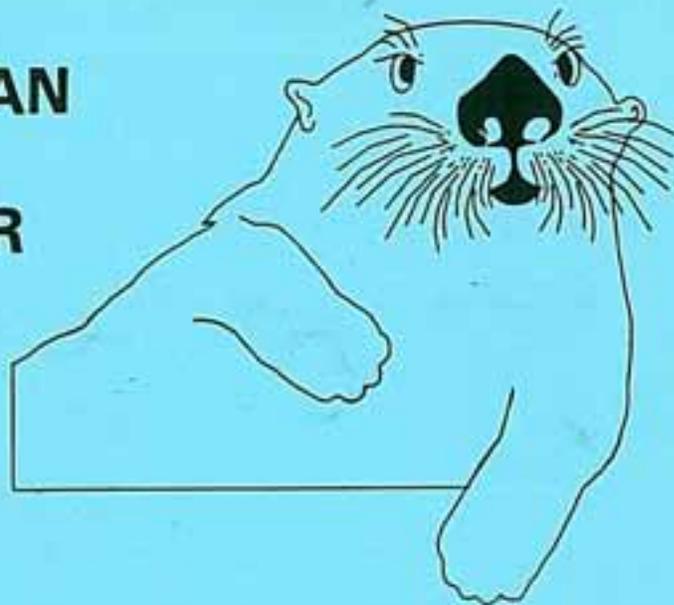


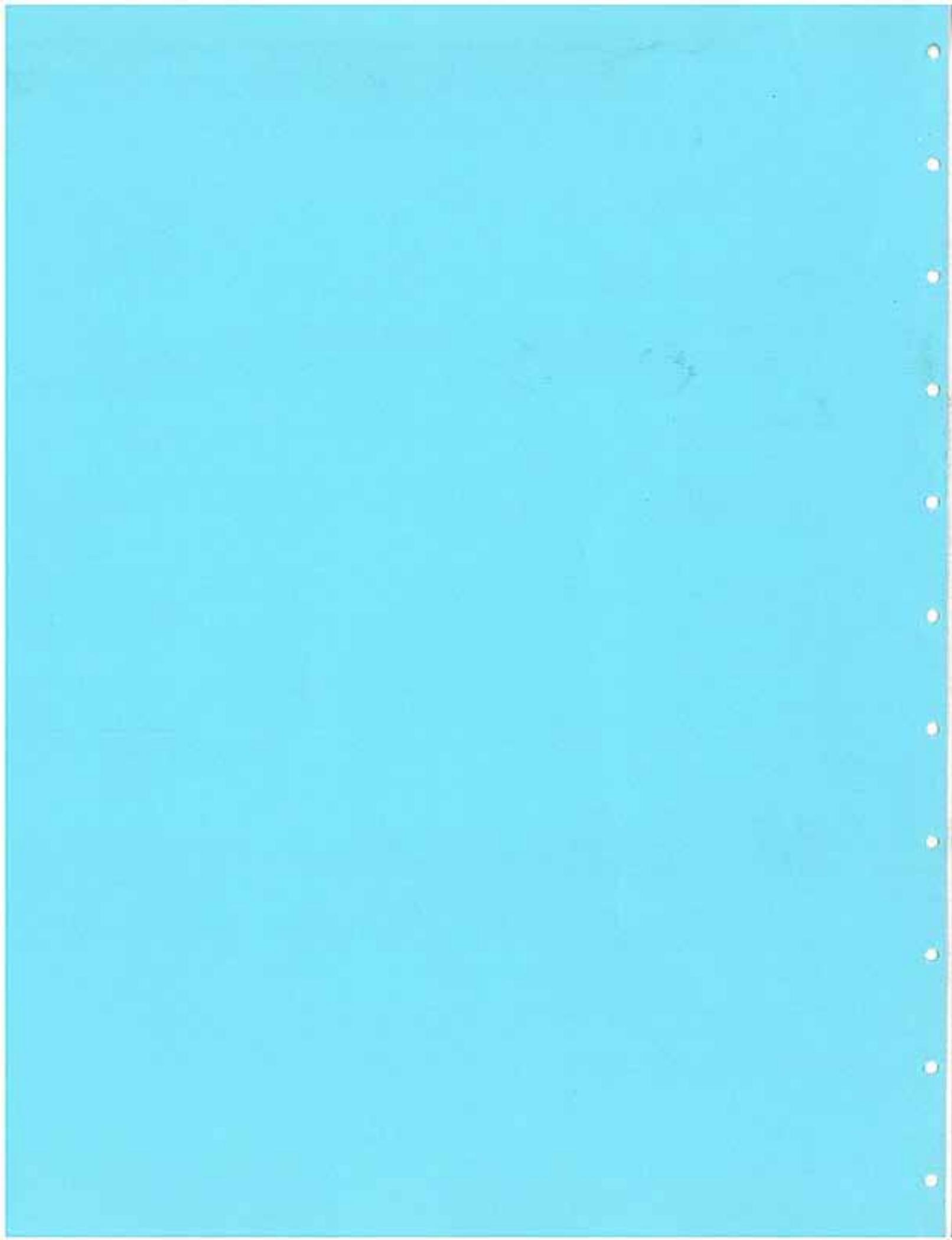
**CONSERVATION PLAN
FOR THE SEA OTTER
IN ALASKA**



June 1994

**U.S. FISH AND WILDLIFE SERVICE
Marine Mammals Management
Anchorage, Alaska**







United States Department of the Interior

FISH AND WILDLIFE SERVICE

1011 E. Tudor Rd.
Anchorage, Alaska 99503-6199

IN REPLY REFER TO:

MMM

AUG 5 1994

Dear Interested Reader:

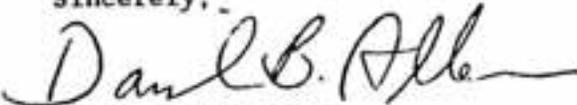
Using a cooperative approach, the Fish and Wildlife Service has prepared Conservation Plans (Plans) for polar bear, walrus and sea otter in Alaska, to provide management and research direction for the next 5 years. These documents will guide our efforts in the stewardship of marine mammals and in meeting our National obligations under the Marine Mammal Protection Act (Act), as well as International obligations. We will use the Plans to assist in funding strategies to address the highest priority tasks. Many of the tasks will be expensive to accomplish because of the logistics involved in working in remote areas, and sometimes in other countries. Our overall goal, consistent with the Act, is to manage marine mammals within their optimum sustainable population ranges, as valuable and essential components of healthy ecosystems upon which they depend.

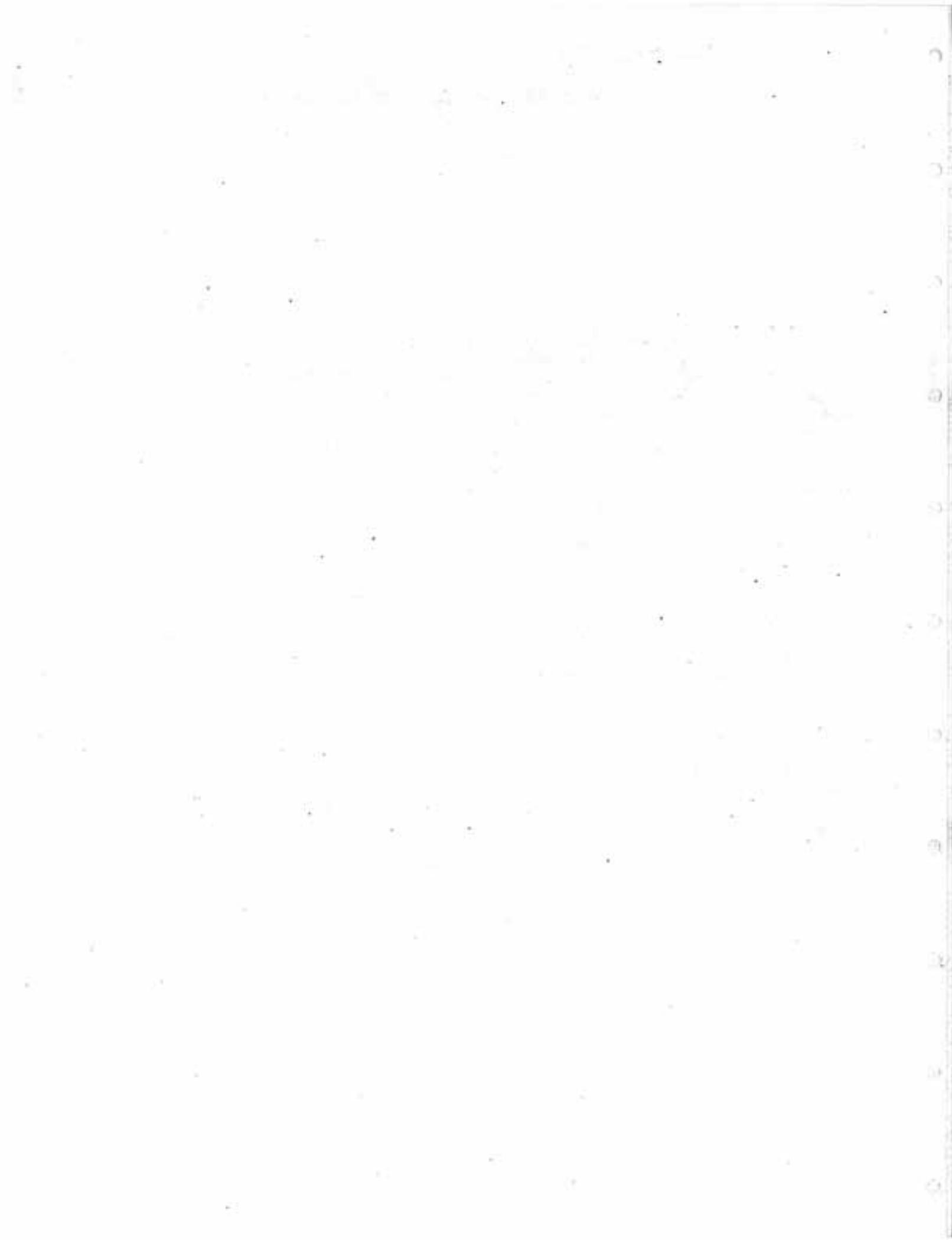
Another purpose of these Plans is to inform the public of the direction of marine mammal management and research in Alaska. This is important to Alaska Natives who depend on marine mammals for subsistence purposes and for creating and selling handicrafts and other non-consumptive uses, to industries such as oil and gas and commercial fisheries which sometimes take marine mammals incidentally during their activities, and to others.

