


MEMORANDUM

TO: Council, SSC and AP Members

FROM: Chris Oliver   
Executive Director

DATE: December 1, 2004

SUBJECT: Aleutian Islands Area-Specific Management

ESTIMATED TIME 8 HOURS (all D-1 items)
--

**ACTION REQUIRED**

Review preliminary discussion paper and provide direction.

**BACKGROUND**

In June 2004, the Council requested staff to examine the biological, social, economic, and management issues specific to the Aleutian Islands area, and to provide recommendations for designating this area as a special management area, or as a separate FMP, or potentially developing an ecosystem-based plan for this region.

The Council's request is addressed in the attached discussion paper (Item D-1(a)1), in two parts. First is a discussion of whether the unique characteristics of the Aleutian Islands should lead fishery managers to consider the area separately from the Bering Sea. The physical and biological characteristics of the Aleutian Islands are presented, as well as State and Federal fishery, marine mammal and seabird, cultural heritage, and research issues. The paper then examines the types of area-specific management that could be applied to the Aleutian Islands, and considers benefits and disadvantages of each. As the Council's request was made under a groundfish agenda item, the paper focuses the discussion on management options for the Aleutian Islands groundfish fisheries. There are three management options discussed in the paper: to create a special management area within the BSAI Groundfish FMP; to create a separate AI Groundfish FMP; and to develop a Fishery Ecosystem Plan for the Aleutian Islands area, and adopt additional management measures in the BSAI Groundfish FMP as necessary. A draft outline of the discussion paper is included below.

At the December 2004 meeting, the Council will decide whether the issue of area-specific management for the Aleutian Islands should be pursued. If the Council directs staff to continue work on this issue, our next tasks could be as follows. Between the December and February (or April, depending on Council priorities) meetings, the discussion paper would be further developed. As yet, none of the management options discussed in this paper have been ground-truthed with other agencies. The USFWS, through the Alaska Maritime National Wildlife Refuge, owns most of the land in the Aleutian Islands area. Additionally, we intend to consult with the various divisions of NMFS and NOAA GC, and the State of Alaska. Although there is not time for extensive stakeholder outreach between these meetings, due in part to the holidays, staff will welcome all input from interested stakeholders. Based on these meetings, and further refinement of the issues, the discussion paper will be finalized.

At the next meeting, the Council could be in a position to initiate an action based on the discussion paper. This action could be to develop a plan and associated analysis to implement one or all of the management options. The identification of HAPC sites (and EFH mitigation measures) in the Aleutian Islands will be decided in February, and the nature of that Council discussion and decision may provide further insight into the question of area-specific management in that area. The discussion paper lays out three types of management options for the Aleutian Islands area, all of which can vary in their specific implementation. The Council will be able to indicate whether staff should continue to explore all of the management options, or whether the analysis in the discussion paper is sufficient to narrow down the type of management the Council would wish to implement. Additionally, the Council may wish to develop a problem statement for why area-specific management is being developed. At future meetings, staff will return to the Council with a practical plan for implementing the Council's management options, and alternative ways of developing the program.

### **Draft AI Discussion Paper Outline**

**Question: Does the Aleutian Islands area merit area-specific management, and if so, what form should that management take?**

#### **1.0 Introduction**

#### **2.0 Does the AI area merit area-specific management?**

- 2.1 Physical and biological characteristics
- 2.2 Fisheries: Federal groundfish, other Federal, State and parallel, subsistence/personal use
- 2.3 Marine mammals and seabirds: SSL, N fur seal, harbor seals, sea otters, whales, short-tailed albatross, Steller's eiders, other seabirds
- 2.4 Marine Mammal and Fishery Management Issues: SSL protection measures, AI pollock stock structure
- 2.5 Cultural heritage and human development issues
- 2.6 Research, scientific and public interest

#### **3.0 If so, what form should management take?**

- 3.1 Defining a boundary for the Aleutian Islands
- 3.2 AI groundfish management measures and scope for change
- 3.3 Approaches of other Councils (to special management areas or ecosystem management)
- 3.4 Option 1: Special management area within BSAI Groundfish FMP
- 3.5 Option 2.: Separate AI Groundfish FMP
- 3.6 Option 3: Fishery Ecosystem Plan, with additional management measures in BSAI Groundfish FMP

#### **4.0 Conclusions**

Next steps?

## PRELIMINARY DRAFT

# Area-specific Management for the Aleutian Islands Discussion Paper

## 1.0 Introduction

The Aleutian Islands represent the central and eastern portion of the Aleutian-Komandorski (Commander) archipelago that extends from the Alaska Peninsula across the U.S.-Russian boundary to the Kamchatka Peninsula (see Figure 1). Numerous straits and passes through the Aleutian Islands connect the Bering Sea to the North Pacific Ocean. They are volcanic islands with a narrow shelf descending to a steep dropoff. Rich in marine life, the Aleutian Islands are home to seabirds, marine mammals, sessile invertebrates, and fish stocks. The Aleut peoples have inhabited the islands for over 10,000 years and subsisted on the marine bounty.

In recent years, the Aleutian Islands have been at the forefront of many issues before the North Pacific Fishery Management Council (Council). The Aleutian Islands area has figured in focused measures to protect Steller sea lions and seabirds, conservation of benthic habitats that support coral and other special resources of public interest, and allocation issues related to the Aleutian Islands pollock and Pacific cod fisheries. With national interest on ecosystem-based management of fisheries heightened through recent Ocean Commission reports and other national-level panels, the Aleutian Islands area may merit consideration as a candidate for special management focus, as a special management unit, or ecosystem-based plan.

In June 2004, the Council tasked staff to prepare a discussion paper that evaluates the Aleutian Islands for designation as a special management area, or separation from the Bering Sea area, as a separate FMP. The paper would include a discussion of the current biological, social, economic, and management issues specific to the Aleutian Islands area, as well as an overview of ongoing research in the AI, and provide recommendations for potentially developing an ecosystem-based plan for this region. In addition, the paper would examine the need to alter FMP provisions and regulations which apply in both areas.

This preliminary draft discussion paper addresses the Council's request in two parts. The first part (Section 2) discusses whether the unique characteristics of the Aleutian Islands should lead fishery managers to consider the area as a discrete ecosystem. Section 3 examines the types of area-specific management that could be applied to the Aleutian Islands, and considers benefits and disadvantages of each. As the Council's request was made under a groundfish agenda item, this paper focuses the discussion on management options for the Aleutian Islands groundfish fisheries.

## 2.0 Does the Aleutian Islands area merit area-specific management?

The Aleutian Islands region is a unique and, to many, a mystifying place. The Aleutian Islands form an archipelago that extends 1000 miles across the North Pacific and lies along the great circle routes used by vessels and aircraft transiting from the U.S. west coast to eastern Russia and Japan. This island chain possesses special characteristics that set it apart from other areas in the North Pacific. It experiences some of the worst weather on the planet, it harbors abundant and diverse bird and mammal populations, and has

an historic and cultural heritage that dates back to the last ice age when the region was likely colonized by peoples that crossed the Bering Land Bridge.

The Aleutian Islands themselves provide habitat for many species of nesting seabirds, rookery and haulout habitat for several species of marine mammals, and a migratory path for great whales, other marine mammals, and pelagic seabirds that occupy this region seasonally for feeding, nesting and fledging chicks. The region has a rich cultural heritage, and is poised to change as military, shipping, fishery, and community development proceeds in the coming decade.

The Aleutian Islands area possesses some unique environmental attributes that may reinforce other reasons for considering area-specific management. These attributes are discussed in more detail below.

### ***Physical and Biological Characteristics***

The Aleutian Islands area or “ecosystem” possesses unique abiotic and biotic environmental features and an interdependent web of energy flow from terrestrial and marine primary production through top level consumer organisms in an island-dominated geographic region. The island chain forms a boundary between the open North Pacific Ocean and its Bering Sea, although the boundary is highly permeable with many inter-island passes that are pathways for water exchange and movement of marine organisms (Figure 2). The Aleutian Islands mark the furthest southward extent of seasonal sea ice of the Bering Sea, although in recent years warming trends have minimized formation of ice in the more southerly portions of the Bering Sea.

From 4,000 foot mountain peaks to the 24,000 foot depths of the Aleutian Trench, the Aleutian Islands offer a unique and dramatic diversity in landforms. Many of the Aleutian Islands are crests of submerged volcanoes. The region is highly volcanic and seismically active because of the tectonic convergence of the Pacific Plate and the North American Plate; the Aleutian Trench marks the convergent boundary of these plates. The region spawns some of the intense weather systems that greatly affect the oceanography and biological productivity in the North Pacific Ocean. The region supports a wide diversity of organisms, some in large numbers, including millions of seabirds, thousands of marine mammals, and abundant fish species, some of which support commercial fisheries.

The climate of the Aleutians is maritime and characterized by frequent cyclonic storms and high winds, and during calm periods the region often is covered by dense fog. Marine water flows through the various passes between islands, providing nutrients to fuel the productivity of the region and the adjacent Bering Sea. The Bering Sea and Aleutian Islands region is one of the most productive marine systems in the world. Plankton and forage fish species provide a nutritional base for millions of seabirds and marine mammals as well as abundant pelagic and demersal fish species.

The Alaska Fisheries Science Center’s Resource Ecology & Ecosystem Modeling group is researching food web models for the Aleutian Islands. An ECOPATH/ECOSIM model has recently been developed for the Aleutian Islands.

#### **Benthic Habitat**

The continental shelf in this area extends only a small distance offshore, then breaks to an edge and slope descending to a seafloor that in some areas, sustains unique assemblages of cold water corals, sponges, bryozoans, and other sessile invertebrates. Unlike the Bering Sea, the distribution of sediment type and texture is not known for the Aleutian Islands (NMFS 2004b), and these habitats have only recently been documented. Some of these benthic areas provide habitat features that have been identified for special

protection as Habitat Areas of Particular Concern (HAPCs). Under the Council's Essential Fish Habitat program, one seamount and thirteen long-lived hard coral beds have been identified and nominated for protection throughout the Aleutian Islands area (Figure 3). Such benthic habitats and the fish and other organisms that associate with this habitat will likely be the focus of continued future research and observation, particularly using new submersible technology.

The Aleutian Islands is thought to harbor the highest abundance and diversity of cold water corals in the world. A pilot research program was initiated in 2002 by the Groundfish Assessment Program of NMFS' Auke Bay Lab. Diving with an occupied submersible around the Andreanof Islands and Petrel Bank, scientists discovered habitats of corals, sponges, and other sessile invertebrates including five high density coral gardens with 100% coverage. The research program was expanded in 2003 and 2004, with funding from the North Pacific Research Board, to increase the number and depth of manned and unmanned submersible dives throughout the study area (Figure 4). Objectives of the research are to:

- (1) assess distribution and abundance of corals, sponges, and bryozoans in the central Aleutian Islands, and construct a predictive model based on oceanographic and geological processes, which would allow scientists to forecast where such habitat is likely to occur;
- (2) establish the importance of corals and sponges in the Aleutian Islands as habitat for commercially important fishes and invertebrates;
- (3) determine the extent of fishing gear impacts on coral and sponge habitats; and
- (4) collect species, describe new species, and study reproductive patterns of corals and sponges (Heifetz et al. 2003, [www.afsc.noaa.gov/abl/MarFish/coralscruise.htm](http://www.afsc.noaa.gov/abl/MarFish/coralscruise.htm)).

## **Fisheries**

There are four federal fisheries that occur in the Aleutian Islands, for groundfish, halibut, scallops, and crab. The State of Alaska manages parallel and state-water fisheries for Pacific cod, salmon, herring, and black rockfish. Subsistence fisheries also occur for many marine species. Recreational fishing effort is small in the area.

### **Federal Groundfish Fisheries**

Aleutian Islands groundfish fisheries are managed by the Council and NMFS under the Bering Sea and Aleutian Islands (BSAI) Groundfish Fishery Management Plan (FMP). The Aleutian Islands is a subarea defined in the FMP as that area of the EEZ that is west of 170° W. longitude and south of 55° N. latitude, and it is divided into three districts (Figure 5). Table 1 lists the species managed under the BSAI Groundfish FMP, and the catch in 2003 for those species in the Aleutian Islands and Bering Sea subareas. For comparison, catch is also indicated for these groundfish in the western GOA regulatory area (which encompasses waters west of 170° W. longitude, to the south of the eastern Aleutian Islands) and the remainder of the GOA regulatory areas. Catches in the Aleutian Islands subarea (AI subarea) have always been much smaller than those in the Bering Sea subarea. Total catches from the AI subarea in recent years have been just over 100,000 mt annually, compared to over 1.8 million mt in the Bering Sea subarea. The historical species composition is illustrated in Figure 6. Management of these Federal fisheries is complex given the geographic size and extent of the region, its distance from research and management facilities, and enforcement and safety concerns.

Historically, groundfish fisheries prosecuted in the AI subarea have included Atka mackerel, Pacific cod, sablefish, flatfish, and rockfish. Prior to 1999, pollock were harvested in this area. From 1999 through 2002, this fishery was closed as a Steller sea lion protection measure. Since 2003, the pollock fishery has

been closed because no quota was allocated for a directed fishery. Some pollock are harvested incidentally in other target fisheries; in 2003, pollock bycatch in other directed fisheries was 1,653 mt.

**Table 1 Catch, in mt, of groundfish FMP-managed species in Alaska, in 2003.**

BSAI Groundfish FMP managed species	Aleutian Islands	Bering Sea	Western GOA	Other GOA
Pollock	1,653	1,340,973	16,508	33,008
Pacific cod	28,649	142,706	16,189	24,831
Sablefish	1,008	896	2,110	8,912
Atka mackerel	54,287 <sup>4</sup>	- <sup>4</sup>	578 <sup>6</sup>	- <sup>6</sup>
Yellowfin sole	- <sup>5</sup>	74,418 <sup>5</sup>	4 <sup>7</sup>	55 <sup>7</sup>
Greenland turbot	960	2,467	8 <sup>7</sup>	5 <sup>7</sup>
Rock sole	- <sup>5</sup>	35,395 <sup>5</sup>	196 <sup>7</sup>	3,186 <sup>7</sup>
Arrowtooth flounder	- <sup>5</sup>	12,834 <sup>5</sup>	8,201	30,705
Flathead sole	- <sup>5</sup>	13,792 <sup>5</sup>	515	1,910
Other flatfish <sup>1</sup>	- <sup>5</sup>	2,749 <sup>5</sup>	788 <sup>7</sup>	1,967 <sup>7</sup>
Alaska plaice	- <sup>5</sup>	9,778 <sup>5</sup>	1 <sup>7</sup>	13 <sup>7</sup>
Pacific ocean perch	12,760	1,151	2,149	8,712
Northern rockfish	4,582	72	533	4,810
Shortraker and rougheye rockfish	230	90	225	1,177
Other rockfish <sup>2</sup>	401	324	664	4,621
Squid	26,639 <sup>8</sup>	1,980 <sup>8</sup>	na <sup>9</sup>	na <sup>9</sup>
Other species <sup>3</sup>	1,334 <sup>8</sup>	10 <sup>8</sup>	na <sup>9</sup>	na <sup>9</sup>

<sup>1</sup> Includes starry flounder, rex sole, longhead dab, butter sole, and all species of flatfish caught in the management area, other than flathead sole, Greenland turbot, rock sole, yellowfin sole, arrowtooth flounder, and Alaska plaice.

<sup>2</sup> Includes light dusky rockfish, shortspine thornyheads, and all species of Sebastes and Sebastolobus caught in the management area, other than Pacific ocean perch, northern rockfish, rougheye rockfish, and shortraker rockfish.

<sup>3</sup> Includes sculpins, skates, sharks, and octopus.

<sup>4</sup> Atka mackerel for the combined Eastern Aleutian Islands district and Bering Sea subarea was 11,010 mt in 2003; it is reported under the Aleutian Islands.

<sup>5</sup> Rock sole, flathead sole, other flatfish, and Alaska plaice species are distributed primarily in the eastern Bering Sea and have a much lesser abundance in the Aleutian Islands.

<sup>6</sup> The Atka mackerel TAC is for the whole GOA, but is mostly caught in the western GOA.

<sup>7</sup> Flatfish categories differ in the GOA; for flatfish catch breakdown, see Turnock et al. 2003; data is for 2003 through October.

<sup>8</sup> Breakdown not available for 2003; data is from 2002.

<sup>9</sup> Breakdown not available for squid and other species in the GOA; GOA-wide total catch was 6,339 mt.

The Council has recently authorized allocation of pollock quota in a directed pollock fishery in the Aleutian Islands (Amendment 82). The allocation is to the Aleut Corporation per recent Congressional action (PL 108-199). The annual quota for this fishery currently is set at no more than 19,000 mt, less the CDQ apportionment and incidental catch allowances for other directed groundfish fisheries. The Council intends to re-visit this quota level and other aspects of the fishery in June 2006. Historically, harvests in the AI subarea pollock fishery have occurred in several areas of concentration, including areas north of Atka Island, northwest of Adak Island, and east of Attu Island and north of Shemya Island.

