Cape Fairfield (148° 50' W. long.), and north of 58° 52' N. lat.

Registration Area K (Kodiak) has as its northern boundary the latitude of Cape Douglas (58° 52' N lat.), and as its western boundary the longitude of Cape Kumlik (157° 27' W. long.).

Northeast District: all waters northeast of a line extending 168° from the easternmost tip of Cape Barnabas, east of a line from the northernmost tip of Inner Point to the southernmost tip of Afognak Point, east of 152° 30' in Shuyak Strait, and east of the longitude of the northernmost tip of Shuyak Island (152° 20' W. long.).

Southeast District: all waters southwest of a line extending 168° from the easternmost tip of Cape Barnabas and east of a line extending 222° from the southernmost tip of Cape Trinity.

Southwest District: all waters west of a line extending 222° from the southernmost tip of Cape Trinity, south of a line from the westernmost tip of Cape Ikolik to the southernmost tip of Cape Kilokak and east of the longitude of Cape Kilokak (156° 19' W. long.).

Semidi Island District: all waters west of 156° 19' W. long. at Cape Kilokak and east of the longitude of Cape Kumlik at 157° 27' W. long.

Shelikof District: all waters north of a line from the westernmost tip of Cape Ikolik to the southernmost tip of Cape Kilokak, west of a line from the northernmost tip of Inner Point to the southernmost tip of Afognak Point, west of 152° 30' W. long., in Shuyak Strait, and west of the longitude of the northernmost tip of Shuyak Island (152° 20' W. long.).

Registration Area M (Alaska Peninsula) has as its eastern boundary the longitude of Cape Kumlik (157° 27' W. long.), and its western boundary the longitude of Scotch Cap Light. The registration area also includes all waters of Bechevin Bay and Isanotski Strait south of a line from the easternmost tip of Chunak Point to the westernmost tip of Cape Krenitzen.

Registration Area O (Dutch Harbor) has as its northern boundary the latitude of Cape Sarichef (54° 36' N. lat.), as its eastern boundary the longitude of Scotch Cap Light, and as its western boundary 171° W. long., excluding the waters of Statistical Area Q.

Registration Area Q (Bristol Bay-Bering Sea) has as its southern boundary a line from Cape Sarichef (54° 36' N. lat.), to 54° 36' N. lat., 171° W. long., to 55° 30' N. lat., 171° W. long., to 55° 30' N. lat., 173° 30' E. long., as its northern boundary the latitude of Point Hope (68° 21' N. lat.).

Registration Area R (Adak) has as its eastern boundary 171° W. long., and as its northern boundary 55° 30' N. lat.

Appendix C Section 211 of AFA

American Fisheries Act (AFA) sideboard restrictions

On October 21, 1998, the President signed into law the American Fisheries Act (AFA) which mandated sweeping changes to the conservation and management program for the pollock fishery of the BSAI and to a lesser extent, affected the management programs for the other groundfish fisheries of the BSAI, the groundfish fisheries of the GOA, the king and Tanner crab fisheries of the BSAI, and the scallop fishery off Alaska. With respect to the fisheries off Alaska, the AFA requires a suite of new management measures that fall into four general categories: (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 in the BSAI pollock fishery, (3) sideboard regulations to protect other fisheries from spillover effects from the AFA, and (4) regulations governing catch measurement and monitoring in the BSAI pollock fishery.

While the AFA primarily affects the management of the BSAI pollock fishery, the Council is also directed to develop and recommend harvesting and processing sideboard restrictions for AFA catcher vessels that are fishing for scallops in the EEZ off Alaska. Section 211 of the AFA addresses sideboard protections for other fisheries off Alaska and this entire section of the AFA is incorporated into he AFA by reference. Scallop harvesting sideboard restrictions that are consistent with Section 211 of the AFA will be implemented through regulation or provided to the Board of Fish as recommendations. Any measure recommended by the Council that supersedes Section 211 of the AFA must be implemented by FMP amendment in accordance with the provisions of Section 213 of the AFA and the Magnuson-Stevens Act.

Limits on participation by AFA vessels. NMFS may issue regulations, as approved by the Council, which define the participation criteria for AFA vessels that wish to participate in the scallop fishery off Alaska.

Harvest limitations for AFA Vessels. The Council may provide scallop harvesting sideboard recommendations to the Board of Fisheries. The State of Alaska, through the Board of Fisheries, may issue regulations to establish an allowable harvest percentage of the GHL by AFA eligible vessels in any scallop fishery, and to govern the in-season management of any sideboard harvest levels established for AFA eligible vessels.

Appendix D EFH

[insert file: Appendix D EFH.wpd]

Appendix E Research Needs

This following research section reviews the results of a workshop on scallop biology and the effects of scallop dredging on benthic communities (ADF&G 2000). The workshop was held in Kodiak, Alaska during 10-12 June 1999. A review of the history of the Alaskan weathervane scallop fishery was presented. Other speakers presented papers on scallop biology and fisheries in other cold water areas. Topics of the papers included physical and biological variables influencing distribution, impacts of suspended particles on energetics, modeling approaches to identify dredging impacts, effects of long-term dredging, benthic communities associated with scallops, and the importance of protecting areas from fishing. Following the first day of public presentations, a two-day workshop was convened to develop a viable study program for examining the effects of dredging on the scallop's life history, population dynamics, and associated benthic community. The workshop results were intended to be applied to the Alaskan fishery for weathervane scallops, but they are applicable to many scallop fisheries. The working groups identified ten research topics for which information needs to be gathered. Topics include the importance of spatial distribution on fertilization success, the reproductive output of individuals, the importance of nursery areas, scallop behavior and how it may be altered by dredging, factors that affect growth, fishery induced injury and mortality, causes and rates of natural mortality, long-term factors affecting recruitment, effects of scallop dredging on the benthos, and developing harvest strategies for scallops. Also, the working groups recommended that a monitoring program be established that included short- and long-term data gathering, and they identified methods and tools that might be used for this task.

Question 1. How does spatial distribution (distance of its nearest neighbor) affect fertilization success?

Rational

A key factor in successful scallop recruitment is having a high egg-fertilization rate. Scallop gametes are broadcast into the water and rely on currents to mix sperm and eggs. Because of the dilution of the sperm, males and females need to be close to one another for successful fertilization. Therefore spatial distribution is critical.

Suggested Research Studies

- Laboratory fertilization trials to determine the effects of distance, dilution, and time to fertilization
- Measure fertilization success in the field
- Measure synchronization of spawning in the field
- Model fertilization probabilities and the effects of fisheries on them

Question 2. What is the reproductive output of individuals relative to weight, size and age?

Rational

The reproductive output of large females is considerably highly than that of recently matured females. Females curtail reproduction when they get to be very old. Thus, size and age structure of the population is important for determining reproductive success. The currant harvest strategy removes the most fecund females by selecting for larger individuals. The consequence of harvesting these large females is not understood.

Suggested Research Studies

- Conduct laboratory studies that measure reproductive output relative to weight, size, and age

- Conduct field studies of reproductive cycle with size, age, and location components
- Construct models linking reproductive output with fertilization success in different areas
- Construct models linking reproductive output with fishing activity

Question 3. Where and when do spat settle, and what constitutes nursery areas?

Rationale

Protecting juveniles is critical to the survival of any harvested species. The spatial relationship between adult and juvenile distributions is unknown. Identifying and protecting nursery areas are commonly used management tools to preserve a resource.

Suggested Research Studies

- Collect information from population surveys and fishery observer programs including benthic and epibenthic species present, and geologic and biogenic structures where juveniles occur
- Identify habitat preferences through laboratory experiments (e.g., temperature, salinity, and food).
- Examine stomachs of potential scallop predators to identify mortality sources and relate to the timing of settlement
- Identify food type and size for larval survival
- Estimate larval duration and growth to determine when spat settle
- Identify oceanographic features that may retain larvae (e.g., fronts, gyres, eddies, currents)
- Develop a larval drift model

Question 4. After settling, what movement behaviors are critical for survival of juvenile and adult scallops, an are these behaviors altered by dredging?

Rationale

The distribution of scallops is critical to reproductive success. Dredge fishing alters the distribution of juvenile and adult scallops. The consequences of this redistribution are unknown, but in adults it may reduce fertilization success. Anecdotal evidence indicates large movements of scallop aggregations sometimes occur.

Suggested Research Studies

- Investigate the scallop's capacity for movement
- Measure the distance a scallop can swim per unit times as a function of size and season
- Is the scallop's capacity for movement altered by the effects of dredging?
- What are the effects of handling, aerial exposure, being discarded (e.g., righting response)?
- If juvenile and adult distributions differ, how and when do juveniles migrate into the adult areas?
- Observe movements relative to sediment type, predators, currents (velocities, direction, eddies, gyres), and fishing gear
- Determine if scallops move to re-aggregate after disruption

Question 5. What factors determine growth rates of scallops?

Rationale

Growth rates determine age of recruitment and potential yield to the fishery. There are geographical

differences in growth rates that may be related to physical conditions, primary production levels, scallop densities, or genetic characteristics.

Suggested Research Studies

- Determine physical factors that affect growth: temperature/salinity, turbidity, seasonality, storm activity
- Determine biological factors that affect growth: metabolism, food, maturation, genetic (stock) effects on physiology, injury, age, and population density
- Develop a bioenergetic model for growth rates of weathervane scallops

Question 6. What are the effects of fishery-induced injuries and handling on mortality?

Rationale

Dredging can damage scallops, some of which are not brought to the surface. Management strategies need to incorporate this mortality but currently do not for lack of data.

Suggested Research Studies

- Fishery discards
- Injured or disturbed but uncaptured scallops (e.g., lethal versus sublethal, acute versus chronic)

Question 7. What is the natural mortality rate of scallops from recruitment into the fishery onward?

Rationale

Management plans predict natural mortality so sustainable harvest quotas can be set. For scallops natural mortality rates are poorly understood. Mortality rates probably differ with locality, age structure, local physical conditions, and benthic community structure.

Suggested Research Studies

- Specific locations at several fishery and closed areas
- Annual variability at several fishery and closed areas
- What are the factors influencing natural mortality?

Question 8. What factors affect recruitment of scallops?

Rationale

Viable fisheries depend on populations with abundance levels that allow harvest. Population abundance trends are dictated by recruitment. Interannual variability and recruitment depend on environmental processes, which are modified by fishing. In scallops, recruitment is periodic.

Suggested Research Studies

- Compare differences in recruitment between fished and unfished beds
- Identify sources and sinks, at the bed level, of recruiting scallops
- Consider indirect effects of fishing through enhanced settlement, predation, disease, and other factors
- Examine the member-vagrant theory and the ocean factors influencing it
- Develop age-structured models of the populations to estimate recruitment
- Develop methods to estimate juvenile scallop abundance using bottom-sampling devices, surveys of predator stomachs, submersibles

- How does the timing of dredging affect recruitment success (pre- and – post –settlement)?
- Contrast recruitment indices from different areas using age data

Question 9. What is the effect of scallop dredging on the benthos?

Rationale
Dredges alter the structure of the sediment and topography, kill some species, and displace others. Many species affected are commercially important or important prey of other commercially important species (e.g., shrimp, crabs, groundfishes). Dredging may lead to both short- and long-term detrimental consequences for scallops and associated species.

Suggested Research Studies
Geochemical studies need to be performed to:

- Determine how dredging affects geochemical (including organic content) and physical attributes (e.g. topography) of the bottom
- Determine how dredging affects water-column or interface turbidity
- Compare the effects of dredging to natural disturbance (e.g., tidal currents, storm events, runoff from land)

Ecological studies need to be performed to determine:

- Dominant infaunal and epifaunal benthic species and their relationships by bottom type
- How dredging affects benthic mobile epifauna and groundfish (e.g., crabs, flatfishes)
- How dredging affects sessile epifauna (e.g., hydroids, bryozoans, and long-lived species)
- How dredging affects the infuana community structure and successional events
- How dredging affects faunal patchiness within these communities
- What are the consequences of the frequency of dredging on benthic communities?
- What are the consequences of the amount of area dredged on benthic communities?
- Which species settle first into a disturbed area?
- Which predators benefit from dredging?