Draft Plans were prepared with the assistance of many individuals and organizations, particularly the Marine Mammal Commission. However, participating in the planning process does not constitute endorsement. The final Plans represent the views of the Fish and Wildlife Service. To be fully useful, these Plans must remain dynamic. They will be reviewed annually and considered for rewriting and updating in 3 to 5 years. Your suggestions and comments are always welcome and should be addressed to:

Supervisor, Marine Mammals Management
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

Sincerely,


Acting Regional Director



**CONSERVATION PLAN FOR THE
SEA OTTER IN ALASKA**

June 1994

**U.S. Fish and Wildlife Service
Marine Mammals Management
4230 University Drive, Suite 310
Anchorage, AK 99508**

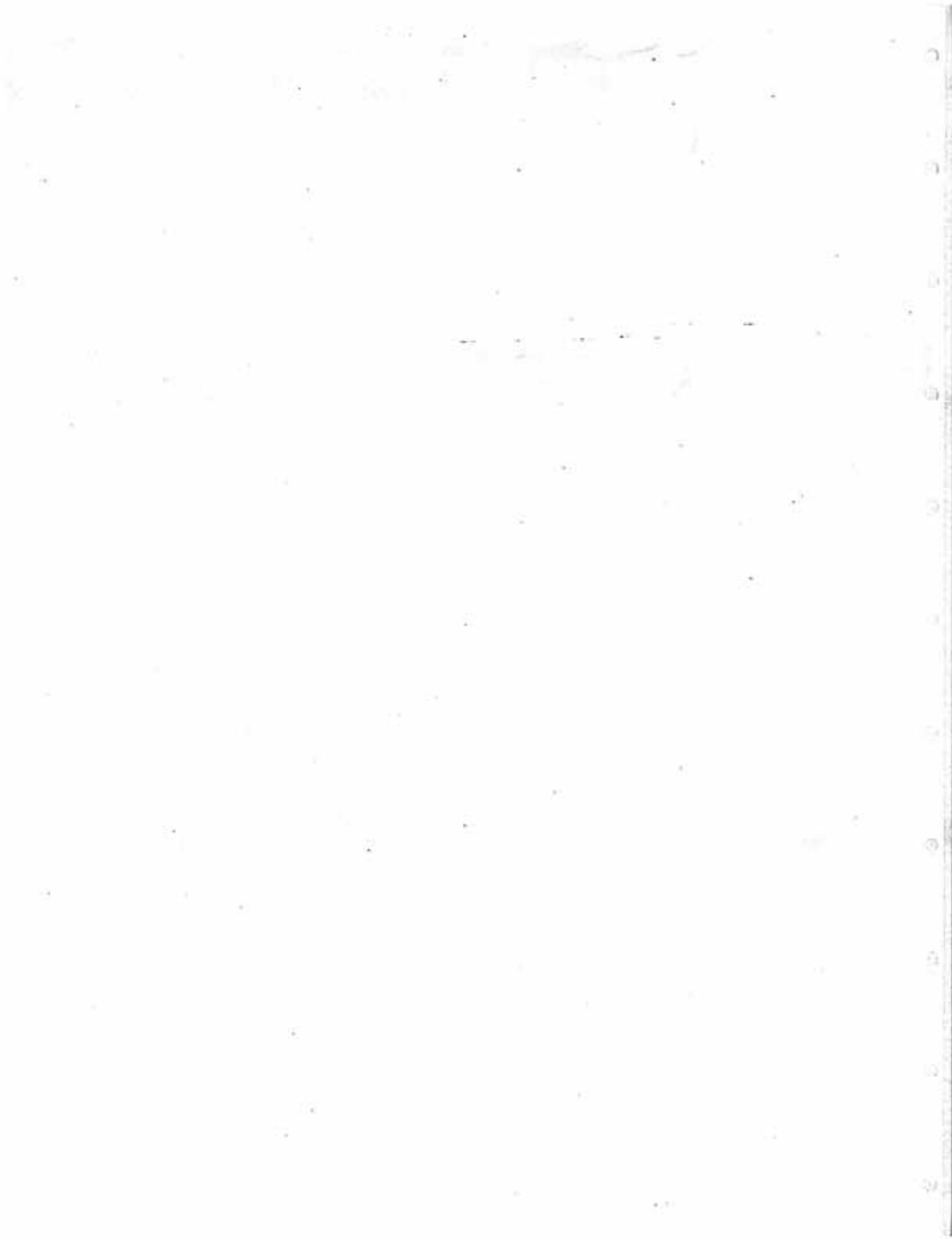


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ACKNOWLEDGMENTS

The U.S. Fish and Wildlife Service thanks the members of the Sea Otter Management Plan Advisory Team for their assistance, patience and review of earlier drafts of this plan: Mr. James Bodkin, U.S. Fish and Wildlife Service; Ms. Kathryn Frost, Alaska Department of Fish and Game; Dr. Robert Hofman, Marine Mammal Commission; Ms. Mara Kimmel-Hoyt, Alaska Sea Otter Commission; Mr. Steve Landino, Minerals Management Service; Mr. Jack Lentfer, Marine Mammal Commission; Ms. Cindy Lowry, Greenpeace; Mr. Lloyd Lowry, Alaska Department of Fish and Game; Dr. Douglas Miller, National Wildlife Federation; Mr. Gilbert Olsen, Alaska Sea Otter Commission; Dr. Donald Siniff, University of Minnesota; and Ms. Kate Wynne, University of Alaska. Mr. James Bodkin, Ms. Victoria Credle, Ms. Angela Doroff, Mr. Thomas Evans, Ms. Carol Gorbics, Mr. Ancel Johnson and Mr. Jon Nickles also reviewed earlier drafts of the plan. Ms. Elaine Rhode, with the assistance of Mr. Douglas Burn and Ms. Angela Doroff, prepared the executive summary which was provided to the public for comment.

The primary author of this plan was Mr. Anthony R. DeGange, U.S. Fish and Wildlife Service. This plan is based in part on a draft conservation plan for sea otters in Alaska provided by the Marine Mammal Commission.

PREFACE

This conservation plan for sea otters in Alaska has been approved by the U.S. Fish and Wildlife Service. It will be used by the U.S. Fish and Wildlife Service in the ongoing management and conservation of sea otters. It was prepared by staff of the Marine Mammals Management office, U.S. Fish and Wildlife Service, with the assistance of the Marine Mammal Commission and the Sea Otter Management Plan Advisory Team. While many of the contributions and recommendations made by participating individuals and organizations have been incorporated into this plan, it does not necessarily represent the views of these individuals and organizations. Parts of this conservation plan solely represent the views of the U.S. Fish and Wildlife Service.

This plan will be reviewed annually and revised at least every three to five years. It will be modified subject to new findings, changes in species status, completion of tasks, legal interpretations, policy changes or Congressional direction. Completion of most tasks is dependent on obtaining new funds.

Literature Citation should read as follows:

U. S. Fish and Wildlife Service. 1993. Conservation Plan for the Sea Otter in Alaska. Marine Mammals Management, USFWS, Anchorage, AK. 47pp.

Approved: Walter D. Stieglitz Date: 6/9/94
Regional Director

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I. INTRODUCTION

Sea otters (*Enhydra lutris*) are conspicuous members of ice-free but cold temperate and sub-arctic nearshore ecosystems of the North Pacific. The Marine Mammal Protection Act (MMPA) of 1972, as amended, transferred management authority for sea otters in Alaska from the State to the U.S. Fish and Wildlife Service (FWS). Since passage of the MMPA, the FWS's management approach has been conservative, allowing populations of sea otters to increase in number and re-occupy most of their historic range. In some regions, populations of sea otters have reached equilibrium densities.

The return of sea otters from near extinction, and the re-occupation of most of their historic range is one of the great wildlife conservation stories of the century. However, the species' recovery has not come without controversy. The conflict between sea otters and humans over shellfish resources is probably the most serious problem that has arisen. With healthy populations of sea otters firmly established in most of their historic range in coastal Alaska, now is an appropriate juncture to examine existing and potential management problems and resource conflicts, and consider potential solutions to those management problems and conflicts.

Preparation of this plan follows a recommendation from Congress in a report accompanying the 1988 amendments to the MMPA which calls upon the Secretary of the Interior to consider whether non-depleted species of marine mammals would benefit from preparation of conservation plans, as well as a 1989 recommendation from the Marine Mammal Commission that the FWS prepare a conservation plan for sea otters in Alaska. This plan is a vehicle for guiding ongoing conservation and management activities for sea otters in Alaska.

This plan was developed with the assistance and input of many individuals and groups. The planning process was initiated in 1991 with the establishment of a Planning Advisory Team. Members of the planning team included representatives from most organizations with a major interest in sea otters, including: Alaska Natives, conservationists, environmentalists, sport hunters, commercial fishermen, scientists, oil and gas industry, Alaska Department of Fish and Game (ADF&G), Minerals Management Service (MMS), and the Marine Mammal Commission (MMC). A Draft Management Plan was completed after input and review by the MMC, Alaska Native representatives and other members of the Planning Team and released for public comment on January 15, 1993, following a Federal Register Notice. The Draft Management Plan also incorporated proposed legislative amendments to the Marine Mammal Protection Act.

The public comment period on the draft sea otter management plan began on January 15, 1993, and ended on February 28, 1993. Comments continued to be received and evaluated until mid-March. Public meetings during the comment period were held in Anchorage, Cordova, Homer, Hoonah, Kodiak, Larsen Bay, Nanwalek, Seward, and Valdez. Public meetings also were held prior to the formal comment period in various Southeast Alaska

towns and villages, including: Angoon, Hoonah, Hydaburg, Juneau, Kake, Ketchikan, Sitka, and Yakutat. A draft final plan was published in April 1993. Additional comments were received on that plan and have been considered in the preparation of this document.

During the comment period or after the comment period had closed, 195 written comments were received. These comments were from a variety of sources, including: five organizations representing Alaska Natives, four Federal or State government offices, two tourism/marine recreation organizations, four conservation/environmental organizations, and numerous individuals. Seventy-six of the responses were the tear-off portions of the Executive Summary. Ninety-one of the responses were duplicated letters originally signed by citizens of Kodiak Island. In addition to comments on the plan, three resolutions from Alaska Native organizations were received. With the exceptions of written responses from three conservation organizations and three individuals, all written responses were from Alaska. Appendix B contains a summary of the public comments.

The Sea Otter Conservation Plan is divided into two parts: 1) a conservation plan, prepared with the assistance of the Marine Mammal Commission; and 2) an implementation plan which details how the FWS will implement the conservation plan. This plan is not intended as a primary reference on sea otter natural history and ecology. For more information on these subjects, readers are referred to other sources, including: Kenyon (1969), Estes (1980), VanBlaricom and Estes (1988), Rotterman and Simon-Jackson (1988), Garshelis (1990) and Riedman and Estes (1990).

II. GOALS AND OBJECTIVES OF THE CONSERVATION PLAN

In order to fulfill the requirements of the MMPA and continue to ensure the conservation of sea otters in Alaska, several specific goals and objectives were identified to guide the development and implementation of this plan. Additionally, the April 30, 1994 amendments to the MMPA allow for co-management of subsistence use by Alaska Natives and the FWS which will require participation by both organizations to implement the goals and objectives of this plan. Section V. of this document provides additional detail on each of the objectives presented here.

Goal A. Maintain the Alaska sea otter population within its optimum sustainable population range

In the MMPA, Congress found that marine mammal species and population stocks should not be permitted to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part, and should not be permitted to diminish below their optimum sustainable population (OSP) level. The term OSP is defined in the MMPA as "...the number of animals which will result in the maximum productivity of the

population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element." This statutory definition has been interpreted by both the FWS and the National Marine Fisheries Service (NMFS) for application in the management context as follows: "Optimum sustainable population is a population size which falls within a range from the population level of a given species or stock which is the largest supportable within the ecosystem to the population level that results in maximum net productivity. Maximum net productivity is the greatest net annual increment in population numbers or biomass resulting from additions to the population due to reproduction and/or growth less losses due to natural mortality" (50 CFR 216.3). Although the OSP range has not been numerically defined for sea otters in Alaska, the stock is believed to be within that range.