The Pacific cod fishery is managed under a quota apportioned to the entire BSAI management area. Pacific cod catch statistics for the AI subarea for the period 2000-2003 showed harvests ranging from 28,649 to 39,684 mt (average 33,335 mt; Thompson and Dorn 2003). This fishery has historically occurred around Adak and Atka islands. Since 1999, when the AI subarea was closed to a directed pollock fishery, the Pacific cod fishery has been prosecuted under SSL protection measures that allow Pacific cod fishing to occur closer to shore than a directed pollock fishery would be allowed. During 1997-2001, the AI subarea accounted for an average of about 16% of the BSAI Pacific cod quota.

The Atka mackerel fishery harvested 54,287 mt in 2003. The harvest quota has been distributed across the AI subarea districts since 1992, to minimize the risk of localized depletion. Although the fishery takes place primarily in the AI subarea, the fishery also occurs north of Akutan Island in the Bering Sea subarea. Areas of harvest concentration in the AI subarea in 2003 were south of Amukta and Tanaga passes, east of Attu Island, and scattered in the Rat Islands area (Lowe et al. 2003).

The sablefish fishery in 2003 harvested 1,008 mt, almost all of which from longline and pot fisheries. The directed fishery is entirely under an IFQ management system and is prosecuted with fixed gear; a small amount is taken incidentally in some trawl fisheries (35 mt in 2003). The locations of the sablefish harvests from 1995-2003 suggest most of the fishing effort in the AI subarea occurs within 100 nm of Adak and Atka. This fishery is not under special restrictions for SSL protection, and occurs in waters within 20 nm of shore in the AI subarea.

The AI subarea rockfish fisheries include catch of Pacific ocean perch (POP), northern rockfish, shortraker and rougheye rockfish, and other rockfish. Rockfish harvested in the AI subarea in 2003 totaled 17,973 mt. Only the fishery for POP is directed, the other species may only be caught incidentally, due to small harvest quotas. 90% of northern rockfish are caught incidentally in the Atka mackerel fishery (Spencer and Ianelli 2003b). The Pacific ocean perch stock is spatially distributed in the AI subarea, where approximately 84% of the population is concentrated, according to survey data (Spencer and Ianelli 2003a). The fishery historically has occurred throughout the AI subarea with some concentration of harvests between Kiska and Agattu islands, around Amchitka Island and Petrel Bank, north of Atka Island, and in Amukta Pass. Shortraker and rougheye rockfish are caught incidentally in a variety of target fisheries. The majority of 'other rockfish' catch is light dusky rockfish and shortspine thornyheads. In the AI subarea, these species are mainly caught incidentally in the Atka mackerel trawl fishery, for light dusky rockfish, and in sablefish, grenadier or skate longline hauls or the POP trawl fishery, for shortspine thornyheads. 'Other rockfish' are also distributed in the Bering Sea subarea, north of Unalaska and Akutan Islands and on the slope (Reuter and Spencer 2003).

Most flatfish species are concentrated on the continental shelf of the Bering Sea, and have low abundance in the AI subarea. The only target flatfish fishery in the AI subarea is for Greenland turbot. About 25% of the Greenland turbot biomass is located in the area, and in 2003, the harvest total was 960 mt, mainly by hook and line gear. The fishery has historically occurred primarily within 100 nm of Adak and Atka islands.

Squid and other species (sculpins, skates, sharks, and octopi) are caught incidentally in other directed fisheries. Squid are caught primarily in the pollock trawl fishery. Skates represent the majority of the other species catch (over 21,000 mt for the BSAI in 2002), and are caught in the hook-and-line Pacific cod fishery (Gaichas et al. 2004).

CDQ fisheries occur in the AI subarea for sablefish, Atka mackerel, Greenland turbot, Pacific ocean perch, northern rockfish, shortraker and rougheye rockfish, and other rockfish. In 2005, there will also be

a CDQ AI subarea pollock fishery. CDQ groups partner with commercial fishing corporations to harvest these allocations. Most of the CDQ groups have ownership interest in the partner corporations.

The Aleutian Islands has been surveyed biennially by bottom trawl since 2000, and was mostly surveyed triennially from 1980 to 1997. The 2002 survey area extends from Unimak Pass (165° W. longitude) to Statemate Bank (170° E. longitude), including Petrel Bank and Petrel Spur, and covers the continental shelf and upper continental slope to 500 m. The aims of the survey are to provide distribution and relative abundance data for the principal groundfish and commercially or ecologically important invertebrate species in the Aleutian Islands, and to collect data to define biological parameters such as growth rates, length-weight relationships, feeding habits, and size, sex, and age compositions. The most abundant species in the area are Atka mackerel, POP, northern rockfish, walleye pollock, Pacific cod, arrowtooth flounder, and giant grenadier. However, fish populations, such as many rockfish, which extend into areas that are either untrawlable with the survey gear or further up in the water column are not fully represented.

The Aleutian Islands has also been surveyed biennially by longline since 1996. Surveyed depths vary from 200m to 1000m. Survey objectives are to determine the relative abundance and size composition of sablefish, shortspine thornyhead, roughey and shortraker rockfish, Pacific cod, arrowtooth flounder, grenadiers, and Greenland turbot. Tags to determine migration patterns of sablefish, shortspine thornyhead, and Greenland turbot are also implanted, and data to determine age composition of sablefish.

Ongoing groundfish research projects in the Aleutian Islands address the reproductive ecology of Atka mackerel, and the value of habitat, particularly coral and sponge habitat, to juvenile rockfish in the area.

#### Other Federal Fisheries

The halibut stock is managed by the International Pacific Halibut Commission (IPHC). Two of the IPHC statistical areas for the halibut fishery encompass portions of the Aleutian Islands, Areas 4A and 4B (Figure 7). Over the last five years, approximately 8,028,000 lb annually, or 14% of the Alaska halibut quota, have been allocated to these areas. Halibut allocations in Alaska are managed under an individual fishing quota program and a community development quota program.

The Federal scallop fishery is managed by the State of Alaska with Federal oversight. The Aleutian Islands scallop fishery is managed under registration Area O (Dutch Harbor). Area O extends from Scotch Cap Light (164° 44' W. longitude) to the Maritime Boundary Agreement Line that separates U.S. and Russian waters, and encompasses both State and Federal waters. Scallop fishing in Area O generally occurs in the far east, to the north and south of Umnak Island (polygons marked on Figure 8). Area O was closed in 2000 due to management concerns over localized depletion. In 2002, the area was reopened with a reduced guideline harvest range ceiling of 10,000 lb, of which 61% was harvested. Area O represents approximately 1.5% of the statewide guideline harvest range for scallops.

The Federal king and tanner crab fishery is also managed by the State of Alaska with Federal oversight. King crab fisheries are managed within registration Area O (Figure 9). The primary crab fishery that occurs in the Aleutian Islands is the Aleutian Islands golden (brown) king crab fishery. Guideline harvest levels (GHLs), are established for the fishery east and west of 174° W. longitude. While effort and harvest have remained relatively stable in the eastern portion of the fishery, where the GHL for 2003-4 was 3.0 million lb, the western portion has experienced greater variability. GHL for west of 174° W. longitude was 2.7 million lb, and both GHLs remain unchanged for 2004-5. Seasons in the golden king crab fisheries last several months, in contrast to other Bering Sea crab fisheries.



There is also an Aleutian Islands red king crab fishery in Area O. The eastern portion of the red king crab fishery has been closed since 1983, and the western portion, which operates in the Petrel Bank area, has opened sporadically in recent years. The fishery did not open in 2004.

Small tanner crab fisheries in the Aleutian Islands are managed in Registration Area J (Figure 10). Tanner crab populations in this area are small, and, when open, are mainly authorized for incidental harvest only. There are currently no CDQ crab fisheries in the Aleutian Islands. However, under crab rationalization, which will be implemented in 2005, CDQ groups will receive a 10% allocation of the western Aleutian Islands golden and red king crab fisheries.

### State Managed or Parallel Fisheries

Future groundfish fishery management in the Aleutian Islands could include expanded parallel fisheries in State waters. Parallel fisheries are managed by the State of Alaska and may occur concurrently with the Federal groundfish fisheries, mirroring the Federal closures and harvest restrictions. Currently, the only directed parallel fishery in the Aleutian Islands occurs for Pacific cod, although other species are taken incidentally.

As outlined in the EA/RIR for Amendment 82 to the BSAI FMP, the potential exists for the State of Alaska to pursue a State-managed or State water pollock fishery in the Aleutian Islands, in which the State regulates the fishery and controls the closures and harvest restrictions. Were the State to initiate such a fishery without adopting the same restrictions as the Federal Steller sea lion protection measures, reinitiation of Section 7 consultation on the Steller sea lion protection measures likely would be required to determine the cumulative effects of the State-managed pollock fishery.

Other State-managed fisheries include sablefish (within State waters), salmon (primarily pink salmon and some sockeye salmon), herring for sac roe or food and bait, and black rockfish. These fisheries are prosecuted wholly within State waters. With increases in human populations in the Aleutian Islands that may accompany military, port, and community development, there may be additional participation in these fisheries and perhaps other, new State fisheries may evolve.

### Subsistence and Personal Use Fisheries

The earliest fisheries in the Aleutian Islands were native subsistence fisheries. Today, subsistence fishing takes place in nearshore waters utilizing such species as cod, halibut, rockfish, and other species. These small-scale subsistence fisheries have continued to the present time. Subsistence activities continue to be a central element in contemporary village life and culture, and are also important to many of Alaska's non-Native residents. Total subsistence consumption ranges from about 200 lb per capita to over 450 lb per capita. Fish, including salmon, halibut, cod, and rockfish, contribute between 57 and 75% of total subsistence resource consumption in the Aleutian Islands. Other subsistence resources include marine and land mammals, seabirds, and marine invertebrates (NMFS 2004a).

### **Marine Mammals and Seabirds**

The Aleutian Islands are inhabited by diverse and abundant marine mammal and seabird populations. Many of these species feed on fish harvested in Federal or State fisheries, or otherwise interact with fishing activities, sometimes leading to injury or mortality. In the case of marine mammals, which are afforded special protection under the Marine Mammal Protection Act, any injury or mortality is illegal unless specially permitted. A similar situation exists for many of the seabirds in the area under the Migratory Bird Treaty Act. The Endangered Species Act also has considerable impact on activities in this

region given the current listing status of many marine mammal and seabird species. The effects of these laws are magnified in the Aleutian Islands because of the abundance of species inhabiting this region, which are afforded these protections.

### Steller sea lions

The Steller sea lion (*Eumetopias jubatus*) (SSL) inhabits many of the shoreline areas of the Aleutian Islands, using these habitats as seasonal rookeries and year-round haulouts. SSLs feed in the nearshore and offshore waters throughout the Aleutian Islands. The SSL was listed as threatened under the Endangered Species Act (ESA) on November 26, 1990 [55 FR 40204] and critical habitat for the species was designated August 27, 1993 [58 FR 45269]. In 1997 the SSL population was split into two stocks or Distinct Population Segments (DPS) based on genetic and demographic dissimilarities (Bickham et al 1996; Loughlin 1997)[62 FR 30772]. These are the western and eastern stocks. Because of a pattern of continued decline in the western DPS, the western DPS of SSL (wSSL) was listed as endangered on May 5, 1997 [62 FR 30772] while the eastern DPS remained under threatened status. The wSSL inhabits an area of Alaska approximately from Prince William Sound westward to the end of the Aleutian Island chain and into Russian waters (Figure 11).

Throughout the 1990s, particularly after critical habitat was designated, various closures of feeding areas around rookeries and haulouts, and some offshore foraging areas, were designated to limit commercial harvest of pollock, Pacific cod, and Atka mackerel, which are important components of the wSSL diet. In 2001 a Biological Opinion was released that provided protection measures that would not jeopardize the continued existence of the wSSL nor adversely modify its critical habitat; that opinion was supplemented in 2003, and after court challenge, these protection measures remain in effect today (see Appendix 1).

Over the past decade or more, the western Aleutian Islands wSSL sub-population was of particular concern. Non-pup counts declined from 14,011 in 1979 to just 817 animals in 2002. Although all other sub-populations in the western DPS increased between surveys conducted in 2000 and 2002, the western Aleutian Islands area group decreased by 23.7% in just two years. The cause of the steep decline observed in the area is unknown, although some researchers are finding links between prey composition and area. Other hypotheses involve changes in oceanic conditions such as salinity and temperature. Other possibilities for this sub-population include the taking of animals in Russian fisheries (e.g., herring). In 2004, scientists conducted another wSSL survey, and found that this Aleutian Islands sub-group is no longer declining. The overall wSSL population increased for a second consecutive survey (an increase was observed between the 2000 and the 2002 surveys.)

Because of the past declines observed in the wSSL population, special studies have been initiated in the Aleutian Islands area to determine the efficacy of the protection measures in providing areas closed to fishing where wSSLs can forage and obtain sufficient prey to meet nutritional requirements. These studies have been termed Fishery Interaction Studies, and have focused on fish movement patterns and the effect of commercial fisheries on Pacific cod and Atka mackerel in the Aleutian Islands. While results are very preliminary, no evidence of fishery-related localized depletion of these two species of fish have been detected, although the studies continue. These studies are unique in that they focus exclusively on fishery interactions with target species, with the objective of testing whether geographic closed areas are an appropriate tool for wSSL management.

While recent surveys show some possibility that the decline in abundance of the wSSL DPS may have halted, the entire DPS will be the subject of continued study and monitoring until persistent increases in this population occur. Undoubtedly studies will continue to explore whether geographic closed areas or other wSSL protection measures may be part of this turn around. The Aleutian Islands wSSL population likely will be an integral part of this ongoing work.

### Northern fur seal

The Northern fur seal (*Callorhinus ursinus*) seasonally occupies rookeries on the Pribilof Islands for mating and rearing of pups. This marine mammal uses Aleutian Island passes as important migratory pathways to and from the Pribilof Islands. The fur seal is pelagic for the winter months, although its habitat use patterns when not on the Pribilofs is largely unknown. The Northern fur seal has declined considerably in the past decade and is the subject of special study by NMFS and special attention by the Pribilof Islands Collaborative.

### Harbor seals

Three separate stocks of harbor seals (*Phoca vitulina richardsi*) are identified in Alaska, with the Gulf of Alaska stock inhabiting the Aleutian Islands (Angliss and Lodge 2003). Ongoing genetic stock identification studies suggest possibly more stock differentiation in the Alaskan harbor seal population, but sufficient data are not available to change the current three-stock structure. Harbor seals have declined in portions of their range in Alaska. The Aleutian Islands group has not been surveyed since 1994, so trends in the region are unknown. Given the declines in some areas, the use of harbor seals as a Native subsistence food item, and the unclear population structure in Alaska, harbor seals are the focus of ongoing research, most of it by the State of Alaska.

### Sea otters

The southwest Alaska distinct population segment of the northern sea otter (*Enhydra lutris*) has been proposed for ESA listing as threatened because of a steep decline in abundance of sea otters, particularly in the Aleutian Islands area. If listed, the USFWS intends to develop criteria for designating critical habitat and to begin the species recovery process. Groundfish fisheries have not been implicated in the decline of sea otters, and interactions between this species and fisheries are not believed to be significant.

The Aleutian Islands area provides important habitat for this coastally-oriented marine mammal, where it remains year-round to feed and rear young. In the 1980s, the sea otter population in the Aleutian Islands ranged from 55,100 to 73,700 individuals (Calkins and Schneider 1985). A 1992 count in the Aleutian Islands area was 8,042 sea otters, and in the spring 2000 surveys the count for this area was 2,442 animals. On February 11, 2004, the USFWS published a Proposed Rule to list the southwest DPS as threatened [69 FR 6600]. The southwest DPS is designated as a strategic stock by the USFWS because of the possible ESA listing, and it is likely that special research and management attention will focus on this species in coming years, particularly in the Aleutian Islands.

### Whales

Several species of whales use Aleutian Island passes as migratory pathways to feeding grounds in the Bering Sea and then to return to seasonal wintering and calving areas further south. Of these whales, the endangered North Pacific right whale is perhaps of most concern given its very small known population size. This whale moves through the Aleutian Island region annually to occupy feeding habitat in the eastern Bering Sea; it is very rare, and only up to 25 individuals have been seen annually in recent surveys.

Other whales move through the Aleutian Islands area, including blue whales, sei and minke whales, humpback whales, and gray whales. The blue whale is the subject of more focused acoustic studies designed to determine population size and habitat use patterns; blue whales may inhabit the Aleutian Islands area year-round. Sperm whales also inhabit the Aleutian Islands area, and are known to depredate

longline-caught sablefish. Killer whales also have been known to depredate longline catches, and have been implicated as predators of Steller sea lions, sea otters, and other marine mammals in the Aleutian Islands. The extent to which whales utilize the waters around the Aleutian Islands is largely unknown, but the Aleutian Islands area appears to be important whale feeding and migratory habitat for many species.