Question 10. What are the considerations for developing harvest strategies of scallops?

Rationale
In several scallop fisheries around the world overfishing and significant alterations of the benthic community have been demonstrated. The following suggestions may serve to avoid the mistakes in other fisheries and capitalize on successful harvest strategies. It is important to learn from the worldwide experiences associated with various scallop species and the fisheries for these species.

Suggested Research Studies
Beyond the ecological considerations mentioned I this document the following should be addressed and understood in the development of harvest strategies for scallops:

- Stock size relative to the unfished population
- The scallop distribution and proportion of their habitats fished
- How many year classes support the fishery?
- What is the applicability of traditional harvest models for scallops?
- What harvest level or rate is sustainable?
- Is MSY (maximum sustainable yield) appropriate?

- Determine if there are several scallop beds with different abundances in a management area
- What is the appropriate unit for a management area? Is it at the level of a bed or larger?
- Need to consider the effect of scallop removals on spatial distribution relative to critical density
- Size versus age limit: What is optimum age or size of harvest given meat yield and reproduction?
- What are the effects of area closures and rotation on scallop recruitment?
- What is the unit stock, and where do the recruits come from?
- Should areas with persistent recruitment be set aside as nurseries?
- Can we set aside areas of broodstock for fishery enhancement?
- Do different year classes come from different parental sources?
- What is the heritability of growth, and does the fishery affect growth?
- What is the best season for fishing?
- Consider

Reference:

Alaska Department of Fish and Game and University of Alaska Fairbanks. 2000. A workshop examining potential fishing effects on population dynamics and benthic community structure of scallops with emphasis on the weathervane scallop *Patinopecten caurinus* in Alaskan Waters. Alaska Department of Fish and Game, Division of Commercial Fisheries, Special Publication 14, Juneau.

Appendix F Community Profiles

The following community profiles were excerpted from:

Jennifer Sepez, Heather Lazrus, Christina Package, Bryan Tilt, and Ismael Vaccaro, 2004. Fishing Communities of the North Pacific, Volume I: Alaska (Draft). Economics and Social Sciences Research Program, Alaska Fisheries Science Center, Seattle, WA.

With the exception of the Seattle profile which was excerpted from:
Down, M. 2004. Community Profiles for the BSAI crab fisheries. EDAW Inc. San Diego, CA.
This profile was done in connection with the EIS for the BSAI crab rationalization initiative and is thus heavily focused upon the BSAI crab fishery.

Additional demographic information on these communities may be found in those documents. Communities included in this section are those which have had landings of scallops from 1990-2003. Information contained in the profiles is intended to give an overview of the community, demographics and involvement in North Pacific Fisheries with particular emphasis placed upon harvest and processing of scallops (listed under *other* shellfish). Additional information on fishing communities in Alaska may be found in Sepez et al (2004).

Cordova

Cordova is located on the western edge of the Copper River Delta in the Chugach National Forest in the Gulf of Alaska and at the southeastern most end of Prince William Sound. The community was built on Orca Inlet, at the base of Eyak Mountain. The area encompasses 61.4 square miles of land and 14.3 square miles of water.

Demographic Profile

According to the U. S. Census, the population of Cordova was 2,434 in 2000. Total population numbers were reasonably stable between the early 1900s and late 1970s. Since the 1980s there has been a steady increase in the population corresponding with the growth of the commercial fishing industry.

Current Economy
The economic base of Cordova has been the fishing industry since the 1940s and roughly half of all households have at least one member directly involved in commercial harvesting or processing. There are several fish processing plants in Cordova which serve a large fleet relative for Prince William Sound. Salmon is major component of the harvest and the current reduction in salmon prices has adversely affected the economy of Cordova. The largest employers are North Pacific Processors, Cordova School District, Cordova Hospital, the City, and the Department of Transportation. Additionally, the U.S. Forest Service and the U.S. Coast Guard maintain personnel in Cordova.
A total of 621 commercial fishing permits were held by 343 permit holders in 2000 according to the Commercial Fisheries Entry Commission.
At the time of the 2000 U.S. Census, 62.2% of the potential labor force was employed and there was a 4.6% unemployment rate and 3.6% of the population were in the armed forces. A total of 29.1% of the population over 16 years of age was not in the labor force and 7.5% of the population was below the poverty level. The median household income in the same year was $50, 114 and the per capita income was $25,256.
Involvement in North Pacific Fisheries
Commercial Fishing
Like many towns in the region, the fishing industry is the major component of Cordova's economy. According to the Department of Fish and Game, and reported by the Alaska Commercial Fisheries Entry

Commission 621 permits were held by 343 permit holders and 425 permits were actually fished in Cordova in 2000. There were 42 vessel owners in the federal fisheries, 328 vessel owners in the salmon fishery and overall 411 crew members claiming residence in Cordova in 2000. The commercial vessel fleet delivering landings to Cordova was involved in groundfish (74 vessels), sablefish (32 vessels) halibut (81 vessels) and salmon (660 vessels) fisheries. In the year 2000, there were 4,269.11 tons of federally managed fish, including 530.02 tons of sablefish, 3250.51 tons of other groundfish, 508.58 tons of halibut, and 21,975.02 tons of salmon landed at the docks in Cordova.

Commercial fishing permits are issued according to specifications of species, vessel size, gear type and fishing area. Permits issued in Cordova for the year 2000 related to crab, halibut, herring roe, other finfish, other shellfish, sablefish, and salmon.
Crab: One permit was issued for a Dungeness crab pot gear vessel over 60 feet restricted to Yakutat (not fished).
Halibut: There were a total of 64 permits issued for halibut in 2000, 51 of which were actually fished in 2000.
Herring: A total of 124 permits were issued for herring roe in Cordova in 2000 (only 14 permits were actually fished).
Other finfish: One experimental/special permit was issued for freshwater finfish with unspecified gear in statewide waters (not fished).
Other Groundfish: There were 54 permits issued for groundfish excluding sablefish in Cordova in 2000, 19 of which were actually fished.
Other Shellfish: One permit was issued for an octopi/squid longline vessel under 60 feet in statewide waters (not fished) and one for a shrimp pot gear vessel under 60 feet limited to Prince William Sound (not fished).
Sablefish: There were 11 permits issued for sablefish in Cordova in 2000, 10 of which were actually fished.
Salmon: There were 364 permits issued in Cordova for Salmon in 2000, 331 of which were actually fished.

In 2000 there were eight fish processing plants operating in Cordova with the capacities to process Halibut, Sablefish, other groundfish and salmon. Some of the larger companies operating processing facilities, such as North Pacific Processors and Ocean beauty Seafoods, also contributed to the port facilities available at the docks.

Sport Fishing
Most of the fresh waters of Prince William Sound, particularly those in the Cordova area, are open the entire year to salmon fishing. Chinook salmon, silver salmon, red salmon, halibut, rockfish and lingcod are other popular sportfishing species found in the marine waters of Orca Inlet, Simpson Bay, Sheep Bay and as close as Spike Island, located just outside the harbor. Prince William Sound is closed to all crab fishing, but is open to shrimping by permit between April 15 through September 15 and other marine invertebrate collecting. In total there were 15 businesses involved in saltwater sportfishing in Cordova in 2002 and 15 engaged in freshwater sportfishing. There was a total of 3215 sport fishing licenses sold in Cordova in 2000, 1251 of which were sold to Alaska residents.
Subsistence Fishing
Data from 1997 compiled on behalf of the Division for Subsistence of the Alaska Dept of Fish and Game provides useful information about subsistence practices in Cordova. About 97.6% of households participated in the use of subsistence resources, including harvesting, sharing and consuming resources, illustrating the importance of subsistence to life in the community. Approximately 88.5% of the total population used salmon and 84.6% used non-salmon fish (herring, herring roe, smelt, bass, cod, flounder, greenling, halibut, rockfish, sablefish, sculpin, shark, wolfish, sole, char, grayling, trout), many fewer households, only11%, used marine mammals and about half the households in the community, 51.7%, used marine invertebrates.

The average per capita harvest for the year 1997 was 179.43 pounds. The composition of the total subsistence harvest can be shown by the percentages of the resources which demonstrate the amount of each resource category used by the community relative to other resources categories. The total subsistence harvest was composed of 34.87% Salmon, non-salmon fish made up 42.61%, land mammals 54.49%, marine mammals 3.64%, birds and eggs accounted for 2.23% of the total subsistence harvest, marine invertebrates for 5.52% and vegetation made up 8.36%. The wild food harvest in Cordova made up 83% of the recommended dietary allowance of protein in 1993 (corresponding to 49g of protein per day or 0.424 lbs. of wild food per day) (Wolfe, Division of Subsistence, ADF&G).
Only one permit was held by a household in Cordova for subsistence fishing of salmon according to Alaska Department of Fish and Game division of Subsistence records from 1999. The permit was used solely for sockeye salmon. Residents of Cordova and members of the Native Village of Eyak, an Alaska Native Tribe, who hold a valid Subsistence Halibut Registration Certificate (SHARC) issued by NMFS, are eligible to harvest subsistence halibut. These allocations are based on recognized customary and traditional uses of halibut. Regulations to implement subsistence halibut fishing were published in the Federal Register in April 2003 and became effective May 2003.

Homer

Location

Homer is a first-class city located on the southwestern edge of the Kenai Peninsula, in the Kenai Peninsula Borough. It encompasses 10.6 square miles of land and 11.9 square miles of water.

Demographic Profile

As a result of the recent boom in the commercial and sport fishing industries, the population of Homer has tripled since 1960. In 2000, the community had 3,946 residents in 1,599 households.

Current Economy

The economy of Homer is dominated by the commercial and sport fishing industries. Fish processing is also a significant factor in the local economy, as are the marine-related trades, including welding, canvas work and electronics. Tourism is a growing industry in Homer; in recent years, the city has developed a small but growing artist community. The South Peninsula Hospital, located in Homer, is a major source of employment. Because of the city's dependence on fishing, the population swells during the summer months as seasonal laborers come to take advantage of jobs in fishing, fish processing, and related activities.
The median annual per capita income in 2000 was $21,823, and the median household income was $42,821. Approximately 5.8% of the total potential labor force was unemployed, and 32.7% of residents aged 16 and older were not in the labor force (ie. not employed and not seeking work). Approximately 9.3% of residents live below the poverty level.

<u>Involvement in North Pacific Fisheries</u>

Commercial Fishing

Commercial fishing, particularly in the halibut, salmon, and groundfish fisheries, is a major part of the economy of Homer. In 2000 there were 132 vessel owners with operations in federal fisheries and 262 vessel owners with operations in state fisheries who resided in Homer. There were 759 registered crew members. In 2000, 539 Homer residents held a total of 1,150 commercial fishing permits. The following section describes the permits in detail by fishery group, gear, and vessel type.
Crab: Fifty-nine residents held a total of 75 commercial permits in the crab fishery, and 27 of these permits were actually fished.
Other Shellfish: Twenty-three residents held a total of 26 permits for other shellfish, and 10 permits were actually fished. A detailed breakdown of the permits is as follows: one octopus/squid longline permit for vessels under 60 feet in statewide waters (none was actually fished); three octopus/squid pot gear permits for vessels over 60 feet in statewide waters (one was actually fished); two shrimp pot gear permits for vessels under 60 feet in Prince William Sound (none was actually fished); two shrimp pot gear permits for vessels over 60 feet in the westward region (none was actually fished); three sea cucumber diving gear

permits for statewide waters excluding the southeast region (two were actually fished); 13 clam shovel permits for statewide waters (six were actually fished); one sea urchin diving gear permit for statewide waters, excluding the southeast region (none was actually fished); and one scallop dredge permit for statewide waters (one was actually fished).
Halibut: One hundred ninety-seven residents held a total of 210 commercial halibut permits, and 167 permits were actually fished.
Herring: Eighty-one residents held a total of 133 commercial permits in the herring fishery, and 42 permits were actually fished.
Sablefish: Seventy-one residents held a total of 81 commercial permits for the sablefish fishery, and 58 permits were actually fished.
Other Groundfish: One hundred eighty-four residents held a total of 274 commercial permits in the groundfish fishery, and 113 permits were actually fished.
Salmon: Three hundred thirty-four residents held a total of 350 commercial permits in the salmon fishery, and 291 permits were actually fished
Other Finfish: There was also one freshwater miscellaneous finfish set gillnet permit issued in Homer, but the permit was not fished.