Three specific objectives have been identified to meet this goal:

- Objective 1: Identify the optimal sustainable population range of sea otters including those factors which may influence how such a range is defined;
- Objective 2: Monitor size, status, and trends of sea otter populations and collect life history data for use in population models and for establishing removal guidelines; and
- Objective 3: Establish cooperative working relationships with Alaska Natives to provide support in their conservation and management efforts related to Native sea otter harvest and use.

Goal B. Maintain Healthy Habitats for Sea Otters

Most sea otter habitats in Alaska are under the jurisdiction of the State. In general, sea otter habitats are relatively healthy in Alaska, although on a local basis threats to habitats may exist.

One specific objective has been identified to meet this goal:

- Objective 4: Characterize sea otter habitat and monitor habitat status and trends.

Goal C. Allow for a Variety of Human Uses

Use of sea otters by Alaska Natives as authorized by the MMPA: The MMPA permits Alaska Natives to harvest sea otters for subsistence purposes or for the purposes of creating authentic Native articles of handicrafts and clothing, provided this is accomplished in a non-wasteful manner.

Scientific research and public display: The MMPA authorizes permits to be issued to allow the capture of sea otters for scientific research and public display.

Incidental take in commercial fisheries: The MMPA allows the take of sea otters incidental to commercial fishing operations. One of the goals of the MMPA is to reduce this incidental take to insignificant levels.

Incidental take due to other human activities: A number of human activities may pose threats to the otter population and its habitat in Alaska, e.g., the development of oil and gas resources, and logging.

Competition for shellfish resources: Following extirpation of sea otters from Alaska waters, the abundance of shellfish and other species eaten by sea otters presumably increased. Commercial, recreational, and subsistence shellfish fisheries subsequently developed in parts of Alaska in the absence of sea otters. Recolonization of such areas is resulting in sea otters and commercial/subsistence/recreational users competing for the same shellfish.

Viewing, photography, and public enjoyment: Tourism is a growing industry in Alaska. Many tourists and Alaskan residents enjoy viewing and photographing sea otters as part of their marine recreational activities. There also exists in the United States a large constituency that has never seen and may never see a sea otter, yet cares deeply that sea otter populations and their habitats are healthy and vital.

Two specific objectives have been identified to meet this goal:

Objective 5: Identify, avoid and minimize human threats to the sea otter population and habitat, and resolve conflicts; and

Objective 6: Establish cooperative programs to further the conservation and management of sea otters in Alaska.

III. BACKGROUND

The genus *Enhydra* consists of only one species, the sea otter, *Enhydra lutris*. It is one of the smallest marine mammals in the world. Three subspecies have been proposed (Wilson et al. 1991), only one of which, *E. l. kenyoni*, occurs in Alaskan waters. The FWS currently recognizes one population stock (as defined in the MMPA) of sea otters in Alaska, although there may be subpopulations which are geographically, and possibly reproductively, isolated.

A. Distribution and Abundance

Historically, sea otters occurred in nearshore waters around the North Pacific rim from Hokkaido, Japan, through the Kuril Islands, Kamchatka Peninsula, the Commander Islands, the Aleutians, peninsular and south coastal Alaska, and southward to Baja California (Kenyon 1969; Wilson et al. 1991). Sea otters were commonly harvested by coastal Alaska Natives.

Examination of archeological evidence indicates that periodic local reductions of sea otters likely occurred (Simenstad et al. 1978). However, the species was abundant throughout its range before the onset of commercial exploitation. The worldwide population of sea otters in the early 1700s has been estimated at 150,000 (Kenyon 1969) to 300,000 (Johnson 1982).

Extensive commercial hunting of sea otters began following the arrival in Alaska of Russian explorers in 1741. Continued exploitation during the 18th and 19th centuries reduced the species throughout its range, completely eliminating them in some areas. Although the number of animals killed is not well documented, Kenyon (1969) estimated that from 500,000 to 1 million sea otters were taken from Alaska between 1740 and 1911.

By 1911, when sea otters were protected under the International Fur Seal Treaty, the species survived in only 13 small and widely scattered remnant groups (Kenyon 1969). These groups were in the Kuril Islands and along the Kamchatka Peninsula, the Commander and Aleutian islands, the Alaska Peninsula and northern Gulf of Alaska, the Queen Charlotte Islands in British Columbia, the Point Sur area in California, and Islas San Benito in Mexico (Figure 1). Total abundance at that time may have been as few as 1,000 to 2,000 animals (Johnson 1982).

By 1929, the two remnant groups in Canada and Mexico had become extinct. The remaining 11 survived and, during the past 80 years, animals from these groups have recolonized a substantial part of their previous range in Russia, the Aleutian Islands, the Alaska Peninsula, the Kodiak Archipelago, Prince William Sound, and California. At present, sea otters have repopulated most of their former range in Alaska although they have not yet reached equilibrium densities in some areas.

In 1965 the Alaska Department of Fish and Game (ADF&G) initiated efforts to reintroduce sea otters into areas that otherwise might not have been recolonized for years or decades. From 1965 to 1972, 708 sea otters captured at Amchitka Island and in Prince William Sound were transplanted to unoccupied habitat in Alaska, British Columbia, Washington and Oregon. These efforts were successful in southeast Alaska, British Columbia and Washington. They failed in Oregon and may have failed in the Pribilof Islands (Jameson et al. 1982, Riedman and Estes 1990).

With passage of the MMPA in 1972, the authority of State governments to manage marine mammals was transferred to the Federal government. However, the MMPA included provisions by which States could petition for return of marine mammal management authority, subject to certain conditions. During the 1970s, the State of Alaska requested return of management authority for 10 species of marine mammals, including the sea otter. In considering the petition and the State's accompanying request for a waiver of the MMPA's moratorium on taking marine mammals, all affected species were subjected to an Administrative Law Judge review to determine whether the species were within their OSP range, as defined by the MMPA.

With regards to sea otters, the Administrative Law Judge found that sea otters in Alaska occur in a number of individual colonies which are all part of a single stock or population. The Administrative Law Judge further found that the Alaska sea otter stock, which was estimated at 100,000 to 140,000 animals, was, as a whole, within the range of OSP (Federal Register, 1979). However, other actions prevented approval of the State's request for management authority.

As noted above, sea otters have reoccupied most of their historic range in Alaska (Figure 1). Calkins and Schneider (1985) estimated a 1976 Alaska sea otter population of 100,000 to 150,000 animals. Based on the best available data, the FWS believes the current population size is within the range proposed by Calkins and Schneider. A new state-wide population estimate will be revised following analysis of data collected in recent years.

Abundance information by geographic area of Alaska has been compiled by the FWS (DeGange and Bodkin, in prep.) and is summarized below.

Near Islands: A minimum of 4,115 sea otters are present in the Near Islands, which were reoccupied in the mid-1960s. The subpopulation¹ at Attu Island, which has been surveyed periodically since the mid-1970s, has grown at about 17 percent annually. The subpopulation in the Near Islands is presumably below equilibrium density.

Rat Islands: A remnant colony of sea otters survived at Amchitka Island and possibly elsewhere in the Rat Islands. It is estimated that as many as 14,400 to 20,650 sea otters are present in the waters around the Rat Islands and that the numbers have reached equilibrium density (Estes 1990).

Andreanof Islands: Sea otters are now distributed throughout this island group and the subpopulation is probably at equilibrium density (Estes 1990). The latest available estimate of 5,805 animals dates from 1965 and may not be indicative of current numbers.

Islands of Four Mountains: Sea otters were first seen at this location in 1978 (A. Johnson, pers. comm.) In 1982, 69 sea otters were counted (Bailey and Trapp 1986). Although the Islands of Four Mountains contain limited habitat for sea otters, this subpopulation is believed to be growing.

Fox Islands: There is no evidence that a remnant colony survived in the Fox Islands, but by 1965 a subpopulation was well established. In 1986, 858 animals were counted near the

¹ As noted above, during review of the State of Alaska's petition for return of marine mammal management authority, it was concluded that the sea otters in Alaska constituted a single population. In this paper, the term "subpopulation" is used to denote components of the population in different geographic areas.

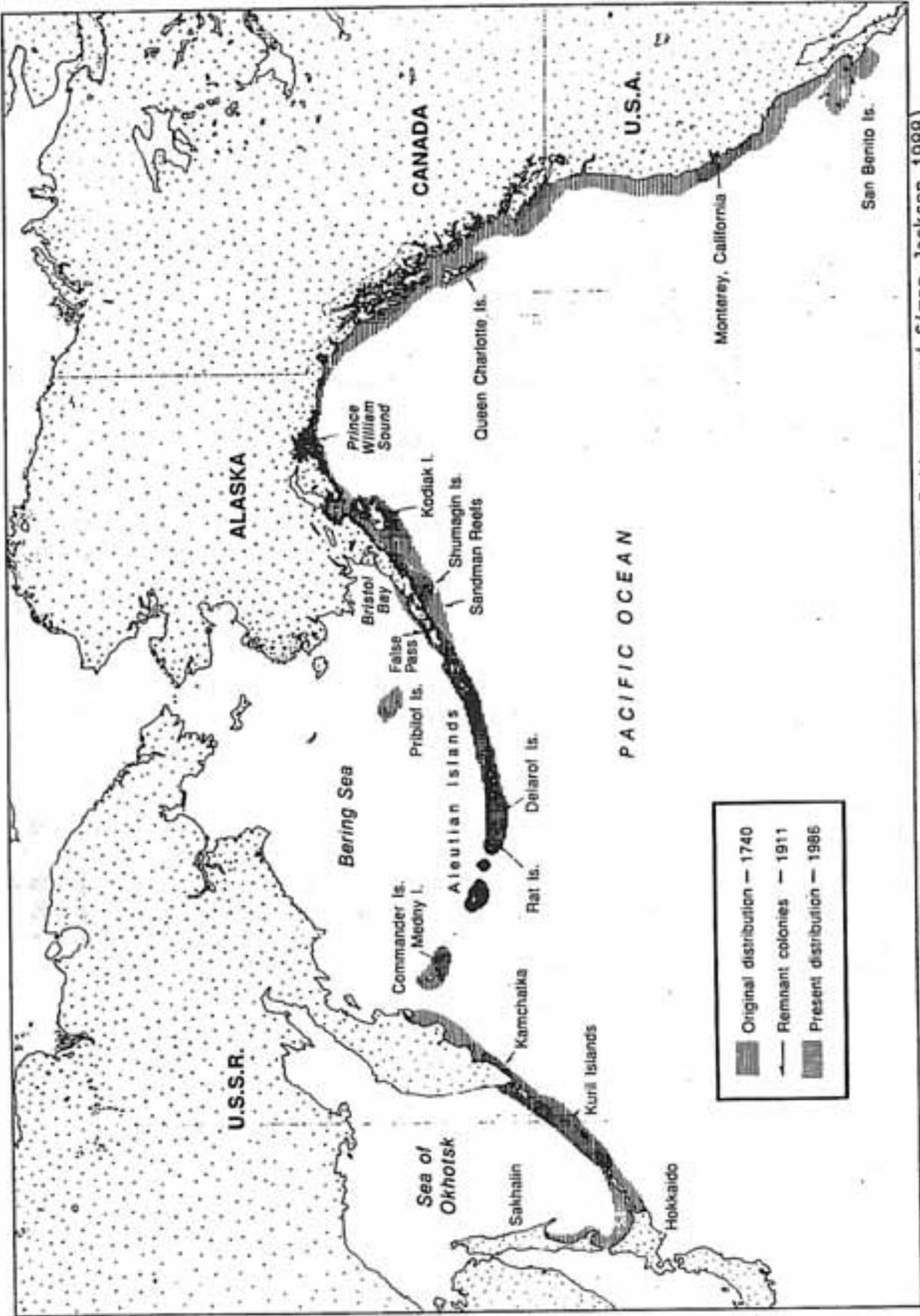


Figure 1. Past and present distribution of sea otters (adapted from Rotterman and Simon-Jackson 1988).

be below equilibrium density and still growing.