### Short-tailed albatross

The short-tailed albatross (*Phoebastria albatrus*) is listed as endangered [65 FR 46643] under the ESA because of its low population size compared to historic levels throughout its range. This albatross breeds primarily on a small island offshore the east coast of Japan. Telemetry studies indicate that after leaving their breeding and nesting grounds, short-tailed albatross move fairly quickly northward to the North Pacific and into the Bering Sea in spring and summer where these birds feed and may remain year-round. This seabird appears to concentrate particularly in the Aleutian Islands area, feeding on the continental shelf and slope and within passes between islands. Given the importance of the Aleutian Islands region as feeding grounds for this endangered seabird, continued research and management will likely emphasize at-sea capture and tracking movement studies in the Aleutian Islands (Rob Suryan, OSU, pers. comm., Oct. 2004) to better understand its year-round distribution and movement patterns. All longline and trawl groundfish fisheries managed by the Council are under an incidental take limit. Future groundfish fishery management in the Aleutian Islands area will likely give special attention to these concerns given the prominence of this species in the Aleutian Islands.

### Steller's eiders

The Steller's eider (*Polysticta stelleri*) is listed as threatened under the ESA. This species of sea duck molts and then winters in nearshore marine waters throughout the Aleutian Islands where it mixes with the more numerous Russian Pacific population of Steller's eider (USFWS 2003). The species utilizes protected bays and inlets as refuge during a flightless period after molting, and then remains in many of these areas to feed throughout the winter. Causes for their decline are unknown but may include such factors as lead poisoning, predation on breeding grounds, contaminants, and ecosystem change. Concerns have been expressed over disturbance of this bird from vessel traffic or release of petroleum products into the marine environment in coastal areas where this species winters. There will continue to be elevated concerns over any human activity or development in or near Steller's eider habitat in the Aleutian Islands and Alaska Peninsula area. Critical habitat for Steller's eider is illustrated in Figure 12.

### Other seabirds

Millions of seabirds nest and fledge young from habitats on many of the Aleutian Islands. The Aleutian Islands area is considered one of the most important and significant seabird nesting areas in the North Pacific because of the unique habitats the islands provide. The Aleutian Islands marine waters over the continental shelf and slope and Aleutian Islands passes provide feeding grounds for millions of seabirds. The Aleutian Islands region seasonally supports thousands of cormorants, gulls, kittiwakes, guillemots, and murrelets and millions of storm-petrels, murre, auklets, and puffins. The Aleutian Islands also provide year-round habitat for large numbers of northern fulmar and smaller numbers of shearwaters and Laysan albatross and some black-footed albatross. One of the principal reasons the U.S. Congress established the Alaska Maritime National Wildlife Refuge, which encompasses nearly all land areas of the Aleutian Islands (and also other islands and coastal areas of Alaska; see Figure 13), is because of the very high numbers of seabirds that nest and feed in this region.

## **Marine Mammal and Fishery Management Issues**

Two situations exist in the Aleutian Islands area that may merit special consideration. One is the geographic extent of the SSL protection measure closures. Over 41% of the AI subarea shelf and slope, to 1000 m, is closed to trawl fishing seasonally or year-round (NMFS 2004a). And a second is the potential changes in how pollock stocks are managed, which may have effects on how the AI subarea pollock fishery evolves in future years.

### **Steller Sea Lion Protection Measures**

Steller sea lion protection measures include areas closed to all or some groundfish fisheries around rookeries and many haulouts along the Alaskan coast (see Appendix 1). These measures were put in place as a result of the steep decline in the SSL population and the hypothesis that this decline could be from nutritional stress. Fishing for pollock, Pacific cod, and Atka mackerel is restricted in these areas to limit fishing on prey items that are important in SSL diets. Closures are widespread in the Aleutian Islands. Recent concerns over the broad extent of closures, and recent research that suggests other hypotheses for the Steller sea lion decline, have led to public proposals for relaxing these measures and opening some areas to allow fishing.

A large proportion of the historical pollock harvest in the Aleutian Islands has come from waters that are now closed to pollock fishing by SSL protection measures. Under the current SSL protection measures, vessels generally must fish at least 20 miles from shore. The inclement weather conditions prevailing during the winter, when the AI subarea pollock "A" season fishery will occur, will likely impede growth of a small vessel pollock fishery that is a goal of Amendment 82. Proposals to change SSL protection measures in the Aleutian Islands area have been brought to the Council and its Steller Sea Lion Mitigation Committee, but the Council has decided not to pursue such changes at this time until more SSL research information becomes available. Nonetheless, it is likely that this issue will remain a concern given the Council's approval of Amendment 82 and the initiation of a directed pollock fishery.

### **Evolving Understanding of Pollock Stock Structure in the Aleutian Islands**

Aleutian Islands pollock stock assessments are evolving, and in the near future, stock assessment biologists may recommend subdividing the Aleutian Islands subarea for the purposes of pollock management. Barbeaux et al. (2003) have examined the Aleutian Islands pollock stock and have suggested alternative approaches to assessing pollock resources in the AI subarea that account for spatial patterns in stock distribution. The population of pollock west of 174° W. longitude appears different in size structure and abundance, and it may be recommended that it be separated from the pollock stock east of 174° W. longitude. Barbeaux et al. (2003) recommend closing the area east of 174° W. to a directed pollock fishery, to form a contiguous closed area with the Bogoslof District (see Figure 5). This pollock conservation zone would provide a buffer between management areas and address uncertainties regarding stock structure. This proposal was discussed by the BSAI Groundfish Plan Team in 2003 and 2004.

Recent pollock stock assessment analyses have suggested that spatial considerations be reflected in recommending ABC levels. This may result in TAC recommendations for areas smaller than the AI subarea, which, in order to have catch proportional to biomass distribution, could impact the amount of pollock available to harvest in the central Aleutian Islands. There are currently three districts identified within the AI subarea in the BSAI Groundfish FMP (Figure 5), and the 174° W. longitude line bisects the Eastern Aleutian Islands District. A recommendation for spatial apportionment of the AI pollock TAC is a reasonably foreseeable issue that the Council will need to weigh as decisions are made on future management of fisheries in the Aleutian Islands.

## ***Cultural Heritage and Human Development Issues***

The Aleutian Islands were likely settled by Aleut peoples that moved to Alaska across the Bering Land Bridge perhaps 15,000 years ago. Aleuts subsisted on what the Aleutian Islands and surrounding marine environment provided. With the arrival of Russian explorers and fur traders starting in 1742, the Aleutian Islands became a focus for fur harvests until 1867 when Russia sold Alaska to the United States. U.S. territorial management continued the fur trade and imposed many changes in the region. In the early 1940s, several islands became World War II battlegrounds and staging areas for the U.S. Aleutian Campaign, dramatically changing the landscape on many islands.

Thus the Aleutian Islands have a rich cultural heritage based on the early inhabitant Aleut peoples and subsequent waves of human occupation including the Russian fur trade, management of Alaska as a territory of the U.S., World War II and Japanese occupation, and in past decades a variety of human endeavors including defense installations, atomic energy research and testing, and commercial fisheries. These various human activities have left their mark on the Aleutians in a unique way, providing an historic and archeological heritage found nowhere else in North America.

### **Development at Adak**

Adak Island was the site of a military naval air station until 1997. The site of an early Aleut community, the Aleut Corporation obtained a portion of the island and incorporated the City of Adak in 2001. With passage of PL 108-199 and the Council's recent action to provide for an Aleutian Islands directed pollock fishery, Adak community development will likely increase in the coming years. The Council's action, which allocates AI subarea pollock to the Aleut Corporation, will contribute to the growth of the port and community of Adak. Some connected with the Aleut Corporation have suggested that they would like to see Adak grow from a community of under 200 persons to a community of about 1,000 persons. The City of Adak and the Aleut Corporation are pursuing a wide range of development projects, seeking to take advantage of the facilities (harbor, airport, fuel storage, buildings) left behind by the Navy when the base was closed. Other regional development may result as Adak grows and services in the community expand.

### **Other Regional Development**

In addition to expansion of Adak and growth of a commercial fishery based there, the Aleutian Islands are slated for additional development. Military development in the Aleutian Islands may expand, possibly including missile defense systems in the region; development on Shemya Island, or possible activities on Amchitka Island to mitigate lingering effects of nuclear testing, also may occur. It would be speculative to determine any specific activity, since much of this is anecdotal or militarily classified. However, in April 2003, Adak was selected as the site for a \$900 million radar system as part of the national missile defense system. This facility is expected to arrive in Adak by summer 2005. Port expansion is also being proposed in the Dutch Harbor/Unalaska area; the Little South America port facility is being studied and environmental and other studies are still progressing. A new port development at the head of Akutan Bay is the subject of a recent Corps of Engineers EIS; a decision on that development may be made soon. Continuing or new military activity, and these port developments, collectively would add vessel and aircraft traffic in the Aleutian Islands area.

## **Research, Scientific Issues, and Public Interest**

### Alaska Maritime National Wildlife Refuge

Most of the islands in the Aleutian chain are part of the Alaska Maritime National Wildlife Refuge, which is administered by the US Fish & Wildlife Service (Figure 13). The Refuge was established to protect breeding habitat for seabirds, marine mammals, and other wildlife. Some islands hold unique species not found elsewhere. The Refuge hosts seabird populations of national and international significance, providing nesting habitat for an estimated 40 million seabirds representing over half of all the nesting seabirds of the U.S. The Refuge also provides important habitat for Steller sea lions, harbor seals, and sea otters.

The Refuge also was established to make possible a program of scientific research on marine ecosystems. Scientists from the U.S. and other nations frequent the Aleutian Islands to conduct a variety of research projects. The region has high scientific visibility given its unique habitats and plants and animals. The research program and scientific activities within the refuge include the eradication of rats and foxes from the islands, and annual seabird and nesting surveys.

### Public Interest and Ecotourism

Conservation organizations have been publicizing the unique environmental attributes of the Aleutian Islands for many years. Dozens of colorful publications, brochures, and website advertisements have highlighted the benthic habitats, coral and sponge assemblages, and fish habitat characteristics of the Aleutian Islands. Cruise ship traffic has increased and brings the public closer to this region than has been the case in the past. Public awareness of these unique aspects of the Aleutian archipelago has increased, and thus the region is now more visible and the focus of public education campaigns for additional conservation, habitat and species preservation movements.

## **3.0 What form should area-specific management take?**

If the Council decides to proceed with area-specific management, there are several broad management options to consider. Although there are four federal fisheries that occur in the Aleutian Islands, for halibut, groundfish, crab, and scallop, the discussion of management options focuses on groundfish only.

The first two sections of this chapter provide a general discussion about issues to consider for area-specific management. Section 3.1 discusses the definition of a boundary for the Aleutian Islands area. The very term 'Aleutian Islands' can be ambiguous, as the area defined by that appellation varies according to context (geographic or cultural, Federal or State fishery management). Section 3.2 examines the management measures currently in place for the Aleutian Islands groundfish fisheries, and provides suggestions for the types of changes that could be accommodated under the management options. In Section 3.3, other Council jurisdictions are surveyed for their approaches to area-specific management. Sections 3.4, 3.5, and 3.6 each provide an option for Aleutian Islands management: a special management area within the BSAI Groundfish FMP, a separate Aleutian Islands Groundfish FMP, or an Aleutian Islands Fishery Ecosystem Plan with additional management measures in the BSAI Groundfish FMP.

### 3.1 Defining a boundary for the Aleutian Islands

In considering area-specific management, an important element is defining the boundary of the Aleutian Islands. If the purpose is to consider a cohesive Aleutian Islands ecosystem separate from dissimilar habitat and oceanographic processes of the Bering Sea, the need to appropriately define the extent of the Aleutian Islands seems critical. Although it is difficult to define unequivocal lines for an ecosystem, for the purposes of management, the Aleutian Islands must have a distinct spatial boundary.

Geographically, the Aleutian Islands archipelago ranges from Attu Island to Unimak Island, approximately from 170° E. to 165° W. longitude. Each of the federal fisheries defines its own boundary for the Aleutian Islands, however, in the FMP or regulations (see discussion under 'Fisheries' in Section 2, above). For groundfish, the BSAI FMP defines the Aleutian Islands subarea as that area of the EEZ that is west of 170° W. longitude and south of 55° N. latitude. This definition means that the Fox Islands, which include Dutch Harbor and Akutan, are not included in the AI subarea.

The subareas and regulatory areas of the BSAI and GOA Groundfish FMPs are based on statistical areas defined by the International North Pacific Fishery Commission (INPFC) in the 1950s. The INPFC Shumagin area (now statistical area 610, see Figure 14) includes waters south of the eastern Aleutian Islands and the Alaska Peninsula, between 170° W. and 159° W. longitude. This area is included in the GOA Groundfish FMP management area.

The BSAI Groundfish FMP originally defined four subareas, all based on INPFC statistical areas (Figure 15). Areas 1 and 4, now the southern portion of the Bering Sea subarea and the Aleutian Islands subarea, respectively, abut the Aleutian Islands. The four areas are still evident in the statistical areas used by NMFS to monitor groundfish catch in the management area (Figure 16).

None of the existing statistical area boundaries correspond exactly with a geographically-defined Aleutian Islands area. In the BSAI FMP, in addition to the Aleutian Islands subarea, statistical areas 517, 518, 519, and 509 all border the eastern Aleutian Islands to the north (Figure 16). In the GOA management area, the western half of statistical area 610 borders this area to the south (Figure 14).

In considering area-specific management for the Aleutian Islands, the question of an appropriate boundary for the area is a critical one. This is discussed in further detail under each of the management options below. However, it is worth noting some overarching considerations. First, any extension of the Aleutian Islands boundary beyond that of the AI subarea, for management purposes, will create a disconnect between data describing the Aleutian Islands before and after the change. The disconnect would be seriously compounded should the Council draw a boundary that does not correspond to one of the existing statistical areas. Inseason data is collected at many spatial levels, including Federal statistical areas, State of Alaska statistical areas and precise GPS haul locations for some directed fisheries, however drawing new Federal statistical areas would make historical comparison of data for this area difficult.

The difficulty with managing data should not necessarily prevent the Council from defining an appropriate Aleutian Islands boundary, although it is an important consideration. For some of the management options discussed below, the defined boundary of the Aleutian Islands may be allowed to differ between the area-specific plan and the management measures in the FMP. While such a solution is not ideal, as it increases the probability of confusion, it may provide the Council necessary flexibility.



### **3.2 Aleutian Islands groundfish management measures and scope for change**

A general overview of the management measures currently governing the Aleutian Islands groundfish fisheries are described in Table 2. The right-hand column of the table suggests management tools that could be used by the Council and NMFS to alter fishing patterns in the Aleutian Islands, under any of the area-specific management options. The implementation of area-specific management would not necessarily require a change in current fishing patterns, however.

### **3.3 Approaches of other Councils to area-specific management**

#### Special Management Areas

The term 'special management area' has been used to designate terrestrial and aquatic areas throughout the U.S. For example, the Kenai River Special Management Area was designated by the State legislature in 1984 as a unit of the state park system. A comprehensive plan was developed for the area by agencies and a public advisory board. The plan's goal is to protect the natural resources and fish and wildlife habitat, manage the river's recreational and commercial uses, and provide public facilities.

No 'special management areas' have been designated in the EEZ by other Councils, based on a web search. However, there are special management areas designated in the nearshore waters of Guam, and other similarly designated areas off the South Atlantic. Since 1983, the SAFMC has had a program allowing the designation of *Special Management Zones (SMZs)* to provide an incentive for creating artificial reefs and fish attraction devices to increase the numbers of fish in an area and/or create fishing opportunities that would not otherwise exist. Designation of an area as a SMZ allows for gear restrictions in the area to prevent over exploitation. Many of these areas have been established through cooperation with fishing organizations and local governments, and serve as a means to promote localized conservation and positive fishing experiences. A total of 51 SMZs have been designated off South Carolina, Georgia, and Florida.

#### Fishery Ecosystem Plans

The Western Pacific Council's 2001 Fishery Management Plan for Coral Reef Ecosystems of the Western Pacific Region is the first ever ecosystem-based plan for fisheries developed in the United States. It incorporates many of the principles and policies recommended by the National Marine Fisheries Service's Ecosystem Principles Advisory Panel. The goal of the FMP is to establish a management regime for the entire Western Pacific Region that will maintain sustainable coral reef fisheries while preventing adverse impacts to stocks, habitat, protected species or the ecosystem. To achieve this goal, the FMP implements several management measures, including (a) the designation of zoned Marine Protected Areas (MPAs) for coral; (b) permit and reporting requirements to fish in designated low-use MPAs (reporting of fisheries information in non-MPA areas will continue to be collected through locally administered monitoring systems), and if needed, a general permit program for all EEZ reef fisheries and; (c) a prohibition on non-selective/destructive fishing gears and conditions on the types and uses of allowable gears.