Homer is also an important hub for commercial fish processing, with six registered processors and a total of 2,660 tons of processed fish from federally managed fisheries in 2000. For that year, vessels made deliveries to processors in Homer for the following fisheries: sablefish (41 vessels); halibut (142 vessels); other groundfish (109 vessels); and salmon (4 vessels).
Sport Fishing
The importance of sportfishing to the economy of Homer cannot be overstated. Fishermen from Alaska, the lower 48 U.S. states, Canada and elsewhere come to Homer to fish in the Cook Inlet, Kachemak Bay, and nearby rivers. The sportfishing industry primarily revolves around halibut, but Coho, Sockeye and Pink salmon are also important. Nearby rivers offer fishing for steelhead and Dolly Varden, as well.
In 2000, sportfishing license sales in Homer totaled 20,550, including 14,664 sold to non-Alaska residents. There were 84 registered saltwater sportfishing guides and 21 freshwater sportfishing guides in Homer in 2002.
Subsistence
Many residents in Homer depend to some degree upon subsistence resources for their livelihoods. In recent years, however, the Kenai Peninsula has been classified as “non-rural” under subsistence designation, so residents have not been permitted to harvest subsistence resources from federally managed lands and waters. Significant harvesting of subsistence resource still occurs on state-managed lands and waters.

In terms of historical reliance on subsistence, the Alaska Department of Fish and Game, Division of Subsistence, reports that, in 1982, 86.7% of households in Homer used salmon (all five Pacific species) for subsistence, and 92.5% used non-salmon fish (including halibut, trout, herring, and other species). A significant portion of households (87.9%) also used marine invertebrates (including clams, crabs, mussels and shrimp) for subsistence.

The average annual per capita harvest of subsistence foods for Homer residents in 1982 was 93.8 pounds, and was comprised of the following resources: salmon (21.2%), non-salmon fish (31.9%), land mammals (25.4%), marine invertebrates (17.9%), birds and eggs (2.1%), and vegetation (1.9%). The most important variety of non-salmon fish for Homer residents is halibut, primarily from the Cook Inlet. Salmon is landed from the Cook Inlet, Kachemak Bay, and nearby rivers.

Kodiak

Location

The city of Kodiak is located close to the eastern tip of Kodiak Island. Kodiak Island is located in the Gulf of Alaska and is the largest island in Alaska, also referred to as 'the emerald isle'. The community is 252 air miles south of Anchorage and is located in the Kodiak Recording District. It is made up of 3.5 sq. miles of land and 1.4 sq. miles of water.

Demographic Profile

In the year 2000 there were 6,334 inhabitants of Kodiak as recorded by the Census and of those 53.3% were male and 46.7% were female. A population was first recorded by the Census for Kodiak in the year 1890 and at that time was reported as having 495 inhabitants. Until 1930 the population remained relatively stable, although in 1940 it doubled to 864 inhabitants and has continued to grow substantially, but in the year 2000 it decreased slightly from the 6,365 people reported in 1990 to the 6,334 reported in 2000. There is a large seasonal population in the community which was most likely not recorded by the Censuses.

Current Economy

Kodiak's economy is based on fishing, seafood processing, retail, and government employment. A total of 1,569 commercial fishing permits were issued to residents of Kodiak in the year 2000 and many fish processors operate in Kodiak including but not limited to: Cook Inlet Processors, North Pacific, Ocean Beauty, Trident, and International Seafoods. A total of 1,263 residents of Kodiak were licensed crew members in the year 2000. In addition to fishing and processing, the City and the hospital are also top employers of those in the community. A $38 million low-Earth orbit launch facility, the Kodiak Launch Complex is located near Chiniak and the largest U.S. Coast Guard station is located south of the city. Subsistence is also important to residents of the community.

Of the population age 16 and over in Kodiak in the year 2000; 68.0% were employed, 3.6% were unemployed, 2.4% were in the armed forces, and 26.1% were not in the labor force. The median household income in the year 2000 was $60,484 with the per capita income having been $21,522. About 7.4% of those in Kodiak were below the poverty level in the year 2000.

Involvement in North Pacific Fisheries

Commercial Fishing∗

Kodiak is the state's largest fishing port where about every possible fishery is harvested and delivered being done by almost every possible gear group. There were 1,569 commercial fishing permits issued to residents of Kodiak in the year 2000 and 1,263 licensed crew members which were residents of the community. There were 256 vessel owners which were residents of the city of Kodiak who participated in the federal commercial fisheries and 187 participated in the commercial salmon fishery. Of the total 1,569 permits issued, 948 were fished in the year 2000. There were 119 crab permits issued to residents of Kodiak for crab, 285 for halibut, 152 for herring, 540 for other groundfish, 67 for other shellfish, 58 for sablefish, and 348 were issued for salmon.

Crab: Of the 119 crab permits issued to residents of Kodiak, 82 were actually fished.

Halibut: In regards to the 285 halibut permits, 236 were actually fished.

Herring: Of the 152 herring permits issued in 2000, only 37 were fished

Groundfish: Out of the 540 other groundfish permits issued to residents of Kodiak in the year 2000, 280 were actually fished.

Other Shellfish: Of the 67 other shellfish permits, 26 were actually fished. No permits were issued for geoduck clams using diving gear in the southeast, but one permit was fished by a resident of the community. For octopi or squid three permits were issued using longline on a vessel under 60' statewide

∗ Commercial fishing permit data from the CFEC is given for the communities of Chiniak and Kodiak

(zero were fished), 21 using pot gear on a vessel under 60' statewide (10 were fished), and 10 using pot gear on a vessel over 60' statewide (three were fished). For shrimp; one permit was issued using an otter trawl westward (zero were fished), nine using pot gear on a vessel under 60' westward (zero were fished), one using pot gear in the southeast (zero were fished), and four using pot gear on a vessel over 60' westward (zero were fished). Two permits were issued for sea cucumbers using diving gear in the southeast (one was fished) and 10 were issued for sea cucumbers using diving gear statewide excluding the southeast (seven were fished). One permit was issued for clams using a shovel to a resident of Kodiak, but was not fished. In regards to sea urchins, no permits were issued using diving gear in the southeast but one was fished and four were issued using diving gear statewide excluding the southeast (two were fished). One permit was issued for scallops dredging statewide and it was fished.
Sablefish: Of the 58 total sablefish permits, 40 were fished.
Salmon: Out of the 348 salmon permits issued to residents of Kodiak, 247 were actually fished.

In regards to landings, 455 vessels participated in the other groundfish fishery and delivered landings to Kodiak for a total of 102,318.27 metric tons in groundfish landings in the year 2000. There were 108 vessels which delivered sablefish for a total of 1,542.49 metric tons. A total of 298 vessels delivered 4,352.30 metric tons of halibut, 32 vessels delivered 1,041.98 metric tons of Bering Sea Aleutian Islands (BSAI) crab, 331 vessels delivered 23,759.03 metric tons of salmon, and 26 vessels delivered 951.34 metric tons of herring. The landings information for scallops delivered to Kodiak has been suppressed for reasons of confidentiality according to Federal Statue 3AAC48.045 because there were only 2 vessels which delivered scallops to the community. The total amount landed in federal species in Kodiak in 2000 was 109,255.03 metric tons.

Kodiak is a major processing center where all species including BSAI crab, groundfish, halibut, herring, sablefish, salmon, and scallops are processed. There are quite a few processors in the community including 11 which processed federal species in the year 2000. Some of the processors in Kodiak include Alaska Fresh Processors Inc., Global Seafoods Kodiak LLC, Island Seafoods Inc, Kodiak Salmon Packers Inc, Tt Acquisition Inc, and Western Alaska Fisheries Inc, with the largest processors in Kodiak being Cook Inlet Processors, International Seafoods, Ocean Beauty, North Pacific, and Trident. Production runs year round at many of the facilities and the workforce population most likely runs in the thousands with a large amount of the work force being residents of the communities of the island. There is a large subculture of Filipino employees in Kodiak because of their work in the canneries.

Sport Fishing
Kodiak is known for its famous sport fishing. The community had a large amount of sport fishing businesses listed for the year 2002 with a wide variety of services including saltwater guide businesses, freshwater guide businesses, aircraft fly-in services, drop-off services, and full service guiding services. There were 5,030 sport fishing licenses sold to Alaskan residents in the city of Kodiak in the year 2000 and a total of 11,331 licenses sold in Kodiak to residents of Alaska, the United States, and from all over the world. There is a variety of sport fishing activities held in the community such as the Kodiak Kid's Pink Salmon Jamboree and the Silver Salmon Derby.

Subsistence Fishing
According to the Alaska Department of Fish and Game (ADF&G), Division of Subsistence in the city of Kodiak for the most representative subsistence year which was in 1993; 99.0% of all households in Kodiak used all subsistence resources, 93.3% used salmon, 95.2% used non-salmon fish (herring, herring roe, smelt, cod, flounder, greenling, halibut, perch, rockfish, sablefish, sculpin, shark, skates, sole, wolffish, char, grayling, pike, trout, and whitefish), 1.9% used marine mammals, and 79.0% of all households used marine invertebrates. The per capita harvest of all subsistence resources was 151.05 lbs in the community in 1993. Of that per capita harvest 31.61% was salmon, 39.70% was non-salmon fish, 0% was marine

mammals, 6.29% was marine invertebrates, 0.44% was birds and eggs, 15.36% was land mammals, and 6.59% was vegetation. Also according to ADF&G there were 1,138 household permits for subsistence salmon issued to residents of Kodiak in the year 1999 for an estimated harvest of 24,956 total salmon. Residents of Kodiak do have the right to apply for halibut subsistence certificates.

Ketchikan

Location

Ketchikan is located on the southwestern coast of Revillagigedo Island, near the southern boundary of Alaska. It is 235 miles south of Juneau. The area encompasses 3.4 square miles of land and 0.8 square miles of water.

Demographic Profile

In 2000 there were 7,922 residents in 3,197 households

Current Economy

The largest economic driving force in Ketchikan is the commercial fishing industry. Many residents hold commercial fishing permits, or work in commercial fish processing plants and supporting industries. In addition, several small timber companies operate in Ketchikan. The tourism industry is growing in importance. The city has become a major port of call for Alaska-bound cruise ships, and an estimated 500,000 cruise passengers visit Ketchikan each year.

In 2000 the median per capita income in Ketchikan was $22,484 and the median household income was $45,802. The unemployment rate was 5.7%, and 29.1% of residents aged 16 years and older were not in the labor force (ie. not seeking work). Approximately 7.6% of local residents were living below the poverty level.

Involvement in North Pacific Fisheries

Commercial∗

Ketchikan is a major commercial fishing hub for the southeast region, and fishing makes up the lion's share of economic activity within the city. In 2000 there were 59 vessel owners with operations in federal fisheries and 140 vessel owners with operations in state fisheries residing in the community. There were 485 registered crew members in the community. That same year, 396 local residents held a total of 787 commercial fishing permits. The following section contains a detailed description of these permits.

Crab: Twenty-six residents held a total of 30 commercial permits in the crab fishery.