North Alaska Peninsula/Unimak Island: At least one remnant colony may have survived in this region near the eastern end of Unimak Island. Based on the most recent survey in 1986, this subpopulation is estimated at 13,091 animals (Brueggeman 1988); its status with respect to equilibrium density is unknown.

South Alaska Peninsula: At least two remnant colonies may have survived, one near Sanak Island and the Sandman Reefs and the other in the Shumagin Islands. The subpopulation is currently estimated at slightly more than 27,000 (FWS, unpubl. data). Its status with respect to equilibrium density is unknown.

Kodiak Archipelago: At least two remnant sea otter colonies may have survived in this area, one north of Shuyak Island and another at the southern end of Kodiak Island. The subpopulation continues to expand throughout the area and is currently estimated at 13,200 sea otters (FWS, unpubl. data).

Pribilof Islands: Commercial exploitation extirpated the Pribilof Islands' sea otter population and efforts to reintroduce the species in 1952 and 1972 may have failed according to Jameson et al. (1982). However, seven animals were observed in 1988, and local residents have reported seeing up to 30 animals. The current status of sea otters in the Pribilof Islands is unknown.

Kenai Peninsula: At present, sea otters are found continuously from Kachemak Bay and Anchor Point to the western entrance of Prince William Sound. In 1989, 2,300 sea otters were observed along the Kenai Peninsula (FWS, unpubl. data). It is not known whether numbers are increasing, decreasing, or stable.

Prince William Sound: A remnant colony survived in southwestern Prince William Sound and has been the source of animals that have recolonized the Sound and waters along the Kenai Peninsula. Sea otters were distributed throughout the Sound and abundance may have been as high as 10,000 prior to the *Exxon Valdez* oil spill in March 1989. An estimated 2,787 (500-5,000) sea otters may have been killed by the spill in Prince William Sound (Garrott et al. 1993). A 1991 boat survey suggests a population of 6,200 sea otters in Prince William Sound, exclusive of Orca Inlet (FWS, unpubl. data).

Northern Gulf of Alaska: A remnant colony of otters may have survived west of Kayak Island in Controller Bay. In the past decade, sea otters have also expanded out of Prince William Sound into Orca Inlet and the Copper River Flats. A population of sea otters is also established in Yakutat Bay. An estimated 2,830 animals inhabit the region. Numbers are probably below equilibrium density.

Southeast Alaska: Commercial harvesting eliminated sea otters from southeast Alaska. In the late 1960s, 412 animals were transplanted from Prince William Sound and the Aleutian

Islands to this area. There are now three distinct groups of sea otters in southeast Alaska. The regional subpopulation is currently estimated at more than 7,000 animals and is growing at a rate of approximately 20 percent a year. Large areas of unoccupied habitat and abundant food resources remain.

B. Natural History and Ecology

Although sea otters are among the smallest of marine mammals, they are the largest of the North American mustelids. Male sea otters in Alaska may exceed 100 lbs. Females are considerably smaller, rarely exceeding 70 lbs. Unlike most marine mammals, sea otters lack a well-developed blubber layer for insulation, relying instead on air trapped within a thick, luxuriant coat of fur. Their fur, together with a high metabolic rate, allows them to thrive in the cold subarctic waters of the North Pacific.

Sea otters are moderately long-lived, with female sea otters in Alaska living to be 15-20 years old and males 10-15 years. They are gregarious and tend to segregate by sex into male areas and female areas. However, reproductively mature males establish and defend territories within female-dominated areas. Groups of more than 1,000 sea otters have been observed in Alaska. Sea otters are polygamous, and males are capable of breeding with a number of females that visit their territories. Reproductive activity can occur throughout the year, although pupping is concentrated in late spring and early summer and breeding occurs primarily in the fall during or following the period of weaning.

Reproductive rates, mortality rates, life-span, and other vital rates for sea otters have been measured in both California and Alaska sea otter populations. In general, demographic variables vary with sex and age, and may be affected by density, habitat quality, especially food abundance, condition of the animals, weather, and other factors. Females usually breed for the first time between three and five years of age.

Female sea otters usually give birth to one pup. Twinning has been documented but is rare. Females usually reproduce annually, although survival of offspring to age one is highly variable, ranging from 30 to 75 percent, depending to a large extent on habitat quality and the severity of winter. Survival of prime age sea otters in Alaska is high; typically more than 85 percent of the population survive each year. Survival of dependent pups past their first few weeks of life also is high and may be related to the age and experience of their mothers. The months following independence are critical ones for young sea otters.

Sea otters feed primarily on sessile and slow-moving marine invertebrates such as abalone, clam, crab, mussel, and sea urchin. The eating of fish is locally common, and occurs most frequently in some rocky habitats at or near carrying capacity. The effects of sea otters on nearshore benthic communities are both direct and indirect. The best documented direct effect is the reduction in benthic invertebrate populations by sea otter predation. In places where prey species recruit infrequently, such as sea urchins and abalones in southeast Alaska, British Columbia and California, sea otters are capable of nearly eliminating some

prey populations or confining them to refugia such as deep water and crevices in rocky bottoms. In other areas such as the Aleutian Islands where sea urchins recruit frequently, the prey population may shift in size frequency and density with a concurrent substantial drop in biomass. Effects similar to those observed in the Aleutian Islands have been documented in soft sediment bottoms where intense predation by sea otters can significantly reduce the size, density, and biomass of clam populations.

The primary indirect effect of sea otter predation is habitat modification. In rocky substrates this modification occurs as the result of the elimination or reduction in grazing pressure from sea urchins with a subsequent release of kelp and other macroalgae. The kelp forests that result provide habitat for a host of other invertebrates and fish that were unable to exist in large numbers in urchin-dominated areas. The indirect effects of sea otter predation in soft-bottom habitats are more subtle and include disturbance of the sea floor and sea floor communities through pit excavation, and the deposition of clam shells that provide attachment substrate for various kelp species and other invertebrates.

C. Current Conservation Framework

The MMPA provides the general framework for the conservation of sea otters. The MMPA calls for a general moratorium on the taking (defined as to harass, hunt, capture, kill or attempt to harass, hunt, capture or kill) of any marine mammal with few exceptions, which include: 1) take for purposes of scientific research, public display, or to enhance the survival or recovery of a species or stock; 2) incidental take in the course of certain commercial fishing operations; 3) intentional take in the course of certain activities following a Secretarial waiver, provided the form of take is compatible with the MMPA; and 4) incidental take of marine mammals in specific activities other than commercial fishing. In all cases, the MMPA specifies that allowable forms of take must either have a negligible impact on the affected species or stock of marine mammal or must not disadvantage the affected species or stock. The moratorium on the taking of marine mammals does not apply to Native Alaska Indians, Aleuts, or Eskimos who reside in Alaska and dwell on the coast of the North Pacific Ocean or Arctic Ocean provided such taking is for subsistence purposes, or is done for purposes of creating authentic native articles of handicrafts and clothing, provided this is not accomplished in a wasteful manner. The MMPA also provides a mechanism for the return of marine mammal management to individual states. With respect to sea otters, the MMPA is implemented through FWS rules and regulations published in the Code of Federal Regulations.

In 1988, the FWS promulgated regulations to establish a marking, tagging, and reporting program as authorized under Section 109(i) of the MMPA. The action was designed to assist the FWS in monitoring the subsistence and handicraft harvests of sea otters, polar bears, and walrus, and in obtaining essential biological data needed to manage these species or stocks. Under the rule, Native sea otter hunters have 30 days from the date of a kill to present the hide and skull to a FWS tagging representative for marking and tagging. Tagging

representatives, often village residents, have been hired in nearly every village or town from which sea otters, polar bears, or walrus are harvested in Alaska.

Besides the marking and tagging program, there are a number of other activities in which the FWS is involved. Conducting surveys is an integral part of the management program. To date, most surveys have been conducted in areas where there are management conflicts, but they have not generally been conducted using methods that ensure repeatability and comparison with future efforts. Research is underway to develop a survey technique for monitoring population trends of sea otters in Alaska.

The FWS has worked cooperatively with the National Marine Fisheries Service (NMFS) to implement the 1988 amendments to the MMPA, which provided a general authorization for the incidental take of sea otters in commercial fishing operations. Logbooks were submitted by commercial fishermen indicating the date and location of all fishing activity and the species and number of sea otters taken. Observers were also placed in certain fisheries in Alaska to monitor incidental takes of sea otters and other marine mammals. The FWS will again work cooperatively with NMFS to implement the 1994 amendments to the MMPA.

The FWS is also responsible for issuing permits that authorize the taking or importation of sea otters for purposes of scientific research, public display, or enhancing the survival or recovery of a stock. The FWS may also issue regulations, for a period not to exceed five years, that authorize the incidental, but not intentional, taking of small numbers of sea otters in specific activities. Other management-related activities that the FWS is involved with include enforcement of laws and regulations, education, coordination with other State and Federal organizations over issues that affect sea otters, and oil spill contingency planning.

Alaska Natives remain vitally concerned about sea otters, reflecting their long history of co-existence. The exemption to the moratorium on taking afforded to Alaska Natives in the MMPA maintains their unique and long-standing role as stewards of marine mammal resources in Alaska. In 1988 the Alaska Sea Otter Commission (ASOC) was formed by Alaska Natives, in part, as a demonstration of their continued concern for ensuring healthy populations of sea otters and continued traditional use. The ASOC is composed of coastal Alaska Native communities from each of six coastal Native regions in Alaska: SeaAlaska, Chugach, Cook Inlet, Koniag, Bristol Bay, and Aleut. Each region is represented on the ASOC by one commissioner. The ASOC is currently developing regional sea otter management plans. These plans are based on local needs and knowledge about sea otters and reflect concepts of self-regulation. The FWS plans to assist the ASOC in these efforts. The FWS, ASOC, and the ADF&G have entered into a Memorandum of Agreement that defines how the organizations will cooperate on management activities.

IV. CONSERVATION ISSUES

The sea otter population in Alaska has made a dramatic recovery since it was protected in 1911. However, management conflicts have arisen, and there are a number of activities that potentially could threaten one or more local populations and perhaps impede maintenance of the total population within its optimum sustainable size range. The principal threats, management conflicts, and conservation issues are: incidental take in commercial fisheries; competition with shellfish fisheries for the same prey resources; displacement from prime habitat by mariculture operations; oil and gas exploration, development and transportation; Native hunting; possible commercial and recreational hunting; and take for scientific research and public display.

A. Incidental Take in Commercial Fisheries

Sea otters are taken incidentally in salmon gillnet fisheries and other fisheries in several areas of Alaska, including Prince William Sound, the Kodiak Archipelago, the Alaska Peninsula, and the Aleutian Islands. Under the 1988 amendments to the MMPA, commercial fishermen were given a five-year exemption from the MMPA's General Permit and "small take" provisions which governed the taking of marine mammals incidental to fishing operations. The National Marine Fisheries Service (NMFS) was given responsibility for developing and implementing the interim exemption program, as well as for recommending a permanent regime to be implemented when the exemption ends in 1993. Under the interim exemption program, fishing vessel owners are required to maintain a log book detailing the taking of all marine mammals by species and number. In addition, the NMFS is required to place observers on a subset of vessels engaged in fisheries that take marine mammals frequently. The log book and observer reports should provide information necessary to determine the nature and extent of the problem.