**Table 2 Current management measures in Aleutian Islands subarea groundfish fisheries, and changes that could be considered**

Issue	Current Aleutian Islands (AI) groundfish management measures	Changes that could be considered for the Aleutian Islands
Allocation	<p>AI TAC + BS TAC <math>\leq</math> 2 MMT</p> <p>AI Fisheries with AI subarea TAC:</p> <ul style="list-style-type: none"> <li>• Directed: Pollock (as of 2005), Pacific ocean perch (by district), Atka mackerel (by district, jig 1% in Eastern AI/BS district), sablefish (trawl 25%, fixed gear 75%), Greenland turbot</li> <li>• Incidental: 'other rockfish'</li> </ul> <p>AI Fisheries with BSAI TAC:</p> <ul style="list-style-type: none"> <li>• Directed: Pacific cod</li> <li>• Incidental: Northern, shortaker and rougheye rockfish, flatfish, squid, other species</li> </ul>	<ul style="list-style-type: none"> <li>• AI subarea TAC for Pacific cod</li> <li>• AI subarea TAC for all species</li> <li>• Spatial apportionment of AI pollock TAC</li> <li>• Break 2 MMT cap into regions</li> </ul>
Permit	<p>AI subarea endorsement on BSAI license</p> <ul style="list-style-type: none"> <li>• certain vessels exempted: vessels fishing only in State waters, vessels less than 32' LOA, or jig gear vessels less than 60' LOA with specific effort restrictions.</li> </ul>	<ul style="list-style-type: none"> <li>• Restrictions associated with AI subarea permit</li> <li>• Require permit for all vessels fishing in AI subarea</li> </ul>
Closures/gear restrictions	<p>Steller sea lions (Appendix 1):</p> <ul style="list-style-type: none"> <li>• 3 nm no-transit zones around rookeries, no trawling for pollock, Pacific cod, or Atka mackerel within 20 nm of rookeries and haulouts during some or all seasons</li> </ul> <p>HAPC (Figure 3):</p> <ul style="list-style-type: none"> <li>• Council is considering designating various AI HAPC areas with protections such as no bottom-trawling</li> </ul> <p>Prohibited species (Figure 17):</p> <ul style="list-style-type: none"> <li>• Attainment of the PSC limit for Chinook salmon (see below) by AI or BS pollock trawl fisheries closes the AI Chinook Salmon Savings Area 1.</li> </ul> <p>Gear:</p> <ul style="list-style-type: none"> <li>• Non-pelagic trawl gear prohibited in directed pollock fishery</li> </ul>	<ul style="list-style-type: none"> <li>• Reevaluate all closure areas together</li> </ul>
Prohibited species and bycatch	<p>Halibut, herring, salmon, king crab, and tanner crab are prohibited species.</p> <ul style="list-style-type: none"> <li>• BSAI-wide halibut PSC limit for trawl fisheries (3,675 mt)</li> <li>• PSC limit for Chinook salmon in AI pollock trawl fisheries</li> </ul>	<ul style="list-style-type: none"> <li>• Identify other prohibited species for the Aleutian Islands (e.g., coral) and set catch limits</li> </ul>
Share-based programs	<ul style="list-style-type: none"> <li>• Directed pollock fishery in the AI subarea is fully allocated to the Aleut Corporation.</li> <li>• Fixed-gear sablefish fishery is IFQ program.</li> <li>• AI subarea-specific fisheries for pollock (as of 2005), POP, Atka mackerel, sablefish, Greenland turbot, rockfish; other CDQ allocations BSAI-wide</li> </ul>	<ul style="list-style-type: none"> <li>• Privilege-based management program for AI fisheries other than pollock and sablefish</li> </ul>
Monitoring and Reporting	<ul style="list-style-type: none"> <li>• 200% observer coverage on AFA vessels harvesting AI pollock</li> <li>• 100%/30%/0% on vessels &gt;125'/60-124'/&lt;60' LOA</li> <li>• Fish tickets, C/P and processor reports</li> </ul>	<ul style="list-style-type: none"> <li>• Increase observers</li> <li>• Require VMS on all vessels</li> </ul>

In FY04, Congress allocated \$1.98 million for NMFS to conduct ecosystem pilot projects in four regions: New England, Mid-Atlantic, South Atlantic, and Gulf of Mexico. The plan is to 1) Use a public process to determine management objectives, threats and alternatives, 2) Hold technical workshops for establishing guidelines in applying ecosystem principles to fisheries management, and 3) to develop quantitative methods and software (models and GIS tools) to aid in evaluating management options and consequences. Each of the four Councils (MAFMC, NEFMC, SAFMC, and GOMFMC) received \$225,000 from NMFS to develop the pilot program.

The South Atlantic Council is relatively far along in this project, and has been actively developing a Fishery Ecosystem Plan (FEP) for the South Atlantic, and hopes to complete a draft by late 2005. Their FEP expands upon their existing Habitat Plan to include a characterization of the biological and physical dynamics, an assessment of existing agencies and management institutions, development of a food web model, development of indices of ecosystem health, updated habitat requirements for managed species, determination of total removals, specification of research and monitoring needs, and further development of appropriate management measures.

The New England Council has started to lay the groundwork for development of ecosystem-based goals and objectives and for implementing the FEP approach. In the near future, they plan to hold about 15 public meetings to seek input on ecosystem objectives for fisheries management, conduct stakeholder surveys, identify technical information needs to support FEP development and evaluation, and develop a prioritized list of ecosystem considerations. The New England Council is also establishing an Ecosystems Committee to oversee the development of the report and of ecosystem goals and objectives. The Mid-Atlantic Council is similarly planning to develop ecosystem-based goals and objectives, and has also formed an Ecosystem Committee to assist them with their task.

### **3.4 Option 1: Special management area within the BSAI Groundfish FMP**

Defining a special management area implies that management will consider the various needs of the area, rather than only the needs of the activity being managed in that area. The Council and NMFS have jurisdiction over fishing activities in the Federal waters around the Aleutian Islands, but to understand and consider the ecosystem of the Aleutian Islands area, the Council must consider the broader interrelationships. As such, for the Council to designate an Aleutian Islands Special Management Area (AI SMA) will require considerable cross-agency cooperation. Other expert agencies will need to be consulted regarding the state of the area and other activities in the area.

#### Spatial boundary and application

A special management area could be applied at many scales. However, as the intent would be for the AI SMA to apply within the BSAI Groundfish FMP, it is likely that such a management measure would be applied to the area defined as the Aleutian Islands within the FMP. As a result, the AI SMA would apply to the Aleutian Islands subarea as defined in the FMP and implementing regulations, and would not include the Fox Islands. Any management measures associated with the AI SMA would apply only to the BSAI groundfish fishery.

#### Effect on existing FMP measures

Adoption of an AI SMA will not necessarily result in radical changes to the management of the Aleutian Islands groundfish fisheries. The AI SMA will provide the Council a mechanism to consider the effects of present and future management actions on the conservation of the Aleutian Islands. Specific amendments to the management regime may, however, result from the designation.

## Implementation

Designation of the AI SMA requires the Council to develop goals and objectives for the area. The purpose of the designation would likely be to recognize the unique nature of the Aleutian Islands area, the role of commercial fishing within ecosystem interactions, and the need to balance the impacts of fishing with other ecosystem relationships.

Once the Council has developed a purpose, an effective way to monitor and assess the AI SMA would be to create a cross-agency scientific 'team', under the oversight of the SSC and the Council. The AI SMA team could be similar to a Plan team. As with the Plan Teams, it would be made up of staff from many agencies, scientists from NMFS, USFWS, State of Alaska, academia, and other stakeholders to be identified. The team would either meet on a regular, periodic basis, or ad hoc at the Council's request. The initial charge of the AI SMA team, with the assistance of staff, would be to prepare a baseline assessment of the Aleutian Islands area, to be updated as necessary.

Additionally, the AI SMA team would provide advice on management actions that affect the Aleutian Islands. The participation of a cross-section of expert agencies would allow the consultation to consider the varied ongoing activities of the Aleutian Islands. The Aleutian Islands resource assessment would be used to evaluate future management actions affecting the AI SMA.

The Council could also choose to initiate specific management measures in conjunction with designation of the AI SMA. Under the license limitation program, qualifying vessels are required to have an AI subarea endorsement in order to fish in the subarea. The Council could apply specific conditions to vessels fishing in the subarea. Table 2 describes management changes that could be considered by the Council. Depending on the goals and objectives of the Council in designating the AI SMA, and the Aleutian Islands assessment, additional management measures could vary from monitoring and reporting requirements to changes to fishing practices.

## Utility in conserving the Aleutian Islands

This approach is potentially the least disruptive to existing fishing practices. It allows the Council to consider the impact of an AI subarea management action in the context of all activities within the subarea. Specific management measures may be designed to address conservation issues, as necessary. By specifically identifying the Aleutian Islands as a unique, 'special' area, the Council publicly highlights its importance.

### **3.5 Option 2: Create an Aleutian Islands Groundfish FMP**

Creating a separate FMP for the Aleutian Islands would require a) defining an Aleutian Islands management area to be the basis for the new FMP; b) defining goals and objectives for the management of the AI groundfish fishery; and c) creating management measures to regulate groundfish fishing in the management area. Existing management measures would need to be reevaluated for consistency with the goals and objectives of the new FMP. The existing BSAI Groundfish FMP (and potentially the GOA Groundfish FMP) would obviously be affected by such a separation, and would need to be rewritten.

### Spatial boundary and application

The management area for an Aleutian Islands (AI) Groundfish FMP would need to be defined by the Council. One option would be to have the FMP encompass only the AI subarea already defined in the BSAI Groundfish FMP. Another option would be to extend the management area to encompass all of the Aleutian Islands, i.e., to incorporate the Fox Islands and surrounding waters. This area is currently part of both the Bering Sea subarea and the Western Gulf regulatory area. Section 3.1 addresses some of the issues with incorporating the eastern Aleutian Islands into a new Aleutian Islands management area. The new FMP would manage the federal groundfish fisheries in the Aleutian Islands.

### Effect on existing FMP measures

The creation of a new AI Groundfish FMP would, in the short term, create a substantial disruption to the BSAI groundfish fisheries, and should the boundary extend into the GOA management area as well, also the GOA groundfish fisheries. New Bering Sea and Aleutian Islands FMPs would need to be written, and the regulations would need to be completely overhauled to separate the fisheries. The separation of the two FMPs would be more simple if the new AI management area boundary is the same as that of the AI subarea. Many of the management measures, including reporting and monitoring, already distinguish the AI subarea. However, the separations would necessarily require new procedures, for example for evaluating stock assessments. An Aleutian Islands Groundfish Plan Team would be created, and stock assessment authors who currently write assessments for the combined areas would need to determine how to separate them. Rewriting of the regulations is bound to create some operational difficulties, where the Bering Sea and Aleutian Islands fisheries cannot clearly be separated in regulation.

If the boundary of the new AI Groundfish FMP extends beyond the AI subarea, disruption to the existing FMP management measures would be compounded. Many of the management measures in the BSAI and GOA Groundfish FMPs are specific to the Bering Sea subarea or the Western Gulf regulatory area. Should these areas be subdivided, in order to apportion some of their area to a new AI Groundfish FMP, management measures in the Bering Sea and the GOA would need to be reconsidered.

### Implementation

Once the boundary is determined, the Council would need to develop goals and objectives for the new AI Groundfish FMP. Many of the existing management objectives from the BSAI FMP would likely still apply, but presumably there would be additional conservation goals for the Aleutian Islands in order to justify separation from the Bering Sea subarea. Based on the revised goals, the existing management measures for the new Aleutian Islands management area (however broadly defined) would be reevaluated. Some existing management measures are discrete for the Aleutian Islands, and others are intertwined with measures for other management areas. New procedures for the isolated Aleutian Islands management area would be developed in the FMP and regulations.

By re-writing the BSAI, and perhaps the GOA, FMPs to excise the Aleutian Islands, the Council would likely need to reconsider those management measures also. Changing the management area is likely to affect the goals and objectives for the FMPs, and so all the FMP measures would need to be reevaluated.

### Utility in conserving the Aleutian Islands

The creation of an AI Groundfish FMP would clearly focus future consideration of management measures on the specific issues of the Aleutian Islands. Measures to protect and conserve the Aleutian Islands from the impacts of the groundfish fisheries could easily be adopted within the FMP framework.

### **3.6 Option 3: Develop an Aleutian Islands Fishery Ecosystem Plan, and incorporate any additional management measures into the BSAI Groundfish FMP**

An *ecosystem* is a geographically specified system of organisms (including humans), the environment, and the processes that control its dynamics. The ecosystem approach is management that is adaptive, geographically specified, takes into account of ecosystem knowledge and uncertainties, considers multiple external influences, and strives to balance diverse societal objectives.

The NMFS Ecosystems Principles Advisory Panel (1999) provided a number of recommended goals, policies and operational steps that would allow ecosystem considerations to be melded into the approaches currently used by the Councils. Chief among the recommended steps was the development of umbrella fisheries ecosystem plans for each region. The intent of the FEPs (as given in the Ecosystem Principles Advisory Report, NMFS 1999) is to provide a framework for organizing information about the structure and function of ecosystems and for developing ways to enhance decision-making when goals of single-species or fishery-by-fishery management approaches conflict. Development of the FEPs would require:

- (1) delineation of the geographic extent of ecosystems,
- (2) development of a conceptual model of the food web,
- (3) description of habitat needs of different life history stages for all plants and animals,
- (4) calculation of total removals, and show how they relate to biomass, production and trophic structure,
- (5) assessment of how uncertainty is characterized and what kind of buffers are to be included in management,
- (6) development of indices of ecosystem health as targets for management,
- (7) description of available long-term monitoring data,
- (8) assessment of ecological, human and institutional elements, which affect fisheries and are outside Council/DOC authority.

In 2003, the NMFS Marine Fisheries Advisory Committee followed up on FEPs by developing strategic guidance (NMFS 2003). The suggested outline for a FEP built on the steps listed in the 1999 report, but also recommended including long and short term goal statements for the desired state of the natural and socioeconomic ecosystems. Recently, NMFS has crafted procedures for developing ecosystem plans. The ecosystem focus is broader than just fisheries, and encourages cooperation with all Federal, State, and other authorities to develop objectives for the ecosystem. The guidelines should be released shortly.

#### Spatial boundary and application

The spatial boundary of the Aleutian Islands Fishery Ecosystem Plan (AI FEP) would be scientifically determined as the extent of the ecosystem of which the Aleutian Islands area forms the center.

The definition of an ecosystem often includes a geographic component, but conspicuous boundaries in marine systems are rarely evident. The Aleutian Islands is no exception, and recent research (Ciannelli et al. 2004) using the Pribilof Islands as an example suggests that marine ecosystem boundaries might be defined by the biological energetics and the foraging range of the principal species that live within it. Such an approach has yet to be applied to the Aleutian Islands.

The AI FEP would take into account all components of the Aleutian Islands ecosystem, including all federal fisheries. Management actions that result from the FEP could be applied to the BSAI groundfish fisheries or any of the other federal fisheries, and would be implemented through changes to the FMPs and implementing regulations.

#### Effect on existing FMP measures

The creation of the FEP itself would not be disruptive to federal fishery management. Based on the findings and objectives of the FEP, however, the Council may wish to amend existing conservation and management measures. Thus amendments to the BSAI Groundfish FMP, and potentially to other federal FMPs, may result from this development.

The scope of the FEP is broader than either of the two previously considered options, as it would consider all components of the ecosystem, and provide goals and objectives for managing fishery impacts from all Federal fisheries. As such, fisheries other than the BSAI groundfish fishery may be affected.

#### Implementation

The FEP would describe the AI ecosystem, including spatial boundaries, predator-prey interactions, habitat needs of the significant food web components, and current and historic states of the ecosystem. Indices of ecosystem health, such as are included annually in the Ecosystem Considerations chapter of the groundfish SAFE report, would be used to assess all impacts, natural and anthropogenic, on the ecosystem. Goals and objectives for the ecosystem would be developed by the Council.

The development of the FEP would require a cooperative effort among many agencies, as the AI FEP would need to consider impacts from all ongoing activities in the Aleutian Islands area. The impacts of shipping, natural resource development, and tourism would all need to be considered in the FEP, and expert authorities from the State of Alaska, USFWS, and the Aleutian Islands communities would likely all be involved in developing the FEP. A mechanism for periodic re-evaluation of the FEP would also need to be devised.

Following the FEP development, an assessment of each FMP would presumably follow. Additional management measures may need to be implemented in order to maintain, in the individual FMPs, the appropriate balance of activities in the Aleutian Islands, as embodied in the FEP goals and objectives.