Other Shellfish: One hundred twenty-six local residents held a total of 195 commercial permits for other shellfish. These permits included the following: 26 geoduck clam diving gear permits for the southeast region (18 were actually fished); 54 shrimp pot gear permits for the southeast region (27 were actually fished); 70 sea cucumber diving gear permits for the southeast region (61 were actually fished); one clam shovel permit for statewide waters (one was actually fished); 41 sea urchin diving gear permits for the southeast region (22 were actually fished); and one octopus/squid pot gear permits for vessels under 60 feet in statewide waters (none was actually fished).

Halibut: Ninety-five local residents held a total of 97 permits for the halibut fishery.

Herring: Sixty-four local residents held a total of 105 commercial permits in the herring fishery.

Sablefish: Twenty-four local residents held a total of 29 permits in the sablefish fishery.

Other Groundfish: Forty-six local residents held a total of 74 commercial permits for other groundfish.

Other Finfish: Five residents held a total of five freshwater fish beach seine permits for statewide waters (none was actually fished).

Salmon: Two hundred thirty-nine residents held a total of 252 commercial permits in the salmon fishery.

∗ Commercial fishing permit data from the CFEC is given for the communities of Ketchikan, Ketchikan East, and Ward Cove

In addition to its role as a hub for commercial fishermen, Ketchikan is also a center of fish processing and storage. In 2000 there were 4 commercial fish processors. Landings for federally managed species (including halibut, sablefish, and groundfish) totaled 413 tons. Salmon landings totaled 26,093 tons. A total of 631 vessels made deliveries of state-managed species to processors in Ketchikan, and a total of 281 vessels made deliveries of federally managed species.

Sport Fishing
Ketchikan is the largest sport fishing hub in southeast Alaska. Fishermen come from all over Alaska, as well as Canada, the lower 48 states, and around the world, to fish the productive waters in the area.

In 2000 there were 117 registered saltwater sport fishing guides and 70 freshwater sport fishing guides. Sport fishing license sales in Ketchikan for 2000 totaled 34,509; the majority of these (27,829) were to non-Alaska residents. This constituted the highest number of licenses sold in any Alaskan community except Anchorage. Major sport species include all five species of Pacific salmon, halibut, trout, steelhead, and char.

Subsistence
Many residents in Ketchikan supplement their incomes with subsistence resources. However, the Alaska Department of Fish and Game does not have detailed information on subsistence harvests and amounts for Ketchikan. In 1999, a total of 329 households held permits to harvest subsistence salmon. A total of 9,267 salmon—primarily sockeye—were harvested. Ward Cove holds a Subsistence Halibut Registration Certificate (SHARC), which allows residents to harvest halibut for subsistence purposes.

Pelican
Location

Pelican is lies on the northwest coast of Chichagof Island in Lisianski Inlet. Most of the community is in fact built on pilings over the tidelands. The island is part of the world's largest coastal temperate rainforest; the Tongass National Forest. The area encompasses 0.6 square miles of land and 0.1 square miles of water. According to the U. S. Census, the population of Pelican was 163 in 2000.

Current Economy
Commercial fishing, including crabbing, and seafood processing are the mainstays of Pelican's economy. Fishing vessels deliver fish to be sold at Pelican Seafoods, the local fish proscessing and cold storage plant. Most employment occurs at Pelican Seafoods, which also owns the electric utility, a fuel company and store. The plant processes black cod, halibut, ling cod, rockfish, and salmon. The City and school provide some employment. A total of 100 commercial fishing permits were held by 41 permit holders in 2000 according to the Commercial Fisheries Entry Commission.

At the time of the 2000 U.S. Census, 70.9% of the potential labor force was employed and there was an 5.5% unemployment rate. A seemingly high 29.1% of the population over 16 years of age was not in the labor force, though this may be explained by the intensely seasonal nature of the fishing and tourism industries, and 4.7% of the population was below the poverty level. The median household income in the same year was $57,083 and the per capita income was $29,347.

<u>Involvement in North Pacific Fisheries</u>
Commercial Fishing
Commercial fishing is important to the economy of Pelican. According to the Department of Fish and Game, and reported by the Alaska Commercial Fisheries Entry Commission 100 permits were held by 41 permit holders but only 59 permits were actually fished in Pelican in 2000. There were 16 vessel owners in

the federal fisheries, 21 vessel owners in the salmon fishery and overall 25 crew members claiming residence in Pelican in 2000. The commercial vessel fleet delivering landings to Pelican was involved in halibut (29 vessels), sablefish (19 vessels), other ground fish (26 vessels), and salmon (95 vessels) fisheries in 2000 (figures for landings by species are suppressed for reasons of confidentiality according to Federal Statute 3AAC48.045).
Commercial fishing permits are issued according to specifications of species, vessel size, gear type and fishing area. Permits issued in Pelican for the year 2000 related to halibut, herring, sablefish, other groundfish, crab, other shellfish and salmon.
Halibut: There were a total of 20 permits issued for halibut in Pelican in 2000, 15 of which were actually fished.
Herring: There was one permit issued for the herring fishery in Pelican in 2000, which was not fished.
Sablefish: A total of 12 sablefish permits were issued in 2000 in Pelican, all of which were actually fished.
Other groundfish: A total of 24 permits were issued in 2000 for other groundfish in Pelican, only seven of which were actually fished.
Crab: One permit was issued in Pelican for crab in 2000, which was fished and pertained to tanner crab pot gear in southeast waters.
Other shellfish: Five permits were issued for other shellfish in Pelican in 2000, only one of which was actually fished. Permits pertained three octopi/squid pot gear vessels over 60 feet in statewide waters (no permits fished), one shrimp pot gear in southeast waters (not fished) and to one sea cucumber diving gear in southeast waters.
Salmon: A total of 37 permits were issued in Pelican in 2000 for the salmon fishery, 22 of which were actually fished.

Two seafood processing plants were in operation in Pelican in 2000 and additionally filed 'Intents to Operate' for 2003. Pelican Seafoods has the capability to process groundfish, halibut, high-seas salmon, salmon and sablefish. The plant also has harbor facilities used by the community.

Sport Fishing
There were nine saltwater sport fishing businesses registered in Pelican in 2002 and seven businesses licensed to provide freshwater recreational fishing according to the Alaska Department of Fish and Game. There was a total of 249 sport fishing licenses sold in Pelican in 2000, 53 of which were sold to Alaska residents.

Subsistence Fishing
Data from 1987 compiled on behalf of the Division for Subsistence of the Alaska Dept of Fish and Game provides useful information about subsistence practices in Elfin Cove. Records describe the subsistence patterns for all 100% of households which participated in the use of subsistence resources, including harvesting, sharing and consuming resources, illustrating the importance of subsistence to life in the community. Of the total population, 94.8% used salmon and 100% used non-salmon fish (herring, herring roe, smelt, cod, flounder, halibut, rockfish and char), 27.1% used marine mammals and a high percentage, 92.3%, used marine invertebrates.

The average per capita harvest for the year 1987 was 355.13 pounds. The composition of the total subsistence harvest can be shown by the percentages of the resources which demonstrate the amount of each resource category used by the community relative to other resources categories. The total subsistence harvest was composed of 16.99% salmon, non-salmon fish made up 33.51%, land mammals 31.24%, marine mammals 2.11%, birds and eggs accounted for only 0.4%, marine invertebrates for 13.12% and vegetation made up 2.64%. The wild food harvest in Pelican made up 229% of the recommended dietary allowance of protein in 1987 (corresponding to a daily allowance of to 49g of protein per day or 0.424 lbs. of wild food per day) (Wolfe, Division of Subsistence, ADF&G).

A total of 13 permits were held by households in Pelican for subsistence fishing of salmon according to Alaska Department of Fish and Game division of Subsistence records from 1999. Sockeye was the main component of the salmon harvest. Residents of Pelican who hold a valid Subsistence Halibut Registration Certificate (SHARC) issued by NMFS, are eligible to harvest subsistence halibut. These allocations are based on recognized customary and traditional uses of halibut. Regulations to implement subsistence halibut fishing were published in the Federal Register in April 2003 and became effective May 2

Petersburg

Location

Petersburg lies along the northwest end of Mitkof Island, where the Wrangell Narrows meet Frederick Sound. It is located about midway between Juneau and Ketchikan. The area encompasses 43.9 square miles of land and 2.2 square miles of water.

Demographic Profile

According to the U. S. Census, the population of Petersburg was 3,224 in 2000. Population numbers have risen steadily since the early decades of the 1900 and are now at a maximum.

Current Economy

The economy of Petersburg is based on commercial fishing and timber harvests and is therefore highly seasonal. A total of 1226 commercial fishing permits were held by 648 permit holders in 2000 according to the Commercial Fisheries Entry Commission. . Several processors operate cold storage, canneries and custom packing services. The state runs the Crystal Lake Hatchery which contributes to the local salmon resource. Petersburg is the supply and service center for many area logging camps. Independent sportsmen and tourists utilize the local charter boats and lodges, but there is no deep water dock suitable for cruise ships.

At the time of the 2000 U.S. Census, 63.6% of the potential labor force was employed and there was a 7.3% unemployment rate. A seemingly high 29.2% of the population over 16 years of age was not in the labor force, though this may be explained by the intensely seasonal nature of the fishing and tourism industries, and 5% of the population was below the poverty level. The median household income in the same year was $40,028 and the per capita income was $25,827.

Involvement in North Pacific Fisheries

Commercial Fishing

Commercial fishing is important to the economy of Petersburg. According to the Department of Fish and Game, and reported by the Alaska Commercial Fisheries Entry Commission 1,226 permits were held by 468 permit holders but only 831 permits were actually fished in Petersburg in 2000. There were 160 vessel owners in the federal fisheries, another 217 vessel owners in the salmon fishery and overall 530 crew members claiming residence in Petersburg in 2000. The commercial vessel fleet delivering landings to Petersburg was involved in herring (44 vessels), halibut (180 vessels), sablefish (64 vessels), other groundfish (158 vessels), and salmon (414 vessels) fisheries in 2000. Landings in Petersburg for the year 2000 included 930.97 tons of federal fish, including 766.47 tons of halibut, 164.50 tons of other groundfish (other figures for landings by species are suppressed for reasons of confidentiality according to Federal Statute 3AAC48.045) and 21,660.18 tons of salmon.

Commercial fishing permits are issued according to specifications of species, vessel size, gear type and fishing area. Permits issued in Petersburg for the year 2000 related to halibut, herring, other finfish, sablefish, other groundfish, crab, other shellfish and salmon.

Halibut: There were a total of 221 permits issued for halibut in Petersburg in 2000, 203 of which were actually fished.

Herring: There were a total of 115 permits issued for the herring fishery in Petersburg in 2000 making it one of the major fisheries for the community, 58 permits were actually fished that year.

Other Finfish: Two permits were issued in Petersburg n 2000 for freshwater fish beach seines in statewide

waters, neither of which were fished.
Sablefish: A total of 80 sablefish permits were issued in 2000 in Petersburg, 75 of which were actually fished.
Other groundfish: A total of 158 permits were issued in 2000 for other groundfish in Sitka, only 54 of which were actually fished.
Crab: A total of 203 permits were issued in Petersburg for crab in 2000, 171 of which were actually fished.
Other shellfish: A total of 73 permits were issued in Petersburg in 2000 for other shellfish, 34 of which were actually fished. Permits pertained to eight sets of geoduck clam diving gear in southeast waters (three permits were actually fished), one octopi/squid longline vessel under 60 feet in statewide waters (not fished), four shrimp pot gear vessels under 60 feet in southeast waters (one permits actually fished), eight shrimp beam trawls in southeast waters (four permits fished), 29 shrimp pot gear in southeast waters (13 permit fished), 17 sets of sea cucumber diving gear in southeast waters (13 permits fished), and six sets of sea urchin diving gear in southeast waters (none fished).
Salmon: A total of 374 permits were issued in Sitka in 2000 for the salmon fishery, 236 of which were actually fished.