Observations of dead sea otters on the Copper River Flats in the mid-1980s raised concerns about losses of sea otters in salmon gillnets. Although sample sizes were small, data from the observer programs in the Prince William Sound and Copper River Flats drift and set gillnet fisheries in 1990 and 1991, and the South Unimak Pass drift gillnet fishery in 1990 and 1991, suggest that incidental mortality of sea otters in these fisheries is low (Wynne 1990; Wynne et al. 1991, 1992). The extent of sea otter mortality associated with other gear types is unknown.

B. Competition for Shellfish Resources

Following the extirpation of sea otters from much of their range, populations of their prey species, such as sea urchins, clams, mussels, chitons, abalone, and crabs, presumably increased. In some areas, these shellfish became the basis for significant commercial, recreational or subsistence fisheries. With the recolonization of much of the species' historic range, sea otters are competing with these fisheries for the same resources.

Sea otters were implicated in the demise of the recreational and commercial Dungeness crab fisheries in Orca Inlet and eastern Prince William Sound (Kimker 1985; Garshelis et al. 1986). In addition, Alaska Natives and others residing in coastal villages from Atka Island in the Aleutian Island chain eastward through southeast Alaska have expressed concern over the impact of sea otter predation on abalone, clam, crab, gumboot chiton, and sea urchin resources used for subsistence.

Existing or potential conflicts between human commercial and recreational fisheries and sea otters also exist in Lower Cook Inlet over razor and hardshell clams, and Dungeness crabs, at Kodiak Island for Dungeness crabs and sea urchins; and in southeast Alaska for abalone, Dungeness crabs, sea urchins, and perhaps geoduck clams. King and tanner crabs also are fished in most of these areas, and although the interaction between these species and sea otters is poorly known, there is concern that stocks of these species could also be negatively affected by sea otter predation.

C. Mariculture

A new industry to grow clams, mussels, oysters and scallops is developing in southeast and south-central Alaska. Such operations could lead to displacement of sea otters from protected coastal waters and may lead to increased mortality through entanglement (Monson and DeGange 1988). Also, depredation of shellfish in unprotected mariculture facilities by sea otters could lead to efforts by the facilities' operators to exclude sea otters by harassment or lethal means. Little information is available on the interaction between mariculture operations and sea otters.

The U.S. Army Corps of Engineers issued a general permit for constructing mariculture facilities in navigable waters in 1991, which eliminated the mechanism through which Federal agencies, such as the FWS, comment on specific proposed operations. Permitting of new mariculture operations is now done entirely by the State of Alaska.

D. Oil and Gas Exploration, Development and Transportation

Activities and oil spills associated with offshore oil and gas exploration, development and transportation have the potential for adversely impacting sea otters and their habitat in Alaska. Because sea otters rely on air trapped in their fur for warmth and buoyancy, they are the marine mammals most likely to be affected adversely by oil spills (Costa and Kooyman 1982; Geraci and St. Aubin 1990). The *Exxon Valdez* oil spill in March 1989 illustrates the impact that oil spills can have on sea otters. It is estimated that approximately 4,028 (range 2,028 to 11,280) sea otters died in Alaska as a result of the spill. In addition, continuing studies suggest that otters still are being affected by oil in their environment in western Prince William Sound.

E. Use by Alaska Natives

Alaska Natives currently may take sea otters for subsistence use or for creating and selling authentic Native articles of handicrafts and clothing, provided that the taking is not wasteful. There is no evidence that the harvest by Alaska Natives has affected populations of sea otters or limited the distribution or productivity of sea otters in Alaska. However, if over harvest occurs, reductions of some local populations in Alaska could occur.

Hunting of sea otters, including hunting by Alaska Natives, was prohibited by the 1911 Fur Seal Treaty and later by Alaska State law. Since 1911, relatively few sea otters are known to have been killed in Alaska, including 62 between 1912-1936, and 2,556 killed by the ADF&G during an experimental harvest in the late 1960s and early 1970s.

In 1972, the MMPA exempted Alaska Natives from the prohibition on taking and, in the early 1980s, some Alaska Natives resumed hunting sea otters and used their fur to create handicrafts, which they then sold. Between 1982 and 1986, a minimum of 1,049 sea otters were reported legally killed by Alaskan Natives (Rotterman and Simon-Jackson 1988). From late October 1988 through the end of calendar year 1992, the number of sea otters reported killed by Alaskan Natives each year were: 1988 - 55; 1989 - 268; 1990 - 166; 1991 - 236, 1992 - 637 and 1993 - 1229 (FWS, unpubl. data). The 1994 sea otter harvest as of May 5, 1994 was 286 (FWS, unpubl. data).

F. Commercial and Recreational Hunting

Many Alaskans, particularly those living in isolated coastal areas, view sea otters and other wildlife as renewable resources with considerable economic as well as subsistence value (Johnson 1982). As sea otters increase in numbers and expand their range, and as interactions with fisheries continue to increase, it is possible that individuals or organizations will seek authorization to hunt sea otters for commercial and/or recreational purposes. Such take would require a waiver of the moratorium on taking established by the MMPA. The FWS does not at this time intend to seek a waiver of, or amend the MMPA, to allow non-Native Alaskans to harvest sea otters for commercial or recreational purposes.

G. Public Display and Scientific Research

Between 1976 and 1988, nearly 100 sea otters were taken from Alaskan waters, primarily from Prince William Sound, for public display in aquaria (Rotterman and Simon-Jackson 1988). Hundreds more have been captured, handled, tagged and released as part of research projects. There have been no observed effects on sea otter populations from either of these activities.

H. Other Potential Issues

Logging and log transfer facilities are proposed for some protected bays along the Alaska coast inhabited by sea otters. If bark and debris are not removed from waters around these facilities, benthic food resources for sea otters in localized areas could be impacted. Disturbance from such activities could also cause sea otters to avoid or abandon areas that otherwise would be prime habitat.

Contamination of sea otter habitat also could result from seafood processing activities (both land-based and floating) and associated dumping of shells, bones and other organic wastes. Other development activities in the coastal zone, especially those that create disturbances in nearshore waters or release effluent, could have negative effects on sea otters.

V. CONSERVATION PLAN

This section includes 5 broad objectives that will contribute towards achievement of the overall goals of the conservation plan. Under each objective, a series of tasks are identified which may be required to meet these goals and those of the MMPA towards resolution of the aforementioned conservation issues. Lead and cooperating organizations, duration, priority and estimated cost are identified for each task in the implementation plan.

Objective 1: Identify the optimal sustainable population range of sea otters including those factors which may influence how such a range is defined

Sea otters have recolonized much, but not all, of their known former range in Alaska. Current abundance is estimated to be more than 100,000 animals. The Alaska sea otter population was determined in 1977 to be within its OSP range. It is the FWS's goal to maintain the sea otter stock in Alaska within its OSP range.

11. Complete the ongoing state-wide population survey to provide up-to-date information on present distribution and abundance

The best available information concerning sea otter distribution and abundance in parts of their Alaska range is from surveys done more than 20 years ago. The FWS has initiated a state-wide survey to obtain more up-to-date information on distribution and relative densities in these areas. This survey will provide an abundance estimate and more up-to-date information on present distribution and relative densities of sea otters. Distribution and abundance information is necessary to (a) reaffirm that the Alaska sea otter population is presently within its optimum sustainable range, (b) better determine the nature and rate of recolonization within different geographic areas and with different habitat characteristics, and

(c) identify areas where sea otters (i) are important to the Alaska tourism and recreation industry, (ii) are impacting, or are likely to impact, subsistence, recreational, or commercial shellfish fisheries, and (iii) are being impacted by Native hunting, incidental take in commercial fisheries, offshore oil and gas development, logging, coastal development, etc.

12. Review taxonomic and genetic data on sea otters in Alaska, and if necessary, redefine population stocks

Currently the FWS recognizes one population stock of sea otters in Alaska. However, two genetic studies on Alaskan sea otters were recently completed. Because the results of these studies may influence how sea otters are managed in Alaska, it is important that they be evaluated.

13. Define the OSP range for the sea otter stock(s) in Alaska

Although the sea otter population in Alaska is believed to be within its OSP range, that range has never been numerically defined. Sufficient population data may exist from parts of the sea otter's range in Alaska to estimate the population of sea otters at carrying capacity. The maximum net productivity level will be more difficult to define but it will be necessary to estimate that value given the mandate in the MMPA to manage above that level.

14. Using available data, define regional conservation units for sea otters in Alaska

Given the size of the range of sea otters in Alaska, and the local differences in the kind and intensity of management conflicts, it is likely that management of sea otters will be regionally based. The State of Alaska, during the Administrative Law Judge hearings for return of management in the 1970s, proposed that the sea otter range in Alaska be divided into 15 management units. The ASOC has divided their management efforts into six different coastal native regions. Those management units defined by the State of Alaska and the ASOC should be considered in the definition of regional conservation units for sea otters.

15. Establish target population levels for regional conservation units and estimate the maximum number of animals that could be removed from those units while maintaining target levels

Under an exemption to the MMPA, Alaska Natives are allowed to harvest sea otters for subsistence and handicraft purposes, without limit, provided the take is not wasteful and the stock remains above the lower bound of OSP. In addition, sea otters are taken incidentally in commercial fishing gear, for public display, and in research operations. One way to ensure that the stock remains within its OSP range is to cooperatively limit removals of sea

otters on a regional basis, with the Alaska Native subsistence harvest receiving priority over other forms of take. Once conservation units and management goals for those units are defined, guidelines for harvest and other forms of take should be established using the best scientific information available.

Objective 2: Monitor size, status, and trends of sea otter population(s) and collect life history data for use in population models and for establishing removal guidelines

Long-term monitoring of sea otter population size or trends in population size will be required to ensure that human activities do not directly or indirectly cause the stock to be reduced below the lower limit of its OSP range. The monitoring program requirements will depend, in part, upon the threats and the level at which the population is maintained. For example, accurate, range-wide monitoring will be required if there are substantial threats or the population is maintained at or near its maximum net productivity level. Occasional or periodic monitoring of selected index areas might be sufficient if the threats are relatively benign and the population is maintained at or near its carrying capacity level. Collection of life history and composition data will be important for constructing population models and for establishing removal guidelines that can be used for managing the take of sea otters.

21. Develop standard methods for estimating population size and/or trends

With few exceptions, available information on size of the sea otter population is insufficient to serve as a baseline for detecting and judging the significance of any future changes in population size. Accurate baselines and precise monitoring programs will be required if there are significant threats or if the population is being held near its maximum net productivity level. Therefore, studies should be designed and conducted to identify the survey procedures and effort that will be required to obtain reliable baselines and to detect changes in population size and trends with enough precision to detect small-scale changes.

22. Develop and implement a program to monitor sea otter population size or trends

Once a survey technique for sea otters is developed, a program must be implemented to monitor population size or population trend. That program would best be concentrated in those regional conservation units where conflicts with sea otters are most prevalent and where a management program may be applied, and in those areas where the Native harvest is most intense.