#### Utility in conserving the Aleutian Islands

The FEP would give the Council an opportunity to examine and incorporate the impacts from all sources on the Aleutian Islands ecosystem, and take action to balance adverse impacts accordingly.

## **4.0 Conclusions**

To the best of our knowledge, current management of the Aleutian Islands is not adversely impacting the sustainability of fish stocks or the environment. A recent programmatic analysis of the BSAI Groundfish FMP concluded that fishery management of the Aleutian Islands groundfish fisheries implements precautionary harvest policies that prevent overfishing of target stocks, reduce the likelihood that stocks will become overfished, and provide additional protection against uncertainty in order to achieve the goal

of preserving the food web (NMFS 2004a). When a potentially adverse impact is identified, the Council and NMFS act to protect and conserve resources and the environment.

At the same time, there appears to be a disparity between the quality of information available for the Bering Sea and that available for the Aleutian Islands. Far more is known and understood about oceanographic processes of the Bering Sea and the stocks and their habitat. In the Aleutian Islands, scientists have recently discovered an abundance and diversity of sessile invertebrates on the ocean floor beyond what was anticipated. Each subsequent submersible research cruise has discovered new species. Our understanding of oceanographic and geological processes in the Aleutian Islands is currently insufficient to predict where these abundant areas are likely to occur. Although research is ongoing, the value of these habitats for juvenile groundfish is unknown. For these reasons, it may be appropriate to pursue area-specific management for the Aleutian Islands area. The dissimilarities between the Bering Sea and Aleutian Islands environments, and our knowledge of each, suggest that the two areas should perhaps be considered independently.

Consideration of ecosystem factors reinforces this conclusion. The bathymetry, meteorology, and oceanography of the Aleutian Islands is considerably different from the Bering Sea. Marine mammals and seabirds that are not to be found elsewhere inhabit the islands. Ecosystem and food web models have been developed for the Bering Sea for many years, but only recently for the Aleutian Islands. Given the uncertainty surrounding fishery dynamics and ecosystem processes in the Aleutian Islands, area-specific management could be warranted as a precautionary measure.

Three options for area-specific management are discussed in this paper. The options focus specifically on management of the Aleutian Islands groundfish fishery, although the scope of the discussion could be expanded to encompass all Federal fisheries. Table 3 compares the three management options. The Fishery Ecosystem Plan option is inherently broader than just the groundfish fisheries. The FEP would consider all fishery impacts in its development, although the Council would then decide whether corollary FMP amendments would be required. The other options, to create a special management area or a separate FMP, are specific to the Aleutian Islands groundfish fisheries. Both options allow the Council the flexibility to retain or amend existing management of the groundfish fisheries. The special management area would involve cooperation with other expert agencies in the Aleutian Islands. The transition to a separate FMP is likely, in the short term, to be disruptive to the Bering Sea, Aleutian Islands, and potentially the Gulf of Alaska groundfish fisheries, as the FMP and implementing regulations would need to be completely overhauled.

#### Where do we go from here?

This preliminary draft discussion paper explores the reasons for initiating area-specific management in the Aleutian Islands, and what kind of management options would accomplish such a management goal.

At the December 2004 meeting, the Council will decide whether the issue of area-specific management for the Aleutian Islands should be pursued. If the Council directs staff to continue work on this issue, our next tasks could be as follows. Between the December and February (or April, depending on Council priorities) meetings, the discussion paper would be further fleshed out. As yet, none of the management options discussed in this paper have been ground-truthed with other agencies. The USFWS, through the Alaska Maritime National Wildlife Refuge, owns most of the land in the Aleutian Islands area. Additionally, we intend to consult with the various divisions of NMFS and NOAA GC, and the State of Alaska. Although there is not time for extensive stakeholder outreach between these meetings, due in part to the holidays, staff would welcome all input from interested stakeholders. Based on these meetings, and further refinement of the issues, the discussion paper will be finalized.



**Table 3 Management options for area-specific management in the Aleutian Islands**

	Special Management Area within BSAI Groundfish FMP	Aleutian Islands Groundfish FMP	Aleutian Islands FEP
<b>Boundary</b>	Aleutian Islands (AI) subarea	Would need to be defined <ul style="list-style-type: none"> <li>likely would include the AI subarea, and could also include parts of the Bering Sea subarea and the Western Gulf regulatory area</li> </ul>	Would need to be defined <ul style="list-style-type: none"> <li>e.g., a polygon around the Aleutian Islands that includes the foraging range of AI predators so that their demands are in balance with prey production</li> </ul>
<b>Applicability to federal and state fisheries</b>	Federal: groundfish State: parallel fisheries?	Federal: groundfish State: parallel fisheries?	Federal: all (groundfish, halibut, crab, scallop) State: parallel and state water? NOTE: does not necessarily imply a change in management measures for all affected fisheries
<b>Affect on current fishery management measures</b>	Perhaps <ul style="list-style-type: none"> <li>amendments to the BSAI Groundfish FMP to enhance conservation of the Aleutian Islands</li> </ul>	Yes <ul style="list-style-type: none"> <li>BSAI and perhaps GOA groundfish management measures and regulations rewritten to accommodate new FMP</li> </ul>	Perhaps <ul style="list-style-type: none"> <li>amendments to some or all FMPs to enhance conservation of the Aleutian Islands</li> </ul>

At the next meeting, the Council would be in a position to initiate an action based on the discussion paper. This action would likely be to develop a plan and associated analysis to implement one or all of the management options. The identification of and mitigation measures associated with EFH and HAPC sites in the Aleutian Islands will be decided in February, and the nature of that Council discussion and decision may provide further insight into the question of area-specific management in that area. The discussion paper lays out three types of management options for the Aleutian Islands area, all of which can vary in their specific implementation. The Council will be able to indicate whether staff should continue to explore all of the management options, or whether the analysis in the discussion paper is sufficient to narrow down the type of management the Council would wish to implement. Additionally, the Council may, at that time, wish to develop a problem statement for why area-specific management is being developed. At future meetings, staff will return to the Council with a practical plan for implementing the Council's management options, and alternative ways of developing the program.

## 5.0 References

- Angliss, R.P. and K.L. Lodge. 2003. Alaska Marine Mammal Stock Assessments, 2003. NOAA Tech. Memo NMFS-AFSC-144. 230 p.
- Barbeaux, S., J. Ianelli, and E. Brown. 2003. Aleutian Islands walleye Pollock SAFE. In: Stock Assessment and Fishery Evaluation Report for Groundfish Resources of the Bering Sea/Aleutian Islands Regions. NPFMC, Anchorage, AK, p. 839-888.

- Bickham, J.W., J.C. Patton, and T.R. Loughlin. 1996. High variability for control-region sequences in a marine mammal: implications for conservation and biogeography of Steller sea lions (*Eumetopias jubatus*). *J. Mammal.* 77(1):95-108.
- Calkins, D.G. and K.B. Schneider. 1985. The sea otter (*Enhydra lutris*). Pages 37-45 in *Marine Mammals Species Accounts*. J.J. Burns, K.J. Frost, and L.F. Lowry, Eds. Alaska Dept. of Fish & Game, Technical Bulletin 7.
- Gaichas, S., D. Courtney, T. TenBrink, M. Nelson, S. Low, J. Hoff, B. Matta, and J. Boldt. 2004. BSAI Squid and Other Species Stock Assessment. In: *Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Regions*. NPFMC, Anchorage, AK.
- Heifetz, J. R.P. Stone, P.W. Malecha, D.L. Courtney, J.T. Fujioka, and P.W. Rigby. 2003. Research at the Auke Bay Laboratory on Benthic Habitat. AFSC Quarterly Report, July-August-September 2003. US DOC, NOAA, AFSC, Seattle, WA. p. 1-10.
- Loughlin, T.R. 1997. Using the phylogeographic method to identify Steller sea lion stocks. *Molecular Genetics of Marine Mammals, Spec. Pub.* 3:159-171.
- Lowe, S., J. Ianelli, H. Zenger, and R. Lauth. 2003. Stock Assessment of Aleutian Islands Atka Mackerel. In: *Stock Assessment and Fishery Evaluation Report for Groundfish Resources of the Bering Sea/Aleutian Islands Regions*. NPFMC, Anchorage, AK, p. 711-776.
- National Marine Fisheries Service (NMFS). 1999. *Ecosystem-based Fishery Management: A Report to Congress by the Ecosystem Principles Advisory Panel*. US DOC, NOAA, NMFS. April 1999.
- NMFS. 2003. *Strategic Guidance for Implementing an Ecosystem-based Approach to Fisheries Management*. Prepared for the Marine Fisheries Advisory Committee by the Ecosystem Approach Task Force. US DOC, NOAA, NMFS, Silver Spring, MD.
- NMFS. 2004a. *Alaska Groundfish Fisheries Final Programmatic Supplemental Environmental Impact Statement*. US DOC, NOAA, NMFS Alaska Region, Juneau, AK. June 2004.
- NMFS. 2004b. *Draft Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska*. US DOC, NOAA, NMFS Alaska Region, Juneau, AK. January 2004.
- Reuter, R.F. and P.D. Spencer. 2003. 2003 BSAI Other Rockfish. In: *Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Regions*. NPFMC, Anchorage, AK, p. 681-710.
- Sayles, M.A., Aagaard, K., and Coachman, C.K. 1979. *Oceanographic Atlas of the Bering Sea Basin*. University of Washington Press. Seattle. 158 pp.
- Sigler, M.F., C.R. Lunsford, J.T. Fujioka, and S.A. Lowe. 2003. Alaska Sablefish Assessment for 2004. In: *Stock Assessment and Fishery Evaluation Report for Groundfish Resources of the Bering Sea/Aleutian Islands Regions*. NPFMC, Anchorage, AK, p. 839-888.
- Spencer P.D., and J.N. Ianelli. 2003a. Pacific Ocean Perch. In: *Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Regions*. NPFMC, Anchorage, AK, p. 563-610.

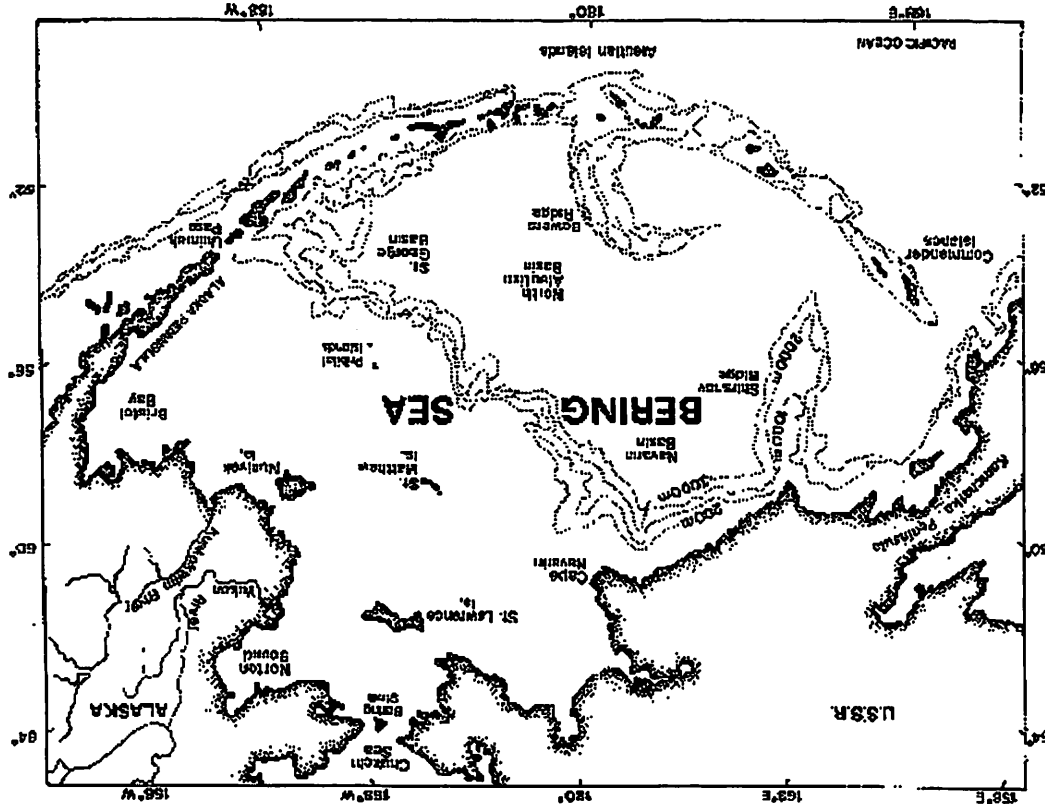
Spencer P.D., and J.N. Ianelli. 2003b. Northern Rockfish. In: Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Regions. NPFMC, Anchorage, AK, p. 611-652.

Thompson, G.G. and M.W. Dorn. 2003. Assessment of the Pacific cod stock in the eastern Bering Sea and the Aleutian Islands Area. In: Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Regions. NPFMC, Anchorage, AK, p. 127-222.

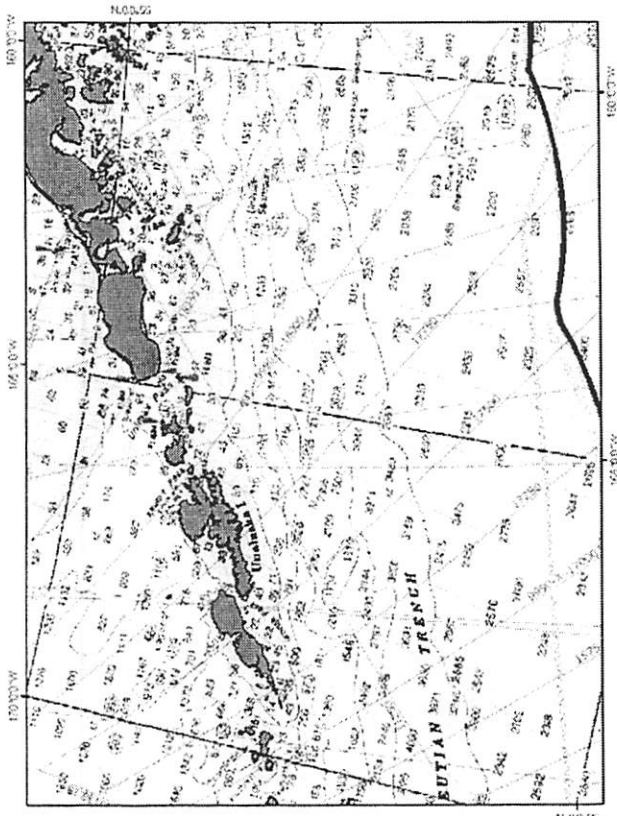
Turnock, B.J., T.K. Wilderbuer, and E.S. Brown. 2004. Gulf of Alaska Flatfish. In: Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Gulf of Alaska. NPFMC, Anchorage, AK, p. 313-340.

USFWS (U.S. Fish & Wildlife Service). 2003. Alaska's Threatened and Endangered Species. Unpubl. Report. US Fish & Wildlife Service, Western Alaska Ecological Services Office, Anchorage, AK.

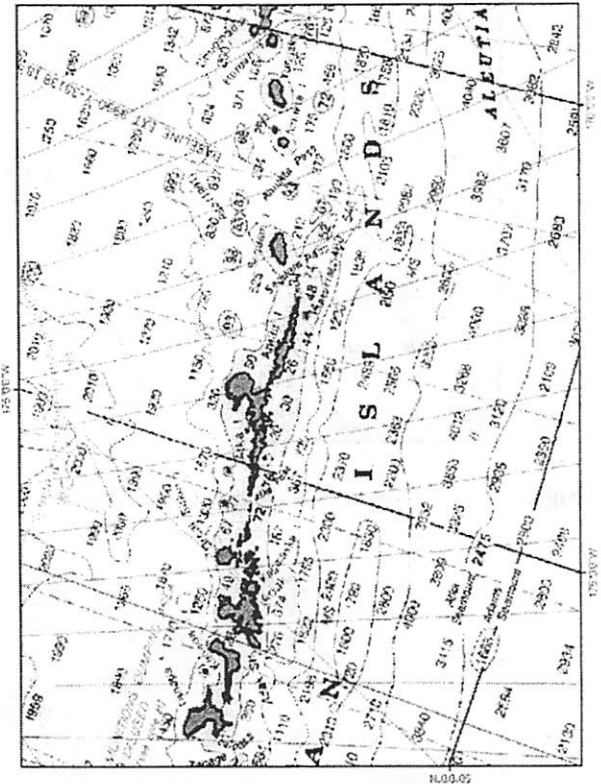
Figure 1 Bathymetric map of the Bering Sea, showing the Aleutian-Commander archipelago (Sayles 1979).