Sport Fishing
There were 35 saltwater sport fishing businesses registered in Elfin Cove in 2002 and 20 businesses licensed to provide freshwater recreational fishing according to the Alaska Department of Fish and Game. There was a total of 3,985 sport fishing licenses sold in Petersburg in 2000, 1432 of which were sold to Alaska residents.

Subsistence Fishing
Numerous social, economic and technological changes have influenced life in Alaskan fishing communities and subsistence harvests and practices continue to provide fishing communities with important nutritional, economic, social and cultural requirements. Data from 1987 compiled on behalf of the Division for Subsistence of the Alaska Dept of Fish and Game provides useful information about subsistence practices in Petersburg. Records describe the subsistence patterns for 96.9% of households in the community which participated in the use of subsistence resources, including harvesting, sharing and consuming resources, illustrating the importance of subsistence to life in the community. Of the total population, 96.9% used salmon and 87.6% used non-salmon fish (herring, herring roe, smelt, cod, flounder, halibut, rockfish, char), no households used marine mammals although a fairly high percentage, 80.3%, used marine invertebrates.

The average per capita subsistence harvest for the year 1987 was 197.67 pounds. The composition of the total subsistence harvest can be shown by the percentages of the resources which demonstrate the amount of each resource category used by the community relative to other resources categories. The total subsistence harvest was composed of 22.92% salmon, non-salmon fish made up 22.49%, land mammals 28.95%, marine mammals did not factor as a significant percentage of the composition of subsistence foods, birds and eggs accounted for only 1.80% of the total subsistence harvest, marine invertebrates for 19.49% and vegetation made up 4.36%. The wild food harvest in Petersburg made up 128% of the recommended dietary allowance of protein in 1987 (corresponding to a daily allowance of 49g of protein per day or 0.424 lbs. of wild food per day) (Wolfe, Division of Subsistence, ADF&G).

A total of 77 permits were held by households in Petersburg for subsistence fishing of salmon according to Alaska Department of Fish and Game division of Subsistence records from 1999. Sockeye made up the largest proportions of the salmon harvest. Residents of Petersburg and members of Petersburg Indian Association who hold a valid Subsistence Halibut Registration Certificate (SHARC) issued by NMFS, are eligible to harvest subsistence halibut. These allocations are based on recognized customary and traditional

uses of halibut. Regulations to implement subsistence halibut fishing were published in the Federal Register in April 2003 and became effective May 2003.

Sand Point

Location

Sand Point is located on Humboldt Harbor on the northwestern edge of Popof Island, on the Popof Strait. It is part of the Shumagin Islands, off the Alaska Peninsula. Sand Point is administratively located in the Aleutians East Borough. It is five miles south of the Alaska Peninsula and about 570 miles southwest Anchorage. The area encompasses 7.8 square miles of land and 21.1 square miles of water.

Demographic Profile

In the year 2000, according to the US Census, Sand Point had 952 residents. The population of Sand Point has been constantly growing since the 1900s. This steady rate of increase was secured in the 1930s with the establishment of the fishing industry, which replaced gold mining.

Current Economy

Sand Point harbors the largest fishing fleet of the Aleutian chain. In the year 2000 117 residents held commercial fishing permits. Trident Seafoods operated a major year-round bottomfish, pollock, salmon and fish meal processing plant, and provided fuel and other services. It employed from 50 to 400 employees, depending on the season. Peter Pan Seafoods owned a storage and transfer station in the community to support its fleet.

Involvement in North Pacific Fisheries

Commercial Fishing

Sand Point is home to one of the largest commercial fleets of Southwest Alaska. According to official records, in the year 2000 Sand Point had 116 commercial permit holders and a total of 327 all-fisheries combined permits. In Sand Point 225 individuals were registered as crewmen and there were 61 federal fisheries vessel owners plus 98 owners of salmon vessels residing in the community. Sand Point's fleet was involved, in one way or another, in most of the Alaskan fisheries, including crab, sablefish, halibut, herring, other groundfish, other shellfish and salmon. The following is a breakdown of permits issued to Sand Point residents in 2000.

Halibut: There were 52 issued permits for halibut fisheries, 38 of which were actually fished.

Groundfish: Groundfish was the fishery that accumulated the highest number of permits, with 150 permits and 84 permit holders. Only 70 permits were actually fished.

Salmon: The salmon fleet accounted for 100 permits, 85 of which were fished.

Crab: There were three king crab permits (one for a vessel under 60 feet with pot gear and two for vessels over 60' fishing with pot gear in Bristol Bay). There are also two permits for vessels over 60 feet for Tanner crab with pot gear in the Bering Sea.

Other: Other fisheries in Sand Point included herring and other shellfish. Herring permits included eight herring roe purse seine permits, three in Bristol Bay, one in Cook Inlet, one in Chignik, and three along the Alaska Peninsula. None of these permits was actually fished. In addition, there were two herring roe gillnet permits (none was fished), and none herring food/bait purse seine permits on the Alaska Peninsula (none was fished). Other shellfish, including octopus and squid had one permit for vessels over 60 feet with pot gear (none was actually fished), and one sablefish mechanical jig permit (none was actually fished).

In terms of fish processing, Trident Seafoods operated a major year-round bottomfish, pollock, salmon and fish meal processing plant, and provided fuel and other services. It employed from 50 to 400 employees depending on the season. Peter Pan Seafoods owned a storage and transfer station that supported its fleet. Because the community had less than three processors, the data on landings was confidential. The fleet delivering landings to Sand Point was larger than the number of ships homeported or anchored in that particular harbor.

Sport Fishing

In the year 2000 this community issued 42 sport fishing permits, 25 of which were bought by Alaskan residents. This small number of permits does not preclude the possibility that the area could be visited by outsiders who their permits elsewhere. In 2000, Sand Point also had five sport fishing guide businesses: four focused on freshwater activities while one worked in saltwater fisheries.

Subsistence Fishing
A survey conducted by ADF&G in 1992 in Sand Point demonstrated the significance of subsistence practices to most Alaskan communities. All Sand Point households participated in the use of subsistence resources. In relation to the main marine resources, 99% of the households used subsistence salmon, 97.1% used other types of fish (herring, smelt, cod, eel, flounder, greenling, halibut, perch, rockfish, sablefish, sculpin, skates, sole, tuna, burbot, char, pike, sheefish, trout, whitefish), 25% of households used marine mammals and 90.4% used marine invertebrates. The total per capita harvest of subsistence resources was 255.7 pounds.

The breakdown of the subsistence harvest was as follows: salmon (53.8%), other fish (21.1%), land mammals (11.31%), marine mammals (1.84%), birds and eggs (2.3%), marine invertebrates (7%) and vegetation (2.7%).

In 1999, Sand Point had 54 Alaska salmon household subsistence permits. The catch was mainly sockeye and Chum. In addition, residents of Sand Point (rural residents or members of an Alaska Native tribe) are eligible to harvest subsistence halibut by holding Subsistence Halibut Registration Certificates (SHARC). This program is still in the initial phase of implementation and no definitive certificate numbers have been released.

Seattle

According to the U.S. Census, the population of Seattle was 3,554,760 in 2000. This represents an increase of nearly 1 million people since the previous census in 1990.

Locational issues are discussed with respect to the Seattle area and the BSAI crab fishery. Here, the discussion is divided into three components: the institution of the Port of Seattle, the "traditional" community of Ballard, and the planning area construct of the Ballard Interbay Northend Manufacturing Industrial Center (BINMIC). Each component provides a different and useful perspective on the Seattle social/socioeconomic ties to the fishery.

The Port of Seattle
Martin Associates (2000) provides an overall assessment of the economic impact of fishing activity based at Port of Seattle facilities. They conclude that such activity generates $400 million in wages (direct, indirect, and induced), $315 million in business revenues, $42 million in local purchases, and $48 million in state and local taxes. There is no way to desegregate the Alaskan distant water fleet from this overall impact, so the utility of the information for the present purposes is limited. They do provide estimates for the annual expenditures in Seattle of the various fishing vessels homeported there, and as might be expected, those for the larger vessels, such as participate in the Alaskan groundfish fisheries, are the highest in terms of expenditures per vessel – $250,000 for catcher trawlers, $900,000 for factory trawlers, and $1.7 million for motherships. Crabbers are in the $180,000 range. Most of the vessels in these classes homeported in Seattle probably participate in the Alaskan groundfish fisheries but also participate in other fisheries. There are also many vessels in the Seattle distant water fleet that do not participate in the Alaskan groundfish fisheries. The Port itself does not have information on moorage fees received, either in total or for segments of the fleet.

The Port of Seattle is separate from the Municipality of Seattle and is an economically self-supporting entity. Besides its direct revenues, it receives 1 percent of the property tax collected in King County, but with a cap on funding not to exceed $33 million a year. In turn, all port revenues are charged a 12.4 percent tax, which is split between the City of Seattle and the State of Washington (in lieu of property tax). The Port's charge is the development of infrastructure that will support local and regional economic activities, especially in cases where the rate of return on investment in that infrastructure may be too low (although still positive) for the private investor. Such development contributes to the overall economy of the region through synergistic and multiplier effects.

Ballard

When looked at on a neighborhood basis, one of more obvious foci of the distant water fishery in the greater Seattle area is the community of Ballard. Today the term "Ballard" represents a loosely defined geographical neighborhood of northwest Seattle. There is no geographically standard area for which various types of comparable information exists. Nonetheless, the area does have a geographical identity in peoples' minds and, together with Magnolia and Queen Anne, has its own yellow pages telephone directory (published by the Ballard and Magnolia Chambers of Commerce). The following brief section is based predominately on information from the Ballard Chamber of Commerce (1998), Reinartz (1988a, 1988b, 1988c, 1988d), Hennig and Tripp (1988), and McRae (1988).

Fishermen's Terminal on Salmon Bay is recognized as the home of the Pacific fishing fleet and has been characterized as the West Coast's "premier home port." Fishermen's Terminal (Salmon Bay Terminal) in turn has often been identified with Ballard, which was formerly a separate city (incorporated 1890) before annexation by Seattle in 1907. Until the construction of the Chittenden Locks and the Lake Washington Ship Canal, opened in 1917, Salmon Bay Terminal was confined to relatively small vessels but was the focus of a developing fishing fleet. Once the area was platted and incorporated, it quickly attracted settlers and industries desiring or dependent upon access to Puget Sound. The timber industry was the first to develop, due to the need to clear land as well as the value of the timber that was available. By the end of the 1890s, Ballard was a well-established community with the world's largest shingle manufacturing industry, as well as boat building and fishing industries. By 1900 Ballard was the largest area of concentrated employment north of San Francisco.

Ballard effectively blocked the expansion of Seattle to the north, and court decisions had given Seattle control over Ballard's freshwater supply, with the result that Ballard became part of Seattle in 1907. At that time the community had 17 shingle mills, 3 banks, 3 saw mills, 3 iron foundries, 3 shipyards, and approximately 300 wholesale and retail establishments. The Scandinavian identity of Ballard developed at or somewhat before this time. In 1910, first- and second-generation Scandinavian-Americans accounted for 34 percent of Ballard's population, and almost half of Ballard's population was foreign-born. Currently, less than 12 percent of the population is of Scandinavian descent, but the cultural association remains pervasive.

Ballard's economy continued to develop and diversify, but it remained fundamentally dependent on natural resources, and especially timber and fishing. In 1930 the *Seattle Weekly News* reported that 200 of the 300 schooners of the North Pacific halibut fleet were homeported in Ballard, demonstrating not only the centrality of Ballard but the long-term importance of distant water fisheries to Seattle fishermen. In 1936 the Port of Seattle built a new wharf at the Salmon Bay terminal, and in 1937 a large net and gear warehouse was scheduled for construction there. Over the years, Seattle-based vessels were central to the evolution of a number of North Pacific fisheries.