23. Monitor the health, status, condition, and life history variables of sea otter populations

More detailed information on health, condition, and life history variables of sea otters would be useful for assessing potential impacts to sea otter populations from various environmental and ecological perturbations such as oil spills and other contaminants, development, commercial fishing, disturbance, and harvest. The FWS recommends the following tasks (231 - 236).

231. Develop a biological sampling program for sea otters harvested by Alaskan Natives

Animals harvested by Alaska Natives can provide a valuable source of information on the general health or condition of individual animals, and the vital parameters (e.g., age composition, age at first reproduction, ovulation and parturition rates, diet) of sea otters in the areas where they are hunted. Such information is essential to effective monitoring of population status. Thus, biological sampling of sea otters taken by Alaska Natives for subsistence and handicraft purposes should be initiated as soon as possible.

232. Develop indirect indices of sea otter population status, health, and condition

Once a biological sampling program is established, material will be available for developing indices of health, condition, and population status. Besides serving as baselines in the event of environmental and ecological perturbations, these indices, especially those dealing with population status, could be used as criteria for deciding when and where to harvest sea otters and the level of that harvest.

233. Estimate life history variables for sea otters in Alaska

In addition to providing baseline information for assessing the effects of environmental and ecological perturbations or changes, life history data can be used in population modelling and ultimately in establishing guidelines to govern harvest and other forms of take. A number of studies designed to investigate sea otter life history attributes have been undertaken in Alaska and California. Most of these studies have been conducted in areas with increasing sea otter populations. A study was recently initiated at Amchitka Island to examine the population ecology of sea otters at a location presumably at carrying capacity. Life history data from previous studies should be compiled and evaluated for use in population models. Recommendations for additional studies also should be made.

234. Develop baseline information on contaminant levels of sea otters from various coastal regions in Alaska

With the exception of hydrocarbon data from the Natural Resources Damage Assessment for the *Exxon Valdez* oil spill, little is known of contaminant levels for sea otters in Alaska. Preliminary data from the Aleutian Islands suggest that DDT/DDE ratios were unexpectedly high. Additional data on existing levels of contaminants in sea otter tissues from various regions in Alaska would be useful for assessing the affects of future environmental catastrophes, or as a baseline to assess the effects of future development in coastal Alaska. A regional program for assessing contamination levels in sea otters should be established.

235. Archive tissue samples in the Marine Mammal Tissue Bank administered by the National Marine Fisheries Service and other tissue banks, as appropriate

The Marine Mammal Tissue Bank is collecting and archiving tissues for future investigations of contaminants in marine mammals. Duplicate samples collected under Task 234 will be archived in the tissue bank. Tissue samples will also be made available to facilities such as the University of Alaska Museum which archive tissues for genetic analysis.

236. Cooperate with the Secretary of Commerce to prepare a comprehensive stock assessment for sea otters, as directed by the 1994 amendments to the MMPA

The 1994 amendments to the MMPA direct the Secretary of Commerce, in consultation with the appropriate regional scientific review group, to prepare stock assessments for each marine mammal stock which occurs in waters under the jurisdiction of the United States.

Objective 3: Establish cooperative working relationships with Alaska Natives to provide support in their conservation and management efforts related to Native sea otter harvest and use.

31. Develop a Memorandum of Agreement with the Alaska Sea Otter Commission and the Alaska Department of Fish and Game that defines cooperative responsibilities towards conservation and management of sea otters in Alaska

Successfully implementing a conservation and management program for sea otters will depend on cooperation among the FWS, Alaska Natives, and the Alaska Department of Fish and Game. Such cooperation would be facilitated by developing a formal agreement specifying how the groups will work together to achieve the desired ends. As noted above, Alaska Natives have established the Alaska Sea Otter Commission to (1) promote the

conservation and well-being of sea otter populations; (2) involve Alaska Natives in resource decisions affecting sea otters; (3) educate and inform the public on the traditional and contemporary relationship between the sea otter and Alaska Natives; and (4) work with regulatory agencies toward the common goal of enhancing and promoting healthy populations of sea otters. At the same time, the FWS has statutory responsibility for ensuring that Native taking is not wasteful and does not result in the population being reduced below the lower bound of its optimum sustainable population range. The ADF&G has responsibility for other fish and wildlife (e.g., shellfish resources) that may affect and be affected by sea otters. On February 1, 1994, the FWS, ASOC and ADF&G signed a MOA outlining common goals, objectives, roles and responsibilities.

311. Assist the Alaska Sea Otter Commission with the development of regional management plans

The Alaska Sea Otter Commission is currently developing draft regional management plans. The goal of the plans are to strive for a balance between maintaining a sustainable sea otter population and providing beneficial use opportunities for Alaska Natives. The Alaska Sea Otter Commission will have the major responsibility of ensuring harvest levels are consistent with maintaining the population within its OSP range. Because the FWS has no authority to limit harvest of sea otters by Alaska Natives until the species or stock is declared depleted, a regional management system will require a substantial level of cooperation between the FWS and Alaska Natives. The FWS could best contribute to such a program by providing survey and population composition data, and cooperating in population model development, harvest monitoring, and biological sampling. The FWS and the ASOC will cooperate in regional planning efforts to ensure the plans are consistent with sound principles of wildlife management and with the MMPA, and with FWS's statutory responsibilities under the MMPA.

312. Incorporate traditional knowledge of sea otters from Alaska Natives into management and conservation strategies

Alaska Natives, through knowledge passed down from generations in oral traditions or through extensive personal contact with the natural resources around them, often have important insights into natural history that are unavailable to western science. These forms of traditional knowledge could make a valuable contribution to any management or conservation program that is adopted for sea otters in Alaska.

313. Work with Alaska Natives to establish guidelines for the humane, efficient, and non-wasteful harvesting of sea otters

As Alaska Natives become increasingly interested in harvesting sea otters, occasionally sea otters may be wounded or killed and not retrieved by Native hunters. A representative subset of Native sea otter hunters should be interviewed to determine what proportion of the sea otters shot are not retrieved, and what factors are responsible for the loss. Using information from skilled hunters, guidelines should be developed and provided to hunters emphasizing efficient and non-wasteful harvesting methods, as well as preferred methods for caring for sea otter skins after harvest. In addition, the Service should work with Alaska Natives to develop sound harvest guidelines to ensure a sustainable harvest regime. Consideration should be given to the harvest ratios of (1) males to females and (2) sub-adult to adult animals based on local sea otter populations, geographic region, resource conflicts, and harvest intensity.

314. Strengthen the Marking, Tagging, and Reporting Program to document the number, age and sex composition of animals taken for subsistence and handicraft purposes

Accurate information on the number, age and sex of sea otters taken state-wide by Alaska Natives for subsistence and handicraft purposes is necessary to determine how the take affects the distribution, size, and productivity of the population. Thus, the marking/tagging program established by the FWS should be continued and, if necessary, expanded to provide accurate information on the numbers of sea otters taken annually, by location, age and sex. Compliance with the program should be evaluated.

315. Work with the Secretary of Commerce on the scientific research program related to the Bering Sea marine ecosystem on research related to subsistence uses of marine resources in that ecosystem

The MMPA amendments of April 30, 1994 state that the FWS should work with the Secretary of Commerce to undertake a scientific research program to monitor the health and stability of the Bering Sea marine ecosystem and shall include research on subsistence uses of marine resources in that ecosystem and ways to provide for the continued opportunity for such uses. The FWS will support this effort as it pertains to subsistence use of sea otters in the Bering Sea ecosystem. To the maximum extent practicable, this research program shall be conducted in Alaska and shall utilize, where appropriate, traditional local knowledge and may contract with a qualified Alaska Native organization to conduct such research.

Objective 4: Characterize sea otter habitat and monitor habitat status and trends

The availability and accessibility of information on sea otter habitat is important to ensure that effects of activities sharing that habitat can be considered. Many planning efforts require this information including oil spill contingency planning, permit reviews in coastal areas, mariculture design and development, and other development which occurs within or in close proximity to important sea otter habitat areas. Maintaining the optimum sustainable sea otter population in Alaska will require protection of habitats necessary to sustain sea otters throughout their life cycle.

In addition, the MMPA amendments of April 30, 1994 require the FWS work with the Secretary of Commerce to recommend a program of research to monitor the health and stability of the Bering Sea marine ecosystem which includes sea otters.

41. Review existing knowledge of sea otter habitat requirements and define habitat data needs

Characterizing, monitoring, and evaluating habitat are difficult and complex tasks. Equally difficult is defining such terms as critical, important, and essential with reference to sea otter habitat. This information will be needed in order to foster habitat conservation, and hence, maintenance of the northern sea otter population within its optimum sustainable population range. Defining habitat data needs is one task that could be undertaken by the proposed sea otter technical group (see Task 52).

42. Define sea otter habitat bathymetrically

Because sea otters are often seen over deep water, and have been caught in crab pots set as deep as 300 ft, recent sea otter surveys have attempted to sample shoreward of the 300 ft bathymetric line. In some regions of Alaska, this results in a huge survey area which is costly and difficult to survey. A study should be designed and conducted to better define sea otter habitat for use in defining population survey boundaries. The use of time-depth recorders may be considered in the study design.

43. Review and plot available sea otter distribution and habitat-use data to identify important breeding, feeding, rafting, and haul-out sites in areas likely to be impacted by development or otherwise at risk from human activities

This task is essential to determining (a) areas and habitat types (e.g., hard- and soft-bottom communities) of particular importance to the long-term health and stability of the Alaska sea otter population; (b) existing and foreseeable threats to important habitats and/or habitat components; and (c) measures that will be required to protect habitats essential to

maintaining the optimum sustainable sea otter population in Alaska. This task can be accomplished primarily in areas where long-term studies of sea otters have occurred by analysis of telemetry data. Relevant data will be incorporated into a geographic information system.

44. Monitor the status of sea otter prey populations and the effects of sea otter predation

Benthic prey populations are a major component of sea otter habitat. A number of studies have been initiated to examine the status of sea otter prey populations and to determine the effects of sea otter predation on those populations. However, a number of those studies are located in remote areas, often far removed from areas of existing or potential management conflicts. A program to monitor prey populations in areas where conflicts are occurring or are expected should be initiated.

45. Develop more effective liaisons with other State and Federal agencies, and with private organizations for tracking and influencing development and activities that might affect sea otters and sea otter habitat

Permits for development or to conduct commercial activities in coastal Alaska are issued by a variety of State and Federal agencies. Negative effects of development on natural resources can sometimes be prevented or mitigated. To do so, however, requires effective consultation and coordination among various agencies and organizations. Networks must be developed to foster this coordination to protect sea otters and sea otter habitat.

46. Work with the Secretary of Commerce to undertake a scientific research program to monitor the health and stability of the Bering Sea marine ecosystem

The MMPA amendments of April 30, 1994 state that the FWS should work with the Secretary of Commerce to undertake a scientific research program to monitor the health and stability of the Bering Sea marine ecosystem and to resolve uncertainties concerning the causes of population declines of marine mammals, sea birds, and other living resources of the Bering Sea ecosystem. The FWS will support this effort as it pertains to sea otters in the Bering Sea ecosystem. To the maximum extent practicable, this research program shall be conducted in Alaska and shall utilize, where appropriate, traditional local knowledge and may contract with a qualified Alaska Native organization to conduct such research.