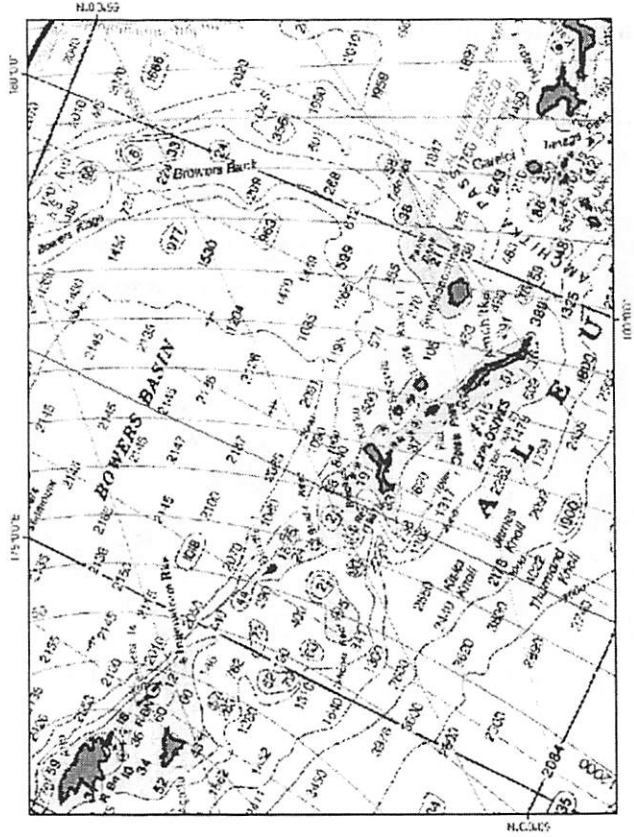
FIGURES



Islands of Four Mountains to Unimak Island



Tanaga Island to Islands of Four Mountains



Attu Island to Tanaga Island

Figure 2 Map of the Aleutian Islands

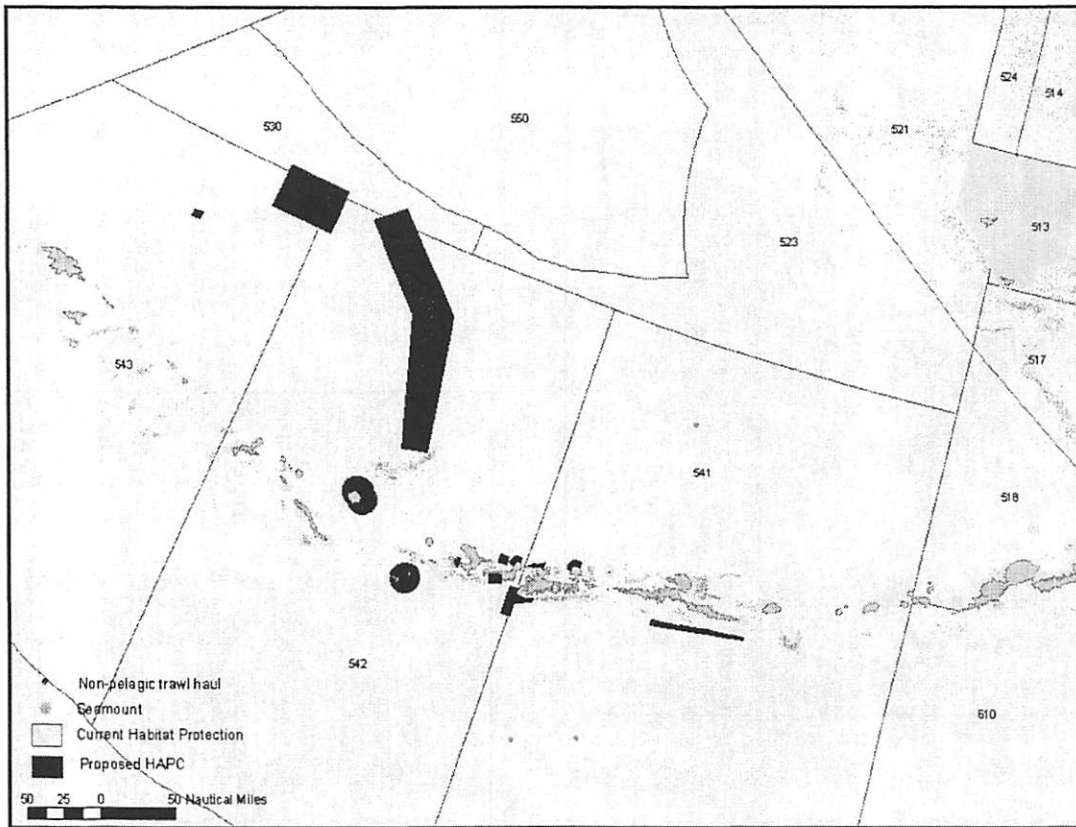


Figure 3 Proposed Habitat Areas of Concern in the Aleutian Islands

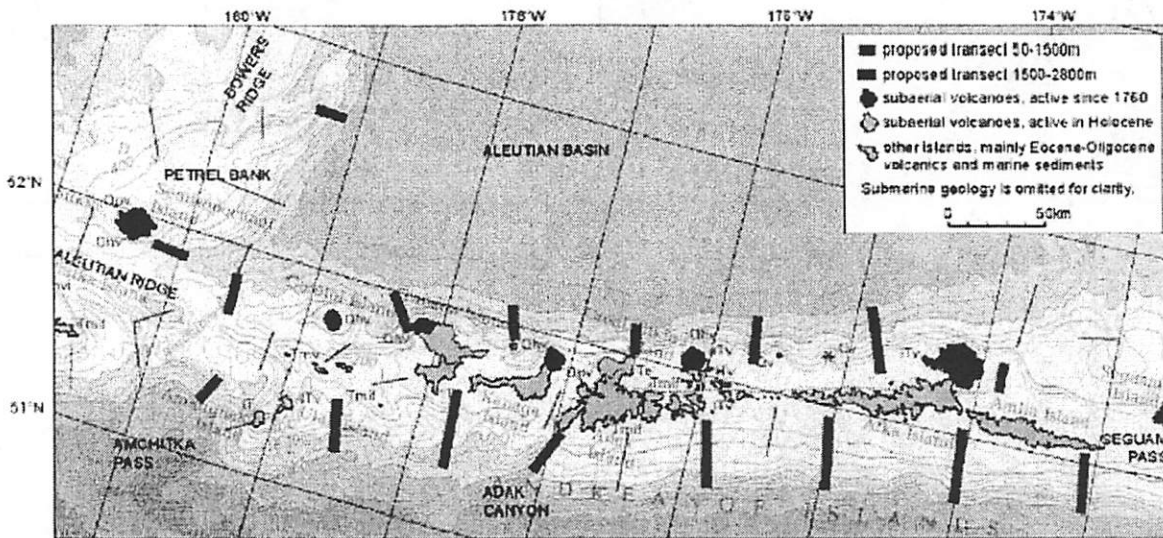


Figure 4 Location of proposed submersible mapping transects in the central Aleutian Islands

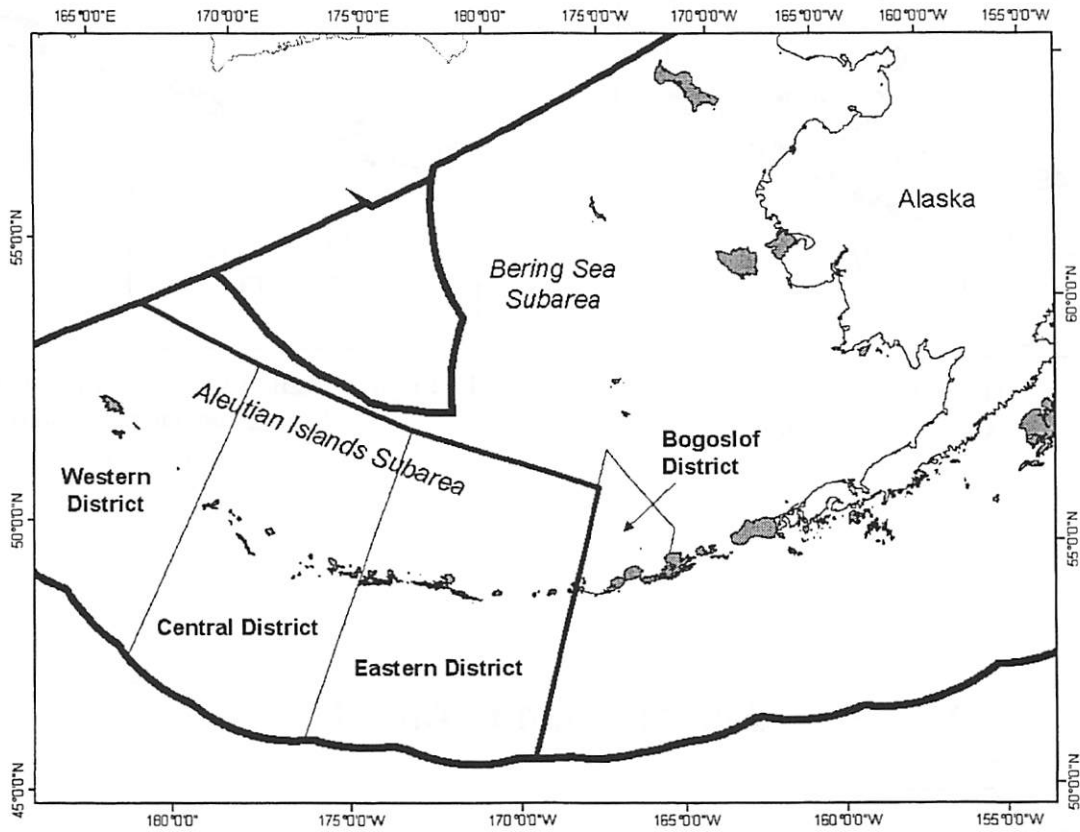


Figure 5 Aleutian Islands subarea of the BSAI Groundfish FMP

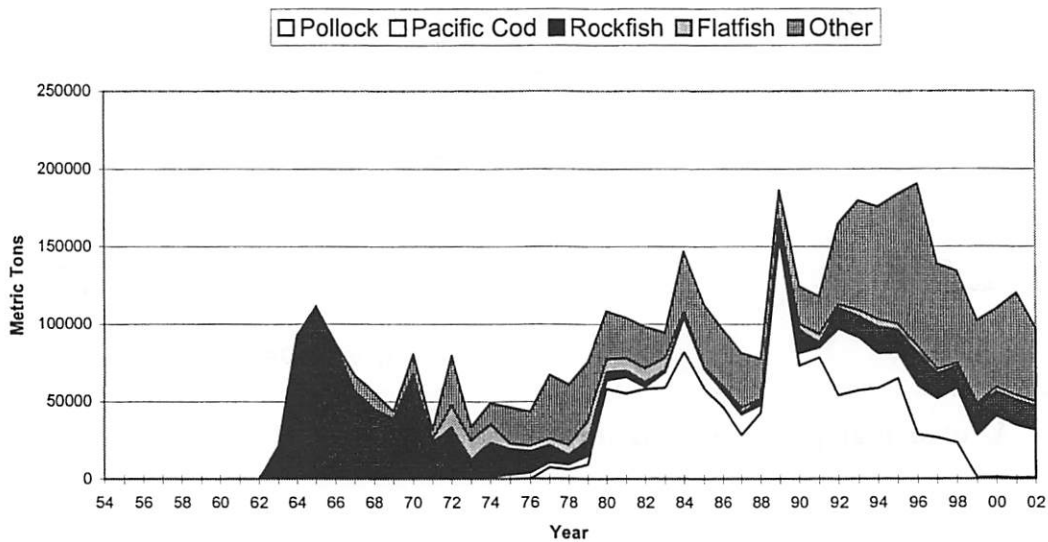


Figure 6 Aleutian Islands Groundfish Catch, 1954-2002.

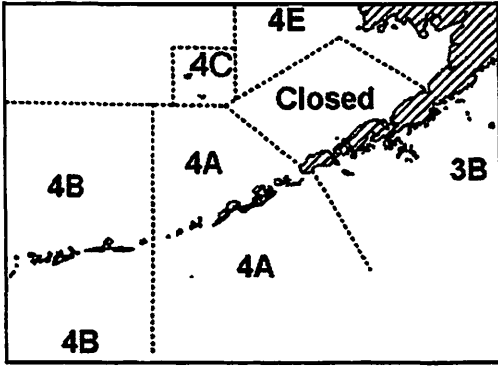


Figure 7 Halibut Fishery Management Areas in the Aleutian Islands

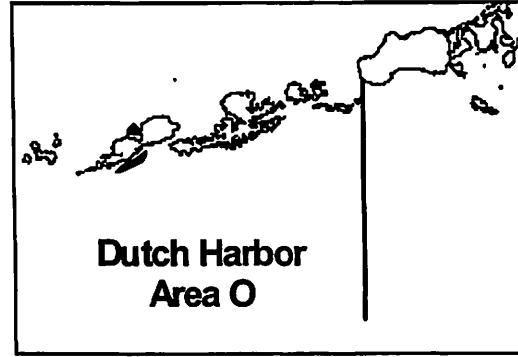


Figure 8 Scallop Registration Area O, with fishing concentration marked by the dark polygons.

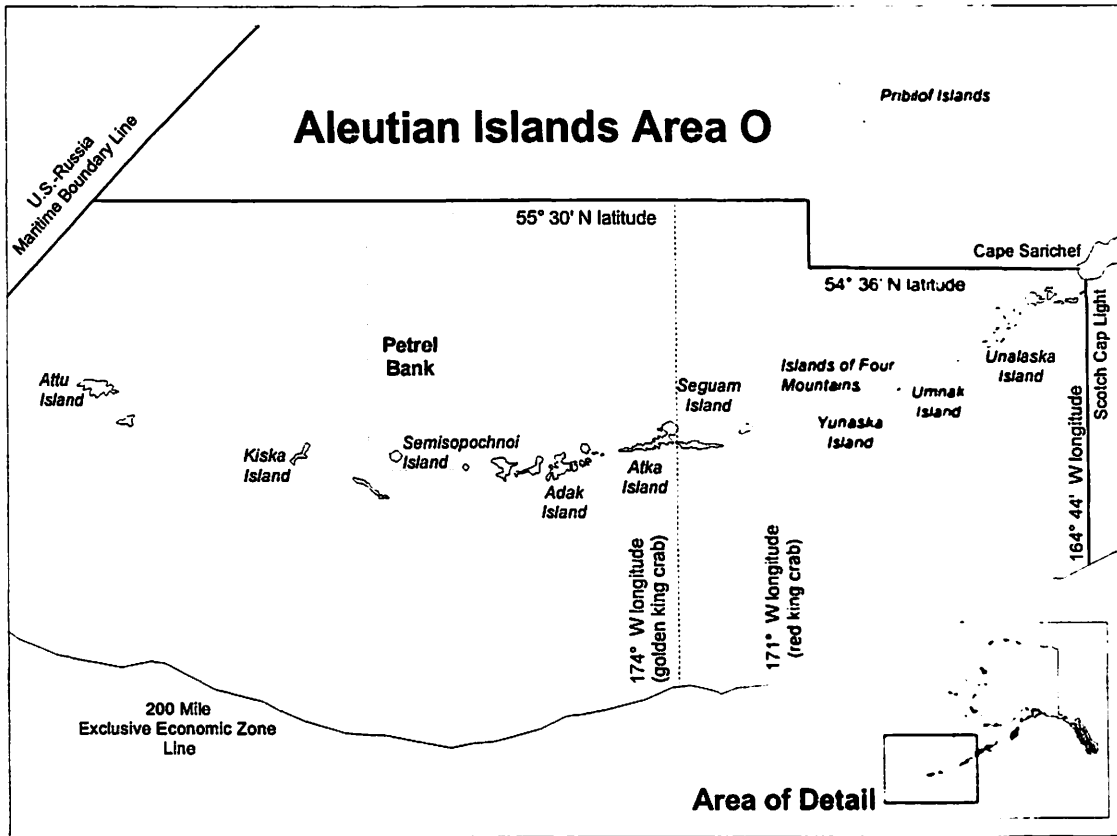


Figure 9 Aleutian Islands, Area O, king crab management area



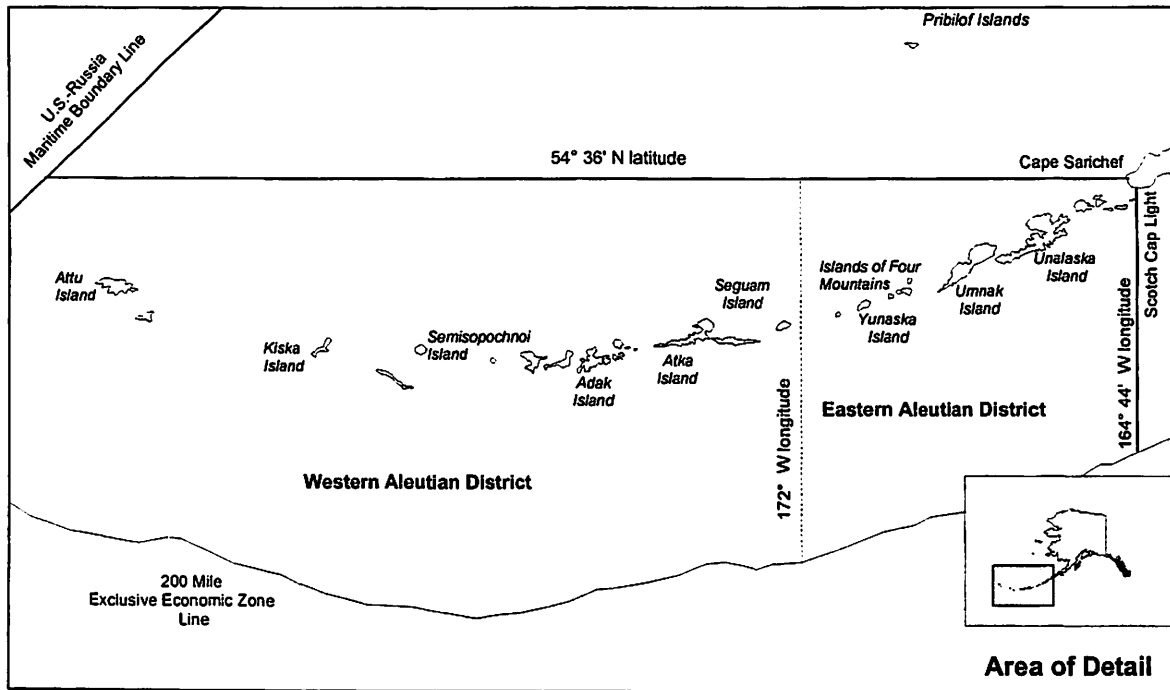


Figure 10 Eastern and Western Aleutian Districts of Tanner crab Registration Area J