Thus in some ways Ballard is considered a "fishing community within" Seattle. While this has historically been the case, when examined specifically with respect to the BSAI crab fishery, the area cannot cleanly be

considered a "village within a city." While there is a concentration of multigenerational fishing families within the area, the "industrialization" of the Alaska fisheries has tended to disperse the ties and relationships. While support service businesses remain localized to a degree (as discussed in another section below), there does not appear to be a continuity of residential location that is applicable to the Alaska crab fishery. This is due to the many changes within the cluster of individual species fisheries that make up the overall Alaska crab fishery, and others in which these fishermen may participate. In summary, this "community within the community" issue is not straightforward due to the complex nature of historical ties, continuity of fishing support sector location through time, changes in the technology and methods of fishing, and industrialization of the fishery. Clearly, Seattle represents a different pattern of colocation of residence and industry with respect to the BSAI crab fishery than that seen in the relevant Alaska communities.

The Ballard Interbay Northend Manufacturing Industrial Center

One of the fundamental purposes for the establishment of the BINMIC Planning Committee was the recognition that this area provided a configuration of goods and services that supported the historical, industrial, and maritime character of the region. At the same time, developmental regional dynamics are promoting changes within the BINMIC area that may threaten the continued vitality of its maritime orientation. Among other objectives, the BINMIC final plan states:

> The fishing and maritime industry depends upon the BINMIC as its primary Seattle home port. To maintain and preserve this vital sector of our economy, scarce waterfront industrial land shall be preserved for water-dependent industrial uses and adequate uplands parcels shall be provided to sufficiently accommodate marine-related services and industries (BINMIC Planning Committee 1998:6).

Previous documents produced for the NPFMC (e.g., NPFMC 2002; IAI 1998) have discussed the BINMIC area, and some of this information is abstracted below. It is now becoming dated, however, as the BINMIC planning document has remained in the form in which it was "finalized" and the City of Seattle does not collect time series measures for the BINMIC area comparable to those, for example, collected for the Port of Seattle.

As previously noted, Ballard, in northwest Seattle, is commonly identified as the center of Seattle's fishing community. This may be true in a historical residential sense, but commercial fishing-related suppliers and offices are spread along both sides of Salmon Bay-Lake Washington Ship Canal, around Lake Union, along 15th Avenue West through Queen Anne, and then along the shores of Elliot Bay on both sides of Pier 91. Not surprisingly, this is also the rough outline of the formal boundaries of BINMIC, which is bordered by the Ballard, Fremont, Queen Anne, Magnolia, and Interbay neighborhoods. It is defined so as to exclude most residential areas, but to include manufacturing, wholesale trade, and transportation-related businesses. It includes rail transportation, ocean and freshwater freight facilities, fishing and tug terminals, moorage for commercial and recreational boats, warehouses, manufacturing and retail uses, and various port facilities (Terminal 86, Piers 90 and 91).

The BINMIC "Economic Analysis" document (Economic Consulting Services 1997) uses much of the same information as was reviewed above, in combination with an economic characterization of the BINMIC area, to establish that certain economic activities are especially important for that area. One of these activities is commercial fishing, although again the specific extent of connections to the BSAI crab fishery in particular are difficult to establish.

The BINMIC area is relatively small, but contributes disproportionately to the city and regional economy.

Again, those characteristics are part of what determined its borders. The BINMIC resident population is only 1,120 (1990 census), but there are 1,048 businesses in the area and 16,093 employees. The great majority of business firms are small, 85 percent have fewer than 26 employees, but accounted for only 30 percent of total BINMIC employment. Self-employed individuals (i.e., fishermen) are probably not included in these numbers.

An important indicator of the importance of commercial fishing and other maritime activities is the availability of commercial moorage. As of 1994, more than 50 percent of all commercial moorage available in Puget Sound was located in Seattle, and of that, more than 50 percent was in the BINMIC area (representing 30 percent of all commercial moorage in the Puget Sound area). Thus, the BINMIC area is clearly important in terms of being an area where vessels (especially larger commercial vessels) are concentrated. The Port of Seattle has concluded that only the ports of Olympia and Tacoma at present provide a significant source of moorage in Puget Sound outside of Seattle. Port Angeles may build additional capacity at some point in the future. Olympia's facility was rebuilt in 1988. Some older moorage constructed of timber piling prior to 1950 is nearing the end of its useful life and will need to be replaced. On the other hand, it is expected that much of the private old timber moorage will not be replaced, so that overall moorage capacity will decline. In the Seattle area, there has also been a dynamic whereby commercial moorage had been converted to recreational moorage. Within the BINMIC area, recreational moorage within the UI Shoreline is prohibited altogether, because of the importance of commercial activity and the danger of interference from recreational moorage. The Port has concluded that it is unlikely that any new private commercial moorage will be developed (because of cost and regulatory regime) and is examining their options (Port of Seattle 1994). As previously mentioned, the Port is pursuing a program of repairing its facilities where economically feasible (when it can be fairly well assured of a steady tenant).

The BINMIC area is fairly well "built out." The BINMIC area contains 971 acres, divided into 806 parcels with an average size of 1.043 acres, but a median size of 0.207 acres. Thus there are many small parcels. Public entities of one sort or another own 574.8 acres (59 percent). The Port of Seattle is the largest landowner with 166 acres, while the city has 109 acres. Private land holders own 396 acres, of which only 19.45 acres were classified as vacant – 19.27 acres in 81 parcels as vacant industrial land and 0.18 acres in 2 parcels as vacant commercial land. An additional 200.76 acres were classified as "underutilized," meaning that it had few buildings or other improvements on it. This classification does not mean that the land may not be in use in a fruitful way (for instance, storage of gear or other use that is not capital intensive).

Economic Consulting Services (1997, Appendix C) lists 85 companies that have a processing presence in Washington State. Of these, over half (47) are located in Seattle, with many in the surrounding communities (Bellevue, Kirkland, Redmond). Of these 47, at least 18 are located within the BINMIC area, and the rest are located very near the boundaries of the BINMIC. Some examples of fairly large fishing entities that are located within the BINMIC (as well as elsewhere) are Trident Seafoods, Icicle Seafoods, Ocean Beauty Seafoods, Peter Pan, Alaska Fresh Seafood, and NorQuest Seafoods. All demonstrate some degree of integration of various fishing industry enterprises.

The BINMIC area of Seattle displays the following characteristics, which indicate its important economic roles:

- significant component of, and plays a vital role in, the greater Seattle economy;
- integrated into local, regional, national, and multinational markets;
- key port for trade with Alaskan and the West Coast, Pacific, and Alaska fishing industries - and the Alaskan fishery is especially significant;

- Salmon Bay, Ship Canal, and Ballard function as a small port of its own but also support fishing and a wide range of other maritime activities - including recreation and tourist vessels and activities; and
- an area of concentration of businesses, corporations, organizations, institutions, and agencies that participate in, regulate, supply, service, administer, and finance the fishing industry.

Chase and Pascall (1996) focus on the importance of Alaska as a market for Seattle region (Puget Sound) produced goods and services. They do so by identifying particular industrial sectors that generate the bulk of these economic impacts, but they do not locate these industrial sectors in terms of particular geographic locations within the region. In their discussion of the fisheries sector, Chase and Pascall indicate that only a fraction of the regional economy is based on fishing and seafood processing industries, but that these industry sectors are concentrated in several communities and rely heavily on North Pacific (Alaskan) resources. The communities that they single out are Bellingham, Anacortes, and the Ballard neighborhood of Seattle. They say that Seattle is the major base for vessels for various fisheries – groundfish (catcher vessels, catcher processors, motherships), halibut, crab, salmon, and others. There are numerous secondary processing plants in the region, and about 60 percent of the seafood harvested and shipped south for processing moves through the Port of Tacoma (Chase and Pascall 1996:23).

The relative value of Alaskan shellfish (crab, shrimp, etc.) for the Seattle fleet varies from year to year, but in 1994 was about 25 percent of the ex-vessel value of the Alaska/North Pacific commercial fishing harvest (Chase and Pascall 1996:26), which represented about 75 percent by harvest value, and 92 percent by weight, of all fish harvested by the Puget Sound fishing fleet (Chase and Pascall 1996:23 - citing ADF&G, NPFMC, NMFS). Since that time, crab harvests have declined considerably, however, so this percentage would now be smaller.

Other relatively recent work (Martin O'Connell Associates 1994) indicates the wide range of activities that the Port of Seattle supports and the web of support services that commercial fishing helps support, but it provides no measure of the contribution of the BSAI crab fishery to this support. Fishing activities are included in this study only to the extent that they are reflected in activities at Fishermen's Terminal. This would generally reflect Bering Sea and Gulf of Alaska catcher vessel activity but would also include a great number of other smaller vessels moored at Fishermen's Terminal. On the other hand, it would also include some Alaskan groundfish activity of similarly sized and somewhat larger vessels, and some factory trawlers. It would not include the activities of larger Alaskan groundfish vessels such as catcher-processor, mothership, and secondary processing activities. By their estimation, fishing activity at Fishermen's Terminal in 1993 generated 4,007 direct jobs (the majority of them crew positions), earning an average of $48,690 per direct job (total $195 million). Also, an additional 2,765 induced and indirect jobs were created. Fishing businesses also expended $145 million on local purchases of goods and services (Martin O'Connell Associates 1994:45-49). Again, this does not indicate the contribution of the BSAI crab fishery so much as it establishes that the local fishing/processing economy is densely developed.

Seldovia

Location

Seldovia is situated on the southern tip of the Kenai Peninsula facing the Cook Inlet and across the water from Homer on the south shore of Kachemak Bay. The area encompasses 0.4 square miles of land and 0.2 square miles of water.

Demographic Profile

According to the U. S. Census, the population of Seldovia was 286 in 2000. Total population numbers increased steadily over the century between 1890, when the population totaled 99, to 1980 when there were 479 residents. Over the last two decades, however, the population has declined to nearly half of its

maximum number.

Current Economy
The economy of Seldovia is intimately linked to the local and national fishing industries. Seldovia is both a commercial fishing and processing center and a popular sport fishing destination. The timber industry is small but significant to the community and tourism is increasing in importance. A total of 104 commercial fishing permits were held by 57 permit holders in 2000 according to the Commercial Fisheries Entry Commission.

Involvement in North Pacific Fisheries
Commercial Fishing∗
Commercial fishing is a main contributor to the economy of Seldovia, along with other natural resource uses. According to the Department of Fish and Game, and reported by the Alaska Commercial Fisheries Entry Commission 104 permits were held by 57 permit holders but only 60 permits were actually fished in Seldovia in 2000. There were 10 vessel owners in the federal fisheries, 9 vessel owners in the salmon fishery and overall 45 crew members claiming residence in Seldovia. One vessel in the salmon fishery actually delivered its landings to Seldovia (figures for landings by species are suppressed for reasons of confidentiality according to Federal Statute 3AAC48.045).

Commercial fishing permits are issued according to specifications of species, vessel size, gear type and fishing area. Permits issued in Seldovia for the year 2000 related to halibut, herring, sablefish, other groundfish, crab and salmon.
Halibut: There were a total of 18 permits issued for halibut in Seldovia in 2000, 16 of which were actually fished.
Herring: There were a total of 11 permits issued for the herring fishery in Seldovia in 2000, none of which were actually fished that year.
Sablefish: A total of five sablefish permits were issued in 2000 in Seldovia, all of which were actually fished.
Other groundfish: A total of 23 permits were issued in 2000 for other groundfish in Seldovia, only seven of which were actually fished.
Crab: Eight permits were issued in Seldovia for crab in 2000, two of which were actually fished.
Salmon: A total of 39 permits were issued in Seldovia in 2000 for the salmon fishery, 30 of which were actually fished.

Although fish processing, especially of shellfish, is considered to have been an important endeavor in Seldovia, only one processing plant was operating in the town in 2000. Port Graham Seafoods Inc. had the capacity to process salmon in that year.