Objective 5: Identify, avoid, and minimize human threats to sea otters and their habitat, and, if possible, resolve resource conflicts

A number of human activities may pose threats to the sea otter population and its habitat in Alaska. As management conflicts or threats to sea otters arise, innovative solutions may be required to minimize these conflicts and threats. Changes in fishing gear and fishing techniques or protective enclosures around mariculture facilities may be needed. These potential threats, and actions needed to assess and avoid, minimize, or mitigate them, are described below.

51. Monitor incidental and deliberate take during commercial fishing operations

Sea otters and other marine mammals are known to be taken incidentally in salmon and other gillnet fisheries in several areas of Alaska (e.g., southeast Alaska, Prince William Sound, lower Cook Inlet, Kodiak Island). In California, incidental take in coastal set net fisheries is thought to have effectively prevented population growth and range expansion from the mid-1970s through the early 1980s (Riedman and Estes 1990). The magnitude of the incidental and deliberate take in Alaska is not well documented. There is no evidence of decreased abundance in areas where fisheries occur, suggesting that the take may be biologically insignificant. Also, studies currently underway have not documented a deleterious effect on sea otter populations.

511. Review available data and, as necessary, continue existing reporting and observer programs

Observers have been placed in a subset of the gillnet fisheries known or thought to take sea otters in Alaska. The results of the observer program suggest that the incidental take of sea otters in drift and set net fisheries on the Copper River Flats and in Prince William Sound is biologically insignificant. Data from the logbook program on the incidental and deliberate take of sea otters in Alaska fisheries have not yet been evaluated fully. The available data should be compiled and reviewed to determine the nature and extent of the incidental take.

The 1994 amendments to the MMPA require that certain vessels register with NMFS in order to obtain an authorization to incidentally take sea otters. In addition, monitoring programs are required to be established in certain fisheries, as determined by the Secretary (of Commerce). The FWS will work in cooperation with NMFS to implement these amendments with respect to gathering information on the incidental take of sea otters and recommending a course of action that should be considered by regional take reduction teams if and when incidental take plans are prepared for sea otters.

512. If necessary, design and conduct a study to determine how to reduce incidental mortality and injury by modifying fishing gear and practices

One of the goals of the MMPA is to reduce the mortality and serious injury of marine mammals incidental to commercial fishing operations to insignificant levels. If after the above review (Task 511), incidental mortality is believed to be of concern it will be determined if there is a practical alternative to existing gear or practices.

513. Identify and implement education, regulatory, and enforcement programs necessary to ensure that incidental take is reduced to insignificant levels

The success of efforts to reduce or eliminate the accidental and deliberate take of sea otters in the course of commercial fishing operations will depend upon fishermen being aware of, and complying with, applicable statutes, regulations, and guidelines. Therefore, if Tasks 511 and 512 indicate that something should be done to reduce the incidental and deliberate taking of sea otters, education, regulatory, and enforcement programs should be developed and implemented.

52. Competition for shellfish resources

Following extirpation of sea otters, the abundance of shellfish and other species eaten by sea otters presumably increased. Commercial, recreational, and subsistence shellfish fisheries have developed in parts of Alaska in the absence of sea otters. Recolonization of such areas is resulting in sea otters and commercial/subsistence/recreational users competing for the same shellfish.

521. Compile available information on sea otter distribution and human use of shellfish resources in Alaska to determine areas where competition for shellfish resources is occurring, and is likely to occur in the future

Some form of management may be necessary or desirable to minimize sea otter predation on shellfish in areas where such predation might preclude commercial, subsistence, or recreational fisheries that have developed in the absence of otters. Available information on the demography and utilization of shellfish resources by sea otters and humans in Alaska must be compiled and compared to determine areas where competition is occurring and is likely to occur in the foreseeable future. Shellfish harvest data from the ADF&G and sea otter distribution and habitat-use data from FWS (Task 33) will be analyzed and overlaid in a geographical information system to assist with this task.

522. Determine whether the competition between humans and sea otters for shellfish is affecting humans adversely

Re-occupation of historic range by sea otters will provide an opportunity to assess the effects of sea otter predation on subsistence and commercial shellfish fisheries by examining pre-sea otter and post-sea otter harvest data collected by the Subsistence and Commercial Fisheries divisions of the ADF&G.

523. Initiate studies to determine the effects of sea otter predation on valuable species of shellfish in commercial, recreational, and subsistence fisheries

Sea otter populations will reduce densities of some shellfish prey species, e.g. sea urchins, to levels that cannot sustain commercial fisheries. For other species, e.g., Dungeness, king, and tanner crabs, the effects of sea otter predation are less clear. Studies should be initiated to evaluate the possible effects of sea otter predation on crabs and other valuable species of shellfish.

524. Identify and initiate such education, regulatory, and enforcement programs as necessary to protect sea otters

As sea otters re-occupy historic range and come into conflict with human users of shellfish, they occasionally are deliberately and maliciously killed. If sea otters are being affected adversely as a result of competition with commercial, recreational, or subsistence shellfish users, it may be necessary to develop education, regulatory, and/or enforcement programs to prevent or reduce the impacts.

53. Mariculture and fish farming

Efforts are underway in southeastern and south central Alaska to "farm" mussels, clams, and oysters. In addition, programs have been initiated in Prince William Sound and elsewhere to augment natural production of certain salmon stocks. Such programs may: exclude sea otters from certain areas through disturbance; introduce or expedite the spread of diseases that may kill or reduce the productivity of important sea otter prey species; or cause conflicts which will lead mariculture operators to seek exclusion of sea otters from areas where the conflicts occur.

531. Review, and if necessary, modify applicable Federal, State, and local licensing and permit processes, and monitoring programs to ensure that they include adequate provisions for identifying and avoiding possible adverse impacts on sea otters

Various Federal, State, and local agencies are responsible for licensing and ensuring that mariculture and hatchery programs comply with applicable Federal, State, and local statutes and regulations. It is not clear whether the responsibilities are well defined and being met. As a first step towards ensuring that the responsible agencies are aware of and are meeting their responsibilities, a review should be done to identify (1) all relevant statutes and regulations, (2) the agencies responsible for implementing and ensuring compliance with the statutes and regulations, and (3) any deficiencies in the statutes and agency efforts to implement them.

532. Determine effects on sea otters and, if necessary, recommend gear modifications to protect sea otters and shellfish

As mariculture operations become more abundant in coastal Alaska, conflicts with sea otters are developing. A study should be undertaken to determine the effects of those operations on sea otters, and to determine if sea otter predation is affecting the shellfish growers.

54. Oil and gas exploration, development, and transportation

Exploration, development and transportation of coastal and offshore oil and gas resources could affect sea otters and their habitat in Alaska in several ways. For example, noise and disturbance from ship and aircraft traffic, rig construction, drilling, etc. could cause sea otters to avoid or abandon otherwise ideal habitat. Also, as demonstrated by the grounding of the oil tanker T/V *Exxon Valdez* in Prince William Sound, oil spills can both kill sea otters and damage or destroy important sea otter habitat.

541. Complete Natural Resources Damage Assessment and close-out of studies, and continue sea otter restoration studies and mitigation following the Exxon Valdez oil spill

Studies were initiated in March 1989, as part of the *Exxon Valdez* damage assessment program, to determine how the oil spill and related clean-up operations affected sea otters and their habitat in Prince William Sound and adjacent areas affected by the spill. Preliminary results indicate that 4,028 (range 2,028 to 11,280) sea otters were killed by contact with the spilled oil and that additional otters were and are being affected by sub-lethal contact and/or food chain effects. The studies should be continued until both first-order and second-order effects are quantified.

542. Identify possible impacts of exploration, development, and transport activities on sea otters and their habitat early in the planning stages

Oil and gas exploration and development is ongoing or planned in several parts of the sea otter's range in Alaska (e.g., Cook Inlet, Shelikof Strait, the northeast Gulf of Alaska, and St. George Basin). The Minerals Management Service is responsible for assessing and ensuring that exploration, development, and related activities in Federal waters do not disadvantage sea otters or other components of potentially affected ecosystems. The Alaska Departments of Fish and Game, Environmental Conservation, and Natural Resources have similar responsibilities regarding development in State waters. These agencies, in consultation with FWS, have conducted or provided support for surveys and other studies necessary to determine where and how sea otters might be affected by proposed or existing activities. Additional studies may be necessary if other areas are proposed to be opened for oil and gas exploration and development.

543. Implement systematic surveys of sea otters in areas of oil and gas exploration, development and transportation

One of the major drawbacks in trying to estimate acute damage to sea otters following the *Exxon Valdez* oil spill was lack of recent survey data in Prince William Sound and along the Kenai Peninsula. Systematic surveys of sea otters must routinely be conducted in areas of intense oil and gas activity, such as Prince William Sound, in the event of future oil spills.

544. Develop and prepare to implement oil spill contingency plans

Many deficiencies in planning and preparedness were illustrated by the failure to effectively contain and prevent significant environmental damage from the *Exxon Valdez* oil spill. Steps have been taken to assess and correct the deficiencies. The FWS has initiated development of a detailed oil spill contingency plan for sea otters to guide response and clean-up activities. An additional plan is needed that addresses data needs and methods for conducting a natural resources damage assessment. These plans will incorporate information from the *Exxon Valdez* spill, state plans and other relevant information.

545. Develop and implement post-lease monitoring programs to verify that there are no unacceptable first- and second-order effects

If oil and gas exploration and development occur in a significant portion of the Alaska sea otter range, post-lease monitoring programs should be developed and instituted to verify the predicted first- and second-order effects. At a minimum, on-going studies of the demography and dynamics of sea otters and the characteristics of sea otter habitats in Prince

William Sound should be continued to provide baseline information and models for predicting possible effects in other areas.

55. Port construction, harbor development, logging, and other human activities

It is likely that tourism, logging, and other commercial enterprises in Alaska will continue to increase. If so, there likely will be a requirement for additional shipping, port development, etc. Such activities could have adverse impacts upon sea otters and their habitat.

551. Design and conduct a study to determine the effects of logging in coastal habitats on sea otters

Logging adjacent to sea otter habitat is widespread on Afognak Island in the Kodiak Archipelago, along the Kenai Peninsula, in southeast Alaska, and in portions of eastern Prince William Sound. Sea otters could potentially be affected by displacement from disturbance, and through habitat destruction by bark and tree waste deposition in foraging habitat. Proposed logging in eastern Prince William Sound could provide an ideal setting for conducting such a study.

552. Review, and if necessary, modify applicable assessment, licensing, regulatory, and monitoring programs to ensure that they provide adequate protection for sea otters and their habitat

A number of different Federal, State and local agencies are responsible for assessing, licensing, regulating, and monitoring activities that could affect sea otters and their habitat. A study should be done to identify and determine whether existing assessment, licensing, regulatory, and monitoring programs are adequate to identify and avoid potential problems. This task and Task 531 should be done cooperatively.

553. Quantify the level and importance of tourism in coastal towns and villages within the sea otters' range in order to reduce conflicts with other human activities

Tourism is an economic mainstay of many coastal communities in Alaska and sea otters are an important part of their viewing experience. Additional information on which communities have tourism industries and where tourists go to view sea otters will be important to reduce conflicts with other human activities that might affect sea otters.

56. Evaluate information on the location and severity of existing or potential conflicts between sea otters and humans and determine where it may be desirable to regulate sea otter distribution or abundance and/or human activities to maintain the Alaska sea otter population within its OSP range, and to maintain or protect other important resources

Available information indicates that the sea otter population in Alaska may be affected by a variety of human activities. Available information also suggests that sea otters may be important to the tourism industry in certain areas and that certain subsistence, recreational, and commercial shellfish fisheries may be impacted adversely if sea otters are allowed to fully recolonize all of their former Alaska range. Management of sea otter populations to protect shellfish might be easier and require affecting fewer animals if management options were implemented before sea otters recolonize selected areas. Likewise, human-related threats to sea otters and their habitat can be avoided or mitigated more easily if they are identified before they develop. Therefore, evaluation of existing or potential conflicts should be afforded high priority. A geographic information system (GIS) should be developed to help organize and evaluate the relevant data sets.

57. Considering the results of task 46, identify and evaluate the likely cost, humaneness, and effectiveness of alternative means for implementing a strategy to protect shellfish fisheries

If some form of management is necessary to protect shellfish fisheries, it must be decided (1) how the distribution and/or densities of sea otters can be regulated in a cost-effective and humane manner; (2) how Native hunting, incidental take in fisheries, and other forms of taking (e.g., live-captures and removals for public display) can be governed collectively to ensure that the sea otter population is not reduced below the lower level of its optimum sustainable range; (3) how fishery development, mariculture development, offshore mining, dredging, logging, etc. can be regulated to ensure that they do not directly or indirectly (e.g., through habitat alteration) cause the sea otter population to be reduced below its maximum net productivity level; and (4) how the population and its habitat can be cost effectively monitored to ensure that they are not affected adversely by human activities.

Sec. 104(b) of the MMPA would require that capture and relocation be considered to expedite recolonization of certain unoccupied areas, and to retard reoccupation of areas where sea otters would impact subsistence, recreational, or commercial shellfish fisheries. Capture and relocation has been used in California sea otter populations, however, it was costly and ineffective. Further, there is no known practical, safe, or predictably reversible way to regulate births through surgical sterilization or chemical contraception (Hofman 1985). Once most or all of the available habitat has been recolonized, lethal means presumably would have to be used. It also should be recognized that fewer animals likely would have to be taken and that it likely would be much easier to maintain the desired distribution and densities if the management program were initiated as or before sea otters

begin to recolonize an area, rather than after desired reduced density zones have been recolonized.

Perhaps the most effective way to determine how population distribution and densities can best be managed in different circumstances would be to design and carry out a series of pilot studies in a representative subset of areas proposed to be managed.

Takings of sea otters specifically to protect shellfish could only be achieved through a waiver to the moratorium on taking as provided for in Sec. 101 (a)(3)(A) of the MMPA. At this time, the Secretary of Interior is not considering waiving the moratorium to remove or restrict sea otters in order to protect shellfish, but individuals and organizations may formally request such a waiver.

Objective 6: Establish cooperative programs to further the conservation and management of sea otters in Alaska

Many individuals, government agencies, and private organizations have an interest in sea otters and their conservation and management.

61. Maintain open and continuous communication with Alaska Natives and sea otter interest groups

Many organizations have responsibilities relative to the conservation and protection of sea otters, and to activities that may affect or be affected by sea otters in Alaska including government agencies, Alaska Native organizations, industry, and public interest groups with particular interests in sea otters. The responsible organizations should be involved, and the affected interest groups should be consulted, in the process of determining sea otter conservation strategies and their implementation. The FWS, under the lead of the Sea Otter Program Biologist will ensure that open communication regarding sea otter management issues and public involvement continue with all interested parties.

62. Establish a sea otter technical group to assist with technical tasks associated with managing sea otters

If sea otters are to be managed effectively in Alaska, a variety of technical expertise will be needed. Much of this expertise is outside the FWS and the ASOC and can be made more accessible with establishment of a technical group similar to those that exist for polar bear and walrus. This group should meet as needed or on a scheduled basis.

63. Develop and implement an information and education program concerning sea otter conservation

The success of the sea otter conservation program will depend on ensuring that the public is aware of various conservation and management issues, and complies with applicable regulations, statutes, and guidelines. There is a specific need to develop materials with Alaska Natives for dissemination in villages along the coast. Therefore, a comprehensive education program should be designed and implemented as a matter of high priority. The program should be reviewed periodically (e.g., at 3-5 year intervals) to ensure that it is effectively meeting the program objectives.

631. Establish guidelines to ensure that viewing does not result in harassment of sea otters

As tourism continues to increase in coastal Alaska, sea otters could suffer chronic harassment as boat captains jockey to place tourists in close proximity. As a step to resolving a similar problem, the NMFS has published draft guidelines for viewing whales and pinnipeds. In the draft guidelines, recommendations on approach distances and a protocol governing how more than one vessel would interact around a group of marine mammals are provided. The FWS may also publish marine mammal viewing guidelines for species under its jurisdiction.

632. Recommend and publicize areas for sea otter viewing in Alaska

Tourism is a rapidly growing industry in Alaska. Many tourists include visits to coastal areas of Alaska as part of their travels and often desire to view marine wildlife, including sea otters. Pamphlets and other educational materials that identify good viewing areas and responsible viewing guidelines could be developed and distributed.

64. Continue consultation and coordination with Federal and State agencies responsible for conservation of sea otters and their habitat in California and Washington

The FWS and State agencies in California and Washington have responsibilities for assessing, monitoring, and conserving sea otters and their habitat in the coastal waters of California and Washington. Continued consultation and sharing of ideas with these agencies may contribute to determining how best to assess and monitor population and habitat status and trends and to conserve sea otters.

65. Continue and, as feasible, expand cooperative programs with Canada, Russia, Japan and Mexico

The United States and Russia exchange information and develop programs concerning sea otters and other marine mammals under the auspices of the U.S./Russia Environmental Agreement. Sea otter researchers from the United States exchange information with Canadian colleagues through informal channels. These efforts should be continued and expanded to include interested individuals in Japan and Mexico as feasible.

VI. IMPLEMENTATION SCHEDULE

This plan advocates a cooperative approach towards managing and conserving sea otters in Alaska. The following table provides specific information concerning tasks identified and discussed in the Conservation Plan. Where possible, duration of tasks, lead and participating agencies, and estimated costs of each task for the next five fiscal years are included. Cost estimates are provided for some tasks. Others will be provided when more information is available or when detailed budgets are prepared. Cost estimates are subject to change and do not reflect a commitment on the part of any agency or organization to fund these tasks. Cost estimates are also provided for work anticipated to be done in Fiscal Year 1994. However, actual funding levels are uncertain and subject to change. What is certain is that a sound conservation program for sea otters will be expensive.

Priorities were assigned using the following criteria:

- A1 -- task completion essential to determine the population's optimum sustainable size, or to avoid or resolve a potentially serious conservation problem
- A2 -- task completion necessary to obtain or maintain the population's optimum sustainable size
- A3 -- task completion possibly desirable, but not currently essential or necessary, to determine or to achieve and maintain the OSP
- B1 -- task must be completed before other high priority tasks can be initiated or completed
- B2 -- task cannot be undertaken before another task is done
- B3 -- task not time or event dependent

Organizations listed in the following tables by abbreviation are as follows:

ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ASOC	Alaska Sea Otter Commission
AWRTA	Alaska Wilderness Recreation and Tourism Association
FWS	Fish and Wildlife Service
NBS	National Biological Survey
MLML	Moss Landing Marine Laboratory
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
NMFS	National Marine Fisheries Service
NPS	National Park Service
UAF	University of Alaska
UCSC	University of California at Santa Cruz
UM	University of Minnesota
USFS	U.S. Forest Service

Other abbreviations that appear in the table are:

Indef.	indefinitely
"K"	carrying capacity
nd	not determined
NRDA	Natural Resources Damage Assessment
TDR	Time-Depth Recorder
y	year

Table 1. Sea Otter Conservation Plan Implementation Schedule

SEA OTTER MANAGEMENT PLAN IMPLEMENTATION SCHEDULE		TASK				AGENCY		Estimated Fiscal Year Costs (thousands of \$)					Comments	
		#	Priority	Duration	Lead	Coop	Year 1 (FY94)	Year 2	Year 3	Year 4	Year 5			
IDENTIFY OSP RANGE OF SEA OTTERS		1												
Complete state-wide estimate		11	A1 B1	.5y	FMS		3-FMS	5						
Review population stock		12	A1 B1	.5y	FMS	NBS	5-NBS 5-FMS							
Define OSP range		13	A1 B1	1.5y	FMS	ADFG NBS		15	5					Involve technical group
Define regional conservation units		14	A2 B1	.5y	FMS ASOC	ADFG								use ADFG proposal
Estimate take levels for management units		15	A2 B2	ongoing	FMS ASOC	ADFG		nd	nd	nd	nd			
MONITOR SIZE, STATUS, AND TRENDS OF SEA OTTER POPULATIONS AND COLLECT LIFE HISTORY DATA		2												
Develop standard survey methods		21	A1 B1	1.5y	FMS NBS		120-NBS & EVOS	90	90					oil spill restoration funds in FY93
Develop and implement population monitoring program		22	A1 B1	5y	FMS	ADFG ASOC	90-FMS	50	50	50	50			southeast survey - FY94
Monitor biological variables		23												
Develop biological sampling program		231	A2 B1	ongoing	FMS ASOC	NBS ADFG NMFS	10-NBS 15-FMS	30	30	10	10			
Develop indices of population status		232	A3 B3	nd	FMS NBS	ASOC		30	30	10	10			
Estimate life history variables		233	A2 B2	ongoing	FMS NBS UM		40-NBS 150-NSF	200	200	200	200			need data from pop. at age ⁿ

SEA OTTER MANAGEMENT PLAN IMPLEMENTATION SCHEDULE	TASK						AGENCY					Estimated Fiscal Year Costs (thousands of \$)					
	#	Priority	Duration	Lead	Coop	Year 1 (FY94)	Year 2	Year 3	Year 4	Year 5	Comments						
Brief Description of Task																	
Develop baseline on contaminants	234	A3 B3	3y	FWS	UCSC		20	15	15								
Archive tissue samples	235	A3 B3	3y	FWS	MHFS ASOC UNF		1	1	1								
Develop stock assessment	236	A1	1y	MHFS		7											
ESTABLISH COOPERATIVE WORKING RELATIONSHIPS WITH ALASKA NATIVES	3																
Develop MOA with ASOC and ADFG	31	A1 B1	.5y			5-FWS											signed 2/1/94
Assist the ASOC with development and implementation of regional management plans	311	A2 B2	ongoing	ASOC FWS	ADFG	10-FWS	20	20	20	20							
Incorporate traditional knowledge	312	A3 B3	Indef.	ASOC	FWS		nd	nd	nd	nd							
Establish guidelines for efficient and non-wasteful use of sea otters	313	A2 B3	1y	FWS ASOC	ADFG		3	2									Interviews with hunters
Strengthen marking and tagging	314	A2 B1	ongoing	FWS	ASOC ADFG	5-FWS	10	10	10	10							
Subsistence use in Bering Sea	315	B1	1y	MHFS FWS	ASOC	7											
CHARACTERIZE SEA OTTER HABITAT AND MONITOR STATUS AND TRENDS	4																
Review existing knowledge and define habitat data needs	41	A2 B2	.5y	FWS NBS	ASOC ADFG		5										Involve technical group
Define sea otter habitat by bathymetry	42	A2 B2	3y	FWS NBS		35-NBS	80	80	80	80							use TDR
Identify habitat at risk	43	A1 B1	ongoing	FWS	ADFG ASOC MNS		10	10	10	10							

SEA OTTER MANAGEMENT