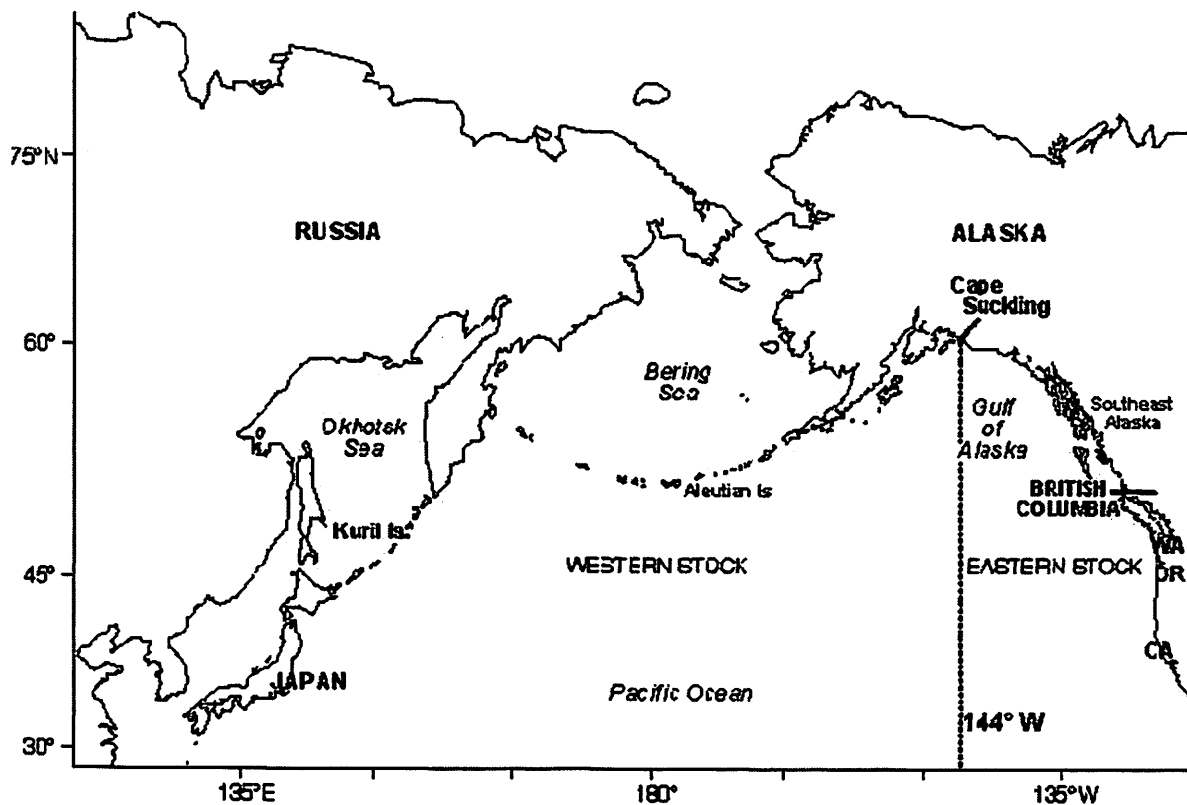


Figure 11 Distribution of western and eastern distinct population segments of Steller sea lion

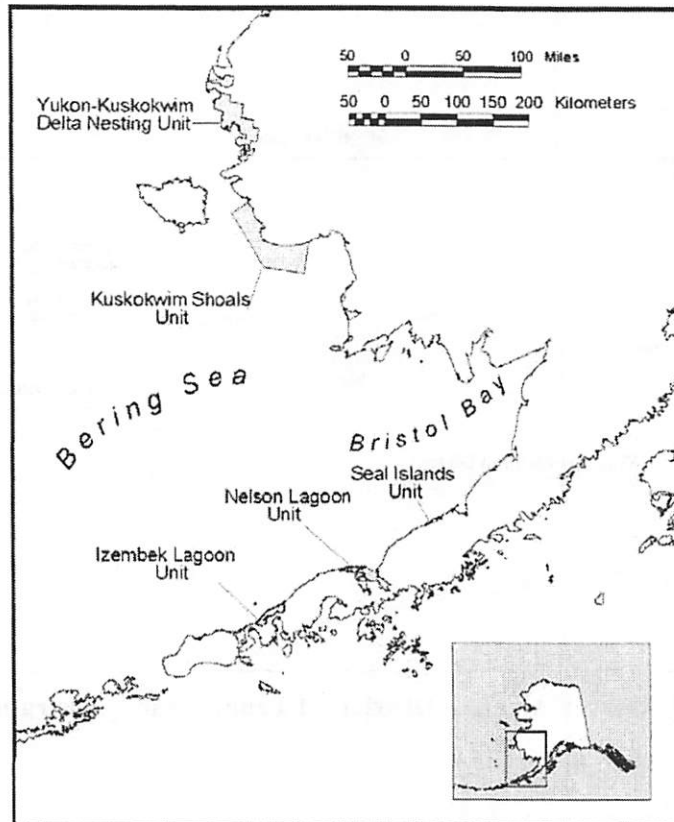


Figure 12 Steller's eider critical habitat area map as per 66 FR 8849, final rule February 2, 2001. Source: USFWS 2001.

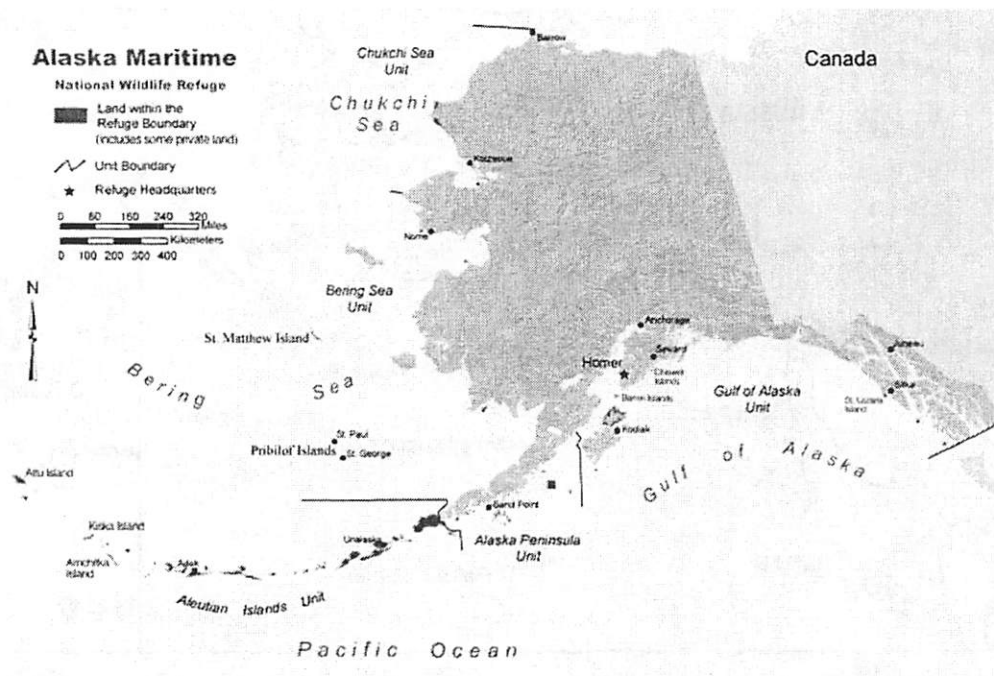


Figure 13 Map of the Alaska Maritime National Wildlife Reserve.

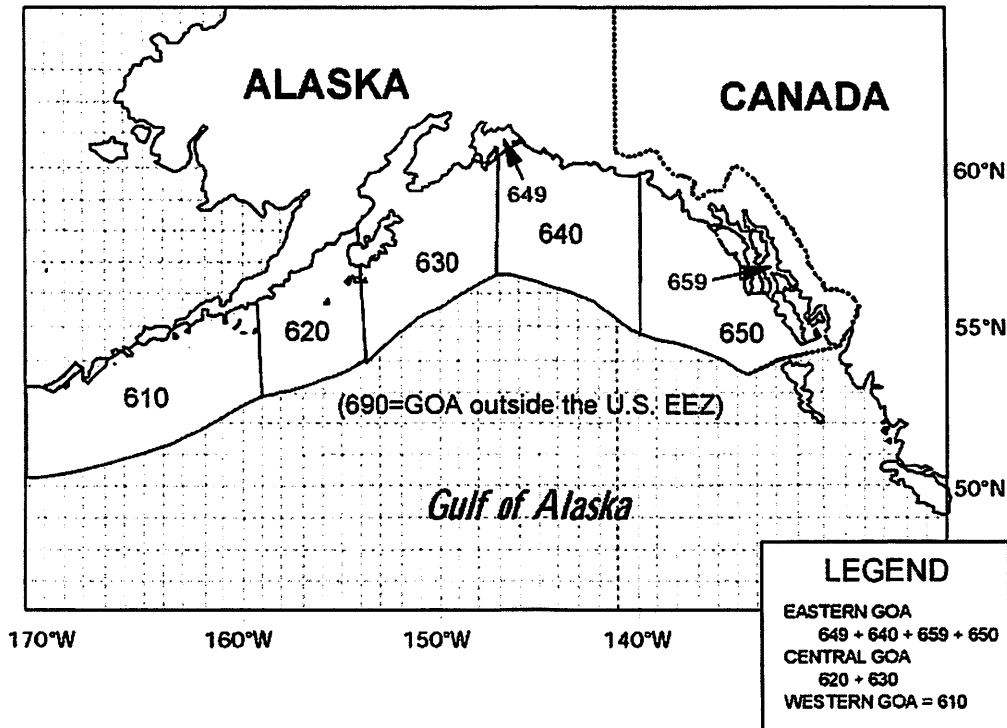


Figure 14 GOA Groundfish statistical areas

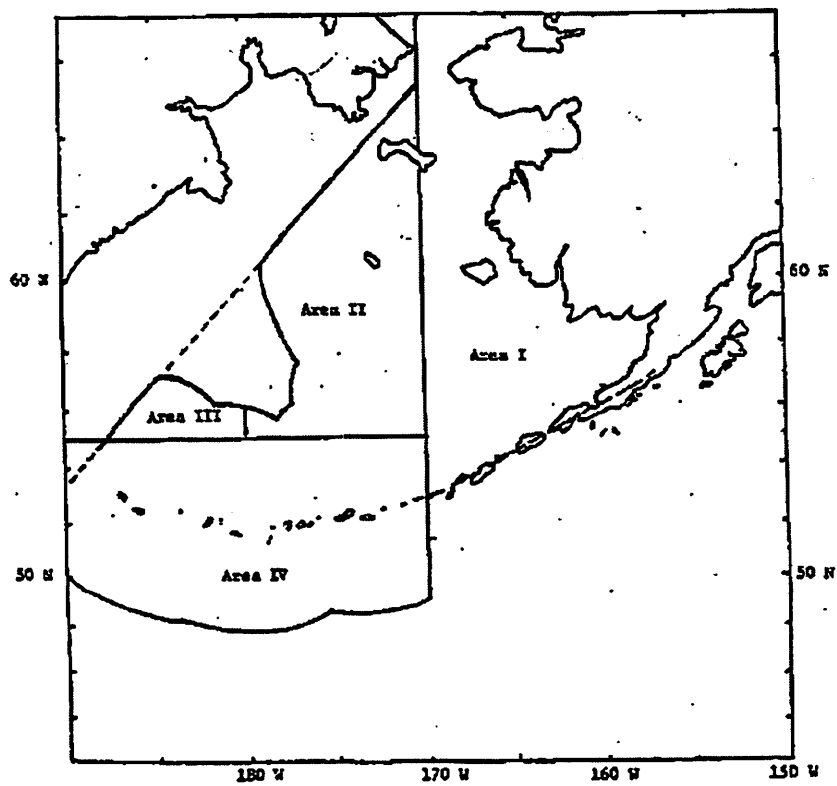


Figure 15 Fishing areas in original BSAI FMP, 1981.