Sport Fishing
In 2002 there were seven sport fishing saltwater guides in operation. In 2000 there was a total of 597 sport fishing licenses sold in Seldovia, 242 of which were sold to Alaska residents. Several species are targeted for sport fishing in Seldovia, including halibut, king salmon, silver salmon, red salmon, pink salmon, jacks, coho, sockeye, chum, tyee, dolly varden, steelhead, Pollock, rainbow trout, arctic char, manta ray, black bass. The City of Seldovia's website proclaims: 'Life doesn't get any better then fishing on one of Seldovia's charter boats.'

Subsistence Fishing

∗ Commercial fishing permit data from the CFEC is given for the communities of Red Mountain and Seldovia

Data from 1993 compiled on behalf of the Division for Subsistence of the Alaska Dept of Fish and Game provides useful information about subsistence practices in Seldovia. Records describe the subsistence patterns for all 95.4% of households which participated in the use of subsistence resources, including harvesting, sharing and consuming resources, illustrating the importance of subsistence to life in the community. Of the total population, 89.2% used salmon and 86.2% used non-salmon fish (herring, herring roe, smelt, cod, greenling, halibut, rockfish, sablefish, trout), many fewer households, only13.8%, used marine mammals and a high percentage, 90.8%, used marine invertebrates.

The average per capita harvest for the year 1993 was 183.55 pounds. The composition of the total subsistence harvest can be shown by the percentages of the resources which demonstrate the amount of each resource category used by the community relative to other resources categories. The total subsistence harvest was composed of 35.01% salmon, non-salmon fish made up 23.76%, land mammals 12.85%, marine mammals only 0.67%, birds and eggs accounted for 0.70% of the total subsistence harvest, marine invertebrates for 18.5% and vegetation made up 8.51%. The wild food harvest in Seldovia made up 119% of the recommended dietary allowance of protein in 1993 (corresponding to 49g of protein per day or 0.424 lbs. of wild food per day) (Wolfe, Division of Subsistence, ADF&G).

A total of 15 permits were held by households in Seldovia for subsistence fishing of salmon according to Alaska Department of Fish and Game division of Subsistence records from 1999. Sockeye and Chinook made up the largest proportions of the salmon harvest, followed by chum. Residents of Seldovia and members of the Seldovia Village Tribe, an Alaska Native Tribe, who hold a valid Subsistence Halibut Registration Certificate (SHARC) issued by NMFS, are eligible to harvest subsistence halibut. These allocations are based on recognized customary and traditional uses of halibut. Regulations to implement subsistence halibut fishing were published in the Federal Register in April 2003 and became effective May 2003.

Seward

Location
Seward is located on Resurrection Bay on the southeast coast of the Kenai Peninsula. It lies at the foot of a mountain range, ending in the South with Mount Marathon. Seward is the gateway to the Kenai Fjords National Park. The area encompasses 14.4 square miles of land and 7.1 square miles of water.

Demographic Profile
According to the U. S. Census, the population of Seward was 2,830 in 2000. Total population numbers have increased steadily from 1910 when there were 534 residents of the community.

Current Economy
There are several fish processing plants in Seward with the collective capacity to process halibut, sablefish, other groundfish and salmon. Salmon is major component of the harvest and the current reduction in salmon prices has adversely affected the economy of Seward.

Involvement in North Pacific Fisheries
Commercial Fishing
Commercial fishing is important to the economy of Seward. According to the Department of Fish and Game, and reported by the Alaska Commercial Fisheries Entry Commission 164 permits were held by 80 permit holders but only 86 permits were actually fished in Seward in 2000. There were 25 vessel owners in the federal fisheries, 24 vessel owners in the salmon fishery and overall 198 crew members claiming residence in Seward. The commercial vessel fleet delivering landings to Seward was involved in halibut (169 vessels), sablefish (129 vessels), other ground fish (203 vessels), and salmon (211 vessels) fisheries in

2000. Landings in Seward for the year 2000 included 2,678.79 tons of federal fish (figures for landings by species are suppressed for reasons of confidentiality according to Federal Statute 3AAC48.045) and 11,530.35 tons of salmon.

Commercial fishing permits are issued according to specifications of species, vessel size, gear type and fishing area. Permits issued in Seward for the year 2000 related to halibut, herring, other finfish, sablefish, other groundfish, crab, other shellfish and salmon.
Halibut: There were a total of 29 permits issued for halibut in Seward in 2000, 27 of which were actually fished.
Herring: There were a total of 14 permits issued for the herring fishery in Seward in 2000, only two of which were actually fished that year.
Other finfish: Three permits were issued for other finfish in Seward in 2000, none of which were actually fished.
Sablefish: A total of 18 sablefish permits were issued in 2000 in Seward, 12 of which were actually fished.
Other groundfish: A total of 44 permits were issued in 2000 for other groundfish in Seward, only 13 of which were actually fished.
Crab: Five permits were issued in Seward for crab in 2000, three of which were actually fished.
Other shellfish: Of five permits, only one permit that had been issued in Seward in 2000 was actually fished. Permits issued in Seward pertained to one shrimp pot gear vessel under 60 feet in westward waters (not fished), one shrimp pot gear in southeast waters (not fished), one shrimp pot gear vessel over 60 feet in westward waters (not fished), one sea cucumber diving gear permit for statewide waters but excluding southeast waters, one sea urchin diving gear permit for statewide waters but excluding southeast waters (not fished).
Salmon: A total of 46 permits were issued in Seward in 2000 for the salmon fishery, 28 of which were actually fished.

Between the five processors registered in Seward in 2000, there were facilities for processing halibut, salmon, sablefish and groundfish. These processors are significant seasonal employers and providers of harbor and portside facilities. Resurrection Bay Seafoods, a processing plant in Seward owned by Wards Cove Packing Company, was purchased by Seattle-based Smoki Foods in the spring of 2003, just before the opening of the halibut season. In recent years, the Seward plant has primarily been a halibut and black cod processing facility. It was put on the market in December after Wards Cove announced it was closing the doors of its Alaska salmon processing facilities.

Sport Fishing
The considerable diversity of fish species available for recreational fishing in the waters around Seward, as well as the town's easy accessibility, make it popular destination for sport fishers. Chinook salmon, silver salmon, red salmon, halibut, rockfish and lingcod are common sportfishing species found in the nearby marine waters. There were 37 sportfishing businesses registered in Seward in 2002 and four freshwater businesses. There was a total of 13,923 sport fishing licenses sold in Seward in 2000, 4,099 of which were sold to Alaska residents. The high numbers are due to Seward's famous river fishing which attract people from all over the world and necessitate arranging accommodation and fishing guides well in advance during summer months.

Subsistence Fishing
According to 2003-2004 Federal subsistence fishery regulations, Seward is designated as a Federal nonrural area. Correspondingly, residents of Seward are not eligible for subsistence fishing permits and are not permitted to harvest fish or shellfish under Federal subsistence regulations.

A total of five permits were held by households in Seward for subsistence fishing of salmon according to Alaska Department of Fish and Game division of Subsistence records from 1999. Salmon is not a federally

managed fish, and is therefore not subject to the same restriction as other fisheries. Pink salmon made up the largest proportions of the salmon harvest, followed by sockeye and chum.

Sitka

Location
Sitka is located on the west coast of Baranof Island fronting the Pacific Ocean, on Sitka Sound in southeast Alaska. An extinct volcano, Mount Edgecumbe, rises 3,200 feet above the community. The area encompasses 2,874.0 square miles of land and 1,937.5 square miles of water.

Demographic Profile
According to the U. S. Census, the population of Sitka was 8,835 in 2000. Population numbers have risen steadily since the late 1800s with drastic population increases occurring in 1880s, 1950s and 1960s.

Current Economy
The economy of Sitka is relatively diverse, including fishing, fish processing, tourism, government, transportation, retail, and health care services. Cruise ships bring over 200,000 visitors annually and numerous businesses cater to tourism, including fishing charters, sightseeing tours and visitor accommodations. Sitka Sound Seafood and the Seafood Producers Co-op are major employers. Regional health care services, the U.S. Forest Service and the U.S. Coast Guard also employ a number of residents. A total of 1,369 commercial fishing permits were held by 586 permit holders in 2000 according to the Commercial Fisheries Entry Commission.

Involvement in North Pacific Fisheries
Commercial Fishing∗
Commercial fishing is important to the economy of Sitka. According to the Department of Fish and Game, and reported by the Alaska Commercial Fisheries Entry Commission 1369 permits were held by 586 permit holders but only 888 permits were actually fished in Sitka in 2000. There were 233 vessel owners in the federal fisheries, 288 vessel owners in the salmon fishery and fishery and overall 658 crew members claiming residence in Sitka in 2000. The commercial vessel fleet delivering landings to Sitka was involved in herring (17 vessels), halibut (277 vessels), sablefish (159 vessels), other groundfish (331 vessels), and salmon (629 vessels) fisheries in 2000. Landings in Sitka for the year 2000 included 4,269.11 tons of federal fish, including 1081.89 tons of halibut, 569.99 tons of other groundfish (other figures for landings by species are suppressed for reasons of confidentiality according to Federal Statute 3AAC48.045) and 8087.729 tons of salmon.

Commercial fishing permits are issued according to specifications of species, vessel size, gear type and fishing area. Permits issued in Sitka for the year 2000 related to halibut, herring, sablefish, other groundfish, crab, other shellfish and salmon.

Halibut: There were a total of 258 permits issued for halibut in Sitka in 2000, 210 of which were actually fished.
Herring: There were a total of 32 permits issued for the herring fishery in Sitka in 2000, 25 of which were actually fished that year.
Sablefish: A total of 133 sablefish permits were issued in 2000 in Sitka, 130 of which were actually fished.
Other groundfish: A total of 338 permits were issued in 2000 for other groundfish in Sitka, only 109 of

∗ Commercial fishing permit data from the CFEC is given for the communities of Katlian, Mount Edgecumbe, and Sitka

which were actually fished.
Crab: A total of 43 permits were issued in Sitka for crab in 2000, 35 of which were actually fished.
Other shellfish: A total of 154 permits were issued in Sitka in 2000, 84 of which were actually fished.
Salmon: A total of 411 permits were issued in Sitka in 2000 for the salmon fishery, 295 of which were actually fished.

Sport Fishing
There were 148 saltwater sport fishing businesses registered in Sitka in 2002 and 63 businesses licensed to provide freshwater recreational fishing according to the Alaska Department of Fish and Game. There was a total of 18,400 sport fishing licenses sold in Sitka in 2000, 3,261 of which were sold to Alaska residents.

Subsistence Fishing

Numerous social, economic and technological changes have influenced life in Alaskan fishing communities and subsistence harvests and practices continue to provide fishing communities with important nutritional, economic, social and cultural requirements. Data from 1996 compiled on behalf of the Division for Subsistence of the Alaska Dept of Fish and Game provides useful information about subsistence practices in Sitka. Records describe the subsistence patterns for 97.4% of households in the community which participated in the use of subsistence resources, including harvesting, sharing and consuming resources, illustrating the importance of subsistence to life in the community. Of the total population, 89.4% used salmon and 91.7% used non-salmon fish (herring, herring roe, smelt, bass, cod, flounder, greenling, halibut, perch, rockfish, sablefish, char, grayling, trout), many fewer households, 17.5%, used marine mammals and a high percentage, 72.4%, used marine invertebrates.

The average per capita subsistence harvest for the year 1996 was 205.01 pounds. The composition of the total subsistence harvest can be shown by the percentages of the resources which demonstrate the amount of each resource category used by the community relative to other resources categories. The total subsistence harvest was composed of 54.48% salmon, non-salmon fish made up 26.27%, land mammals 24.86%, marine mammals 3.56%, birds and eggs accounted for only 0.29% of the total subsistence harvest, marine invertebrates for 13.4% and vegetation made up 3.41%. The wild food harvest in Sitka made up 133% of the recommended dietary allowance of protein in 1996 (corresponding to a daily allowance of 49g of protein per day or 0.424 lbs. of wild food per day) (Wolfe, Division of Subsistence, ADF&G).

A total of 530 permits were held by households in Sitka for subsistence fishing of salmon according to Alaska Department of Fish and Game division of Subsistence records from 1999. Sockeye made up the vast majority of the salmon harvest. Residents of Sitka and members of Sitka Tribe of Alaska who hold a valid Subsistence Halibut Registration Certificate (SHARC) issued by NMFS, are eligible to harvest subsistence halibut. These allocations are based on recognized customary and traditional uses of halibut. Regulations to implement subsistence halibut fishing were published in the Federal Register in April 2003 and became effective May 2003.

Unalaska / Dutch Harbor
Location
Unalaska is a town located on Unalaska Island in the western Aleutian Islands. The Dutch Harbor portion of the community is located on Amaknak Island and is mainly an industrial port area, connected by a bridge to Unalaska Island, where most of the population is concentrated. Unalaksa and Dutch Harbor are treated as a single community here, in accordance with their inseparability in certain data sets and an underlying socioeconomic interconnectivity.

Demographic Profile
Unalaska is a town of 4,283 people in 988 housing units (Census 2000). During peak fishing seasons the population of the city can swell to over ten thousand.
Current Economy
The Unalaska/Dutch Harbor economy is based almost entirely on commercial fishing. It is the major source of employment, accounting for over 90% of jobs. Employment occurs in the harvest and processing sectors, and in fishing-related services such as fuel, vessel maintenance, trade and transportation (Alaska Department of Community and Economic Development). A nascent tourism industry is present in the community, with cruise ship stopovers, sportfishing, kayaking, and birdwatching attracting visitors. The subsistence economy is also still important in the community.

The median per capita income in 2000 was $24,676, and the median household income was 69,539. Approximately 12.5% of the population was below the poverty level. In 2000, 11.1% of residents were unemployed and seeking work, and 16.8% were unemployed and not seeking work (not in the total potential labor force).

Involvement in North Pacific Fisheries
Commercial Fishing
Unalaska/Dutch Harbor are located at the center of the most productive groundfish fishery in the world. Pollock generates the most revenue of the commercially fished species in Dutch Harbor/Unalaska. Other species processed in Dutch Harbor/Unalaska include pacific cod, black cod, halibut, flatfish, salmon, herring, opilio, tanner, and king crab. In 2000 there were 50 residents who held a total of 103 commercial fishing permits. There were 17 resident vessel owners operating in federal fisheries and six vessel owners operating in non-federal fisheries. There were 200 registered crew members residing in Unalaska/Dutch Harbor in 2000. This section contains detailed information about commercial permits in 2000 for Unalaska and Dutch Harbor as a single entity.
Crab: Permits in the crab fishery totaled 16, and 13 of them were actually fished.
Other Shellfish: A total of four permits for other shellfish were issued, but none was actually fished.
Halibut: *Permits* in the halibut fishery totaled 25, and 13 of them were actually fished.
Herring: There was only one permit issued in the herring fishery, and none was actually fished. This permit was for a vessel with purse seine gear in Bristol Bay.
Other Groundfish: Permits in the groundfish fishery totaled 40, and 18 of them were actually fished.
Sablefish: Permits in the sablefish fishery totaled seven, and five of these were actually fished.
Salmon: Permits in the salmon fishery totaled eight, and five were actually fished.

Dutch Harbor/Unalaska is the busiest fishing port in the nation in terms of landings; nine processors reported a total of 316,312.6 tons in landings for 2000. Of this, the vast majority of landings (305,394.8 tons, or 96.5%) were in the groundfish fishery. Vessels delivered landings to Dutch Harbor/Unalaska for the following species: groundfish (192 vessels); Sablefish (56 vessels); halibut (197 vessels); BSAI crab (136 vessels); salmon (50 vessels); herring (46 vessels); and scallops (1 vessel).

The largest onshore processors in Dutch Harbor/Unalaska are Unisea, Westward Seafoods, and Alyeska Seafoods. Osterman Fish, Prime Alaska, and Royal Aleutian also operate in Dutch Harbor. The off-shore processors in the area are the Bering Star, which is a floating processor that spends most of its time in Dutch Harbor/Unalaska, and the Fishing Company of Alaska (FCA), which is an at-sea processing company.

Sport Fishing

There are at least eight charter boat companies that operate out of Unalaska/Dutch Harbor, taking customers on sport fishing cruises to catch sockeye salmon, silver salmon, pink salmon, halibut, and dolly varden. There are three registered fishing guides for fresh water and six for salt water. Sport fishing permit sales for Unalaska totaled 833 in 2000, including 485 to Alaska residents.

Each season sport fishermen are lured to Unalaska for the Halibut Derby which offers prizes for the largest halibut caught each season and a prize of $100,000 for breaking the IGFA Pacific Halibut World Record, which is currently a fish of 459 pounds, caught in Unalaska. Some participants in the halibut charter fleet report a recent increase in competition on the local fishing grounds from commercial fishing boats which have responded to a decrease in the ex-vessel value of salmon by moving into halibut fisheries.

Subsistence
Many residents of Unalaska use subsistence resources to supplement their incomes. The Alaska Department of Fish and Game, Division of Subsistence, reports that, in 1994, 96.8% of Unalaska households used subsistence resources. Approximately 91.9% of households used salmon, particularly coho and cockeye. Approximately 94.6% of households used non-salmon fish species, including cod, halibut, herring, rockfish, sablefish, and char. In addition, 13.8% used marine mammals for subsistence, and 86.5% used marine invertebrates.

The annual per capita harvest of subsistence foods for Unalaska in 1994 was 194.5 pounds, and was comprised of the following resources: salmon (27.7%), non-salmon fish (41.6%), land mammals (4.9%), marine mammals (4.9%), birds and bird eggs (0.8%), marine invertebrates (14.1%), and vegetation (6.0%). In 1999, 206 households in Unalaska and Dutch Harbor held subsistence salmon harvesting permits. The local Qawalingin Tribe of Unalaska holds a Subsistence Halibut Registration Certificate (SHARC), which allows them to harvest halibut for subsistence.

Yakutat

Location
Yakutat lies among the lowlands along an extremely isolated stretch of coastline in the Gulf of Alaska. The community is located at the mouth of Yakutat Bay, one of the few refuges for vessels along this stretch of coast. The massive Hubbard and Malaspina Glaciers are nearby. The area encompasses 7,650.5 square miles of land and 1,808.8 square miles of water. Yakutat city is the sole residential grouping in Yakutat borough, making figures for each reflective of the other and therefore somewhat interchangeable.

Demographic Profile
According to the U. S. Census, the population of Yakutat City and Borough was 808 in 2000. Population numbers are currently at a maximum having increased drastically since the 1970s when the population was in the hundreds

Current Economy
Yakutat's monetary economy is almost exclusively dependent on fishing, fish processing and government. North Pacific Processors is the major private employer. Recreational fishing opportunities, both saltwater and freshwater fishing in the Situk River, are world-class and attract visitors to the region from across the globe. Most residents depend heavily on subsistence hunting and fishing. Salmon, trout, shellfish, deer, moose, bear and goats are harvested. A total of 253 commercial fishing permits were held by 162 permit holders in 2000 according to the Commercial Fisheries Entry Commission.

At the time of the 2000 U.S. Census, 71.8% of the potential labor force was employed and there was a

6.0% unemployment rate. Of the population over 16 years of age, 22.2% were not in the labor force, though this may be explained by the intensely seasonal nature of the fishing industry, and 13.5% of the population was below the poverty level. The median household income in the same year was $46,786 and the per capita income was $22,579.

Involvement in North Pacific Fisheries

Commercial Fishing

Commercial fishing is important to the economy of Yakutat. According to the Department of Fish and Game, and reported by the Alaska Commercial Fisheries Entry Commission 253 permits were held by 162 permit holders but only 167 permits were actually fished in Yakutat in 2000. There were 36 vessel owners in the federal fisheries, 50 vessel owners in the salmon fishery and overall 56 crew members claiming residence in Yakutat in 2000. The commercial vessel fleet delivering landings to Yakutat was involved in halibut (17 vessels), sablefish (49 vessels), other ground fish (75 vessels), and salmon (72 vessels) fisheries in 2000 (figures for landings of all species are suppressed for reasons of confidentiality according to Federal Statute 3AAC48.045).

Commercial fishing permits are issued according to specifications of species, vessel size, gear type and fishing area. Permits issued in Yakutat for the year 2000 related to halibut, herring, sablefish, other groundfish, crab, other shellfish and salmon.

Halibut: There were a total of 27 permits issued for halibut in Yakutat in 2000, 24 of which were actually fished.
Herring: One permit was issued for herring spawn on kelp in northern southeast waters, which was fished.
Sablefish: Two permits were issued for sablefish in Yakutat which pertained to two longline vessels under 60 feet in statewide waters (one permit fished).
Other groundfish: A total of 17 permits were issued in 2000 for other groundfish in Yakutat, only four of which were actually fished.
Crab: Ten permits were issued in Yakutat for crab in 2000, three of which were actually fished.
Other shellfish: A total of 18 permits were issued for other shellfish in Yakutat in 2000, six of which were actually fished. All 18 permits pertained to one shrimp pot gear vessels under 60 feet restricted to Yakutat (six permits actually fished).
Salmon: A total of 178 permits were issued in Yakutat in 2000 for the salmon fishery, 128 of which were actually fished.

Sport Fishing

There were 12 saltwater sport fishing businesses registered in Yakutat in 2002 and 19 businesses licensed to provide freshwater recreational fishing according to the Alaska Department of Fish and Game. There was a total of 3,897 sport fishing licenses sold in Yakutat in 2000, 308 of which were sold to Alaska residents.

Subsistence Fishing

Numerous social, economic and technological changes have influenced life in Alaskan fishing communities and subsistence harvests and practices continue to provide fishing communities with important nutritional, economic, social and cultural requirements. Data from 1987 compiled on behalf of the Division for Subsistence of the Alaska Dept of Fish and Game provides useful information about subsistence practices in Yakutat. Records describe the subsistence patterns for 96.4% of households in the community which participated in the use of subsistence resources, including harvesting, sharing and consuming resources, illustrating the importance of subsistence to life in the community. Of the total population, 88.3% used salmon and 96.4% used non-salmon fish (herring, herring roe, smelt, cod, flounder, greenling, halibut, rockfish, sablefish, char) 53.3% used marine mammals and a high percentage,

92.6%, used marine invertebrates.

The average per capita subsistence harvest for the year 1996 was 397.77 pounds. The composition of the total subsistence harvest can be shown by the percentages of the resources which demonstrate the amount of each resource category used by the community relative to other resources categories. The total subsistence harvest was composed of 54.20% salmon, non-salmon fish made up 19.31%, land mammals 3.7%, marine mammals 7.81%, birds and eggs accounted for only 0.63% of the total subsistence harvest, marine invertebrates for 9.98% and vegetation made up 4.38%. The wild food harvest in Yakutat made up 257% of the recommended dietary allowance of protein in 1987 (corresponding to a daily allowance of 49g of protein per day or 0.424 lbs. of wild food per day) (Wolfe, Division of Subsistence, ADF&G).

A total of 77 permits were held by households in Yakutat for subsistence fishing of salmon according to Alaska Department of Fish and Game division of Subsistence records from 1999. Sockeye made up the vast majority of the salmon harvest. Members of Yakutat Tlingit Tribe who hold a valid Subsistence Halibut Registration Certificate (SHARC) issued by NMFS, are eligible to harvest subsistence halibut. These allocations are based on recognized customary and traditional uses of halibut. Regulations to implement subsistence halibut fishing were published in the Federal Register in April 2003 and became effective May 2003.

G:\FMGROUP\Amendments 78-73 EFH-HAPC\Scallop FMP text\2005 scallop FMP.doc
Gharrington: 6/05
Jkurland: 8/24/05
Mnbrown: 10/13/05 per Council edits.