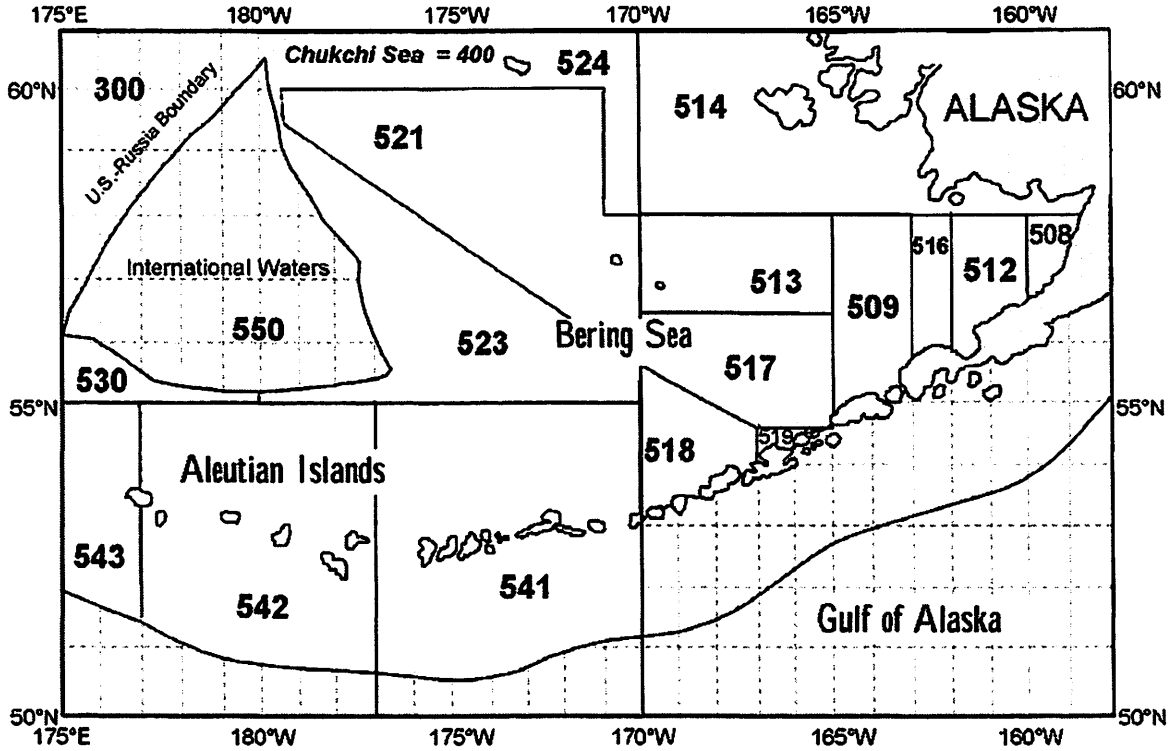


Figure 16 BSAI Groundfish statistical areas

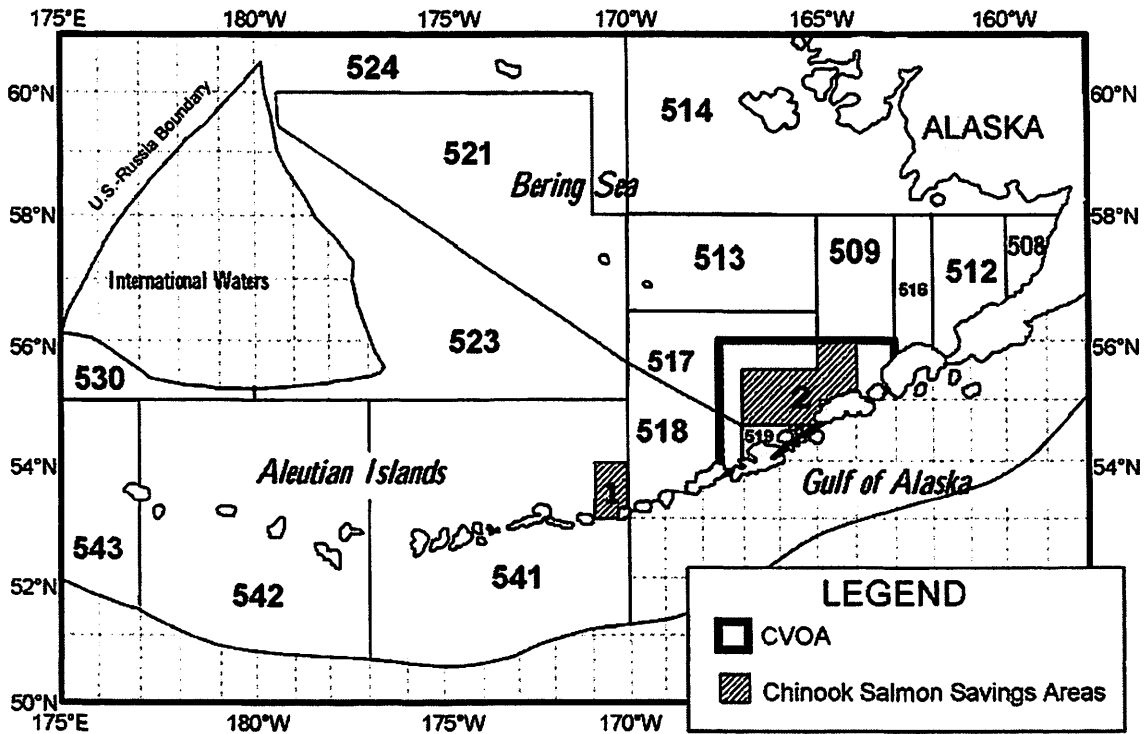
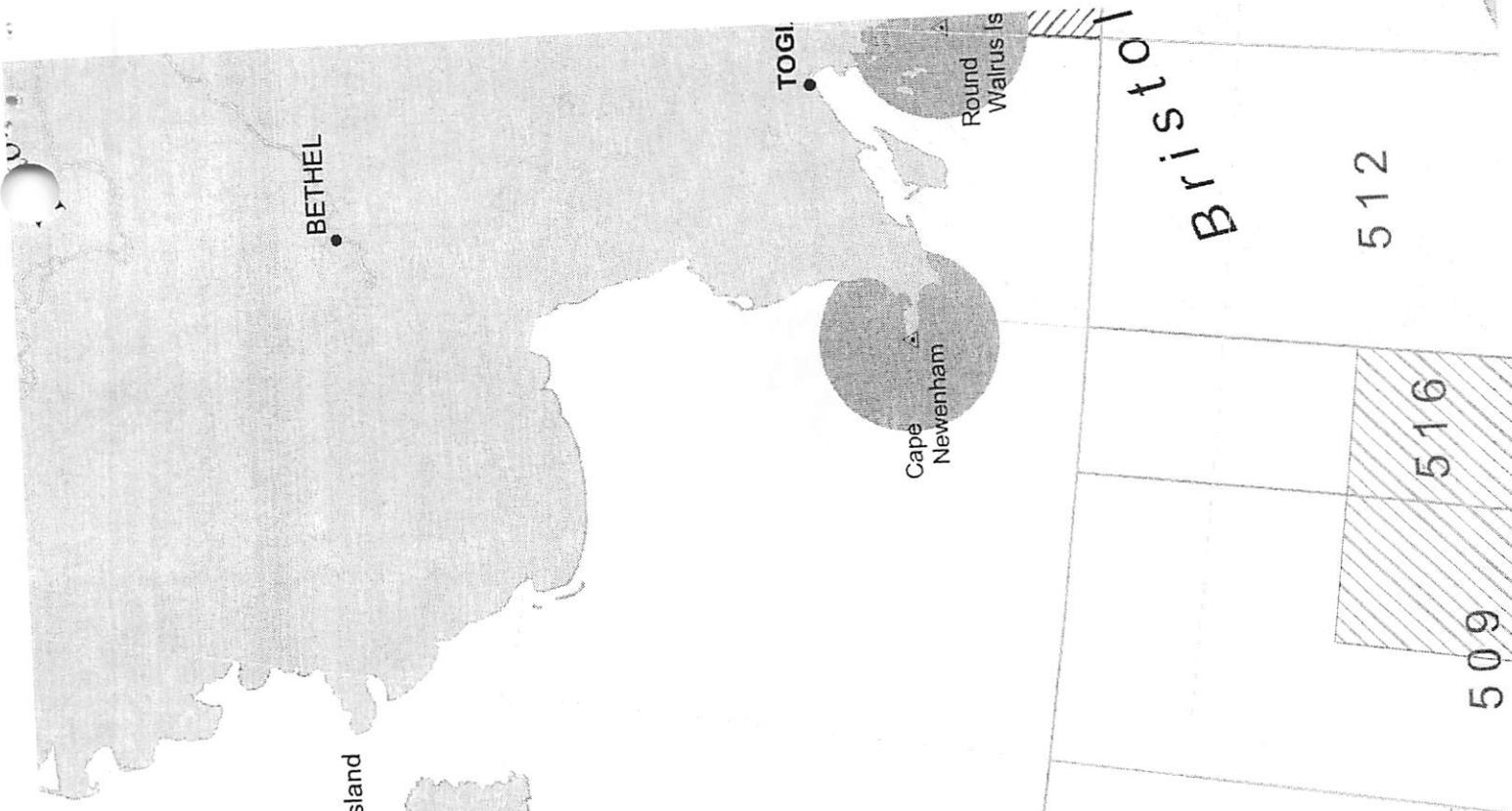


Figure 17 Chinook salmon savings areas



BETHEL

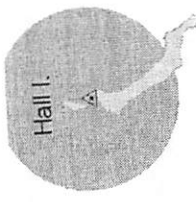
Nunivak Island

Cape Newenham

Round Waiyus Is

TOGI

514



Hall I.

521

Bristol

512

516

509

513

St. Paul I.  
NE Pt.

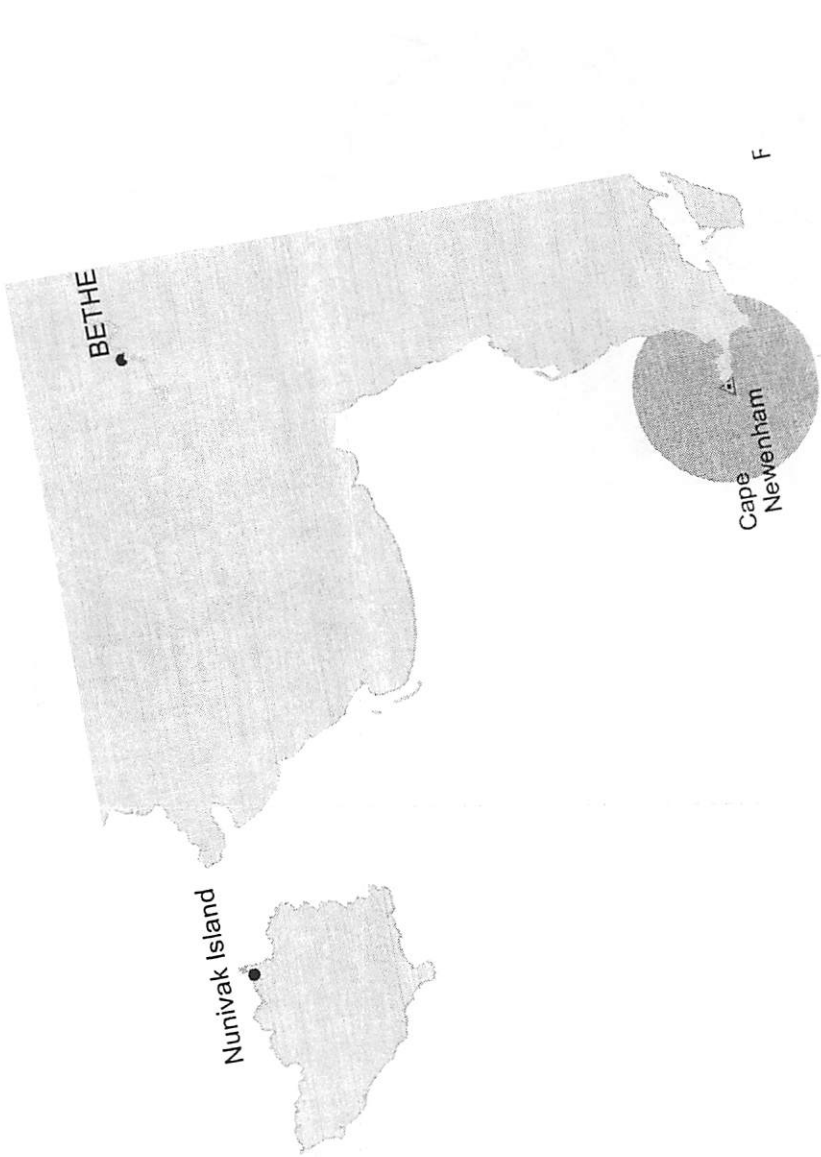
Walrus I. (Pribilofs)

St. Paul  
Sea Lion Rock

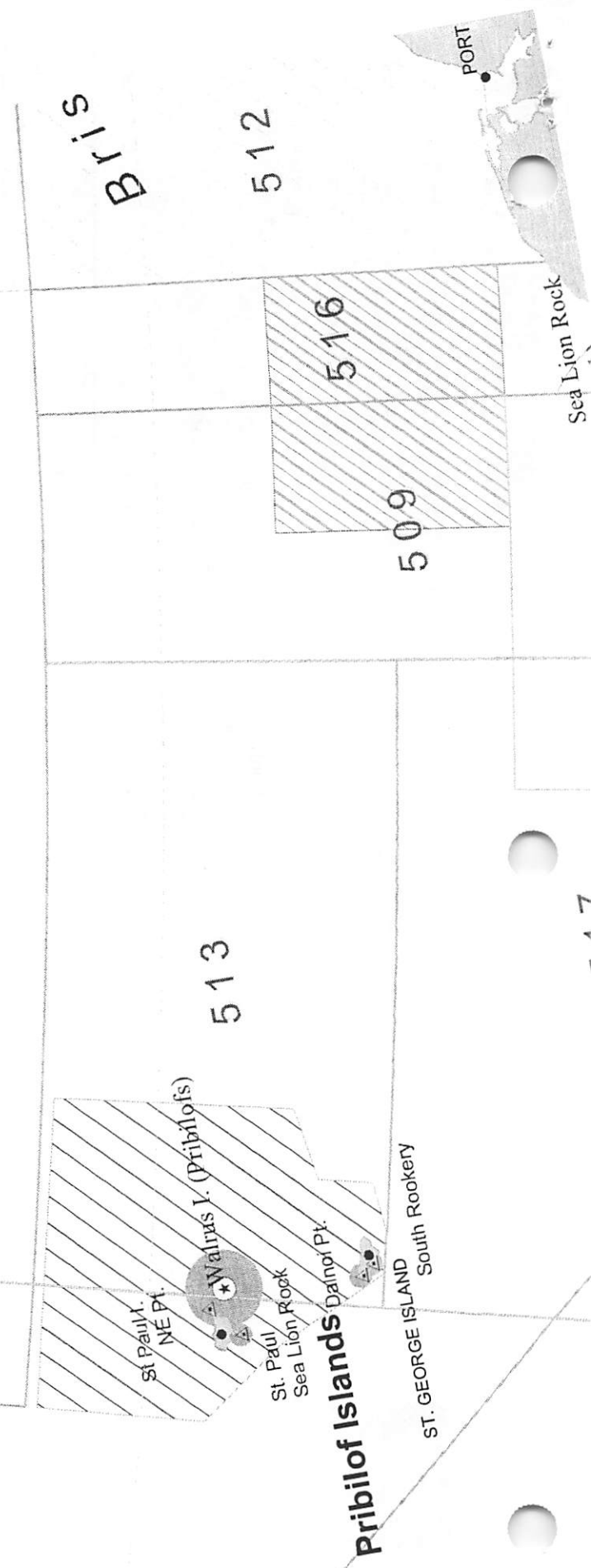
Dalnoi Pt.

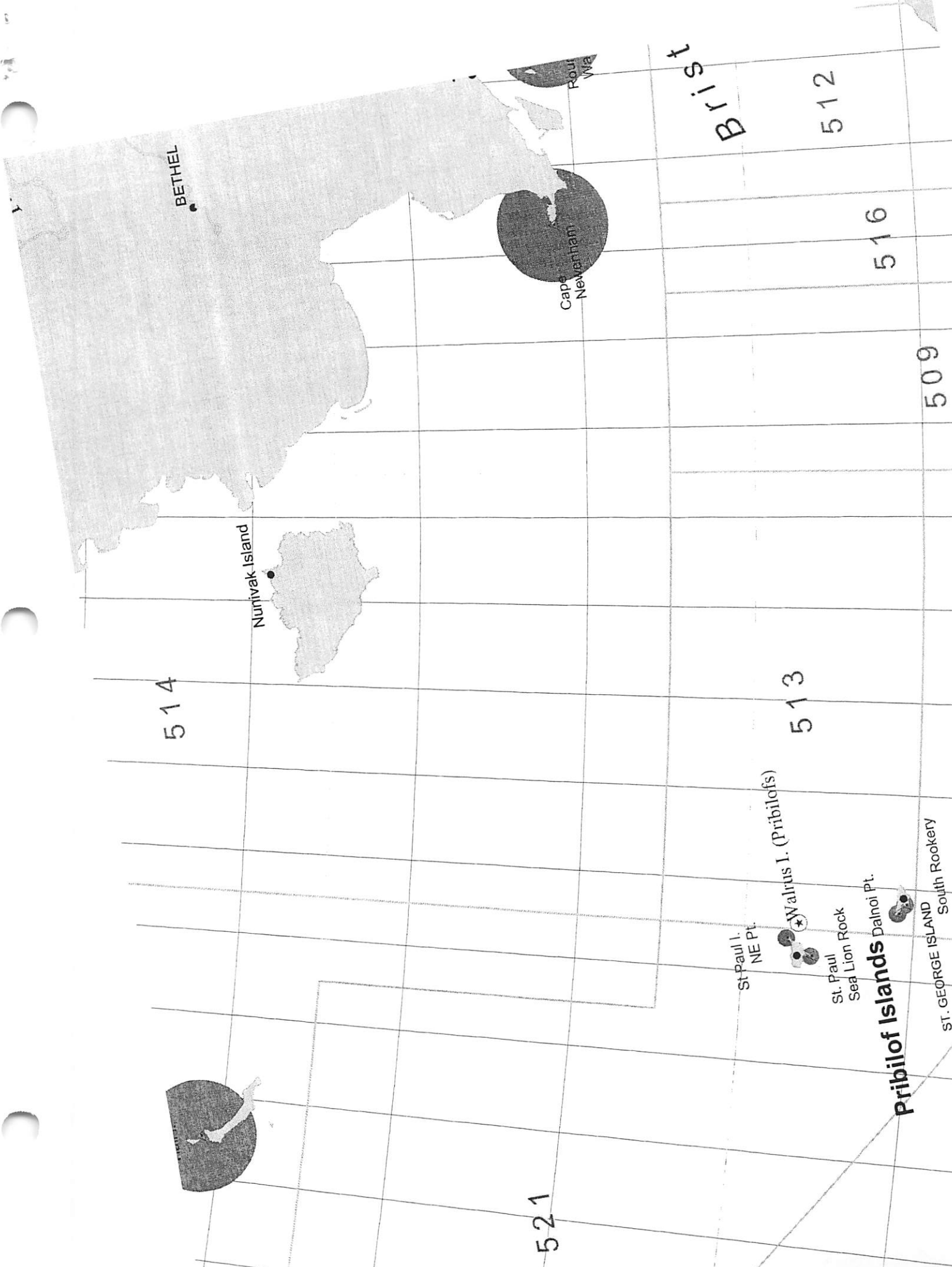
Pribilof Islands

ST. GEORGE ISLAND  
South Rookery



21





BETHEL

Cape  
Newenham

Nunivak Island

514

521

St. Paul I.  
NE Pt.

St. Paul  
Sea Lion Rock

★ Walrus I. (Pribilofs)

Dalnol Pt.

**Pribilof Islands**

ST. GEORGE ISLAND  
South Rookery

Bristol

512

516

509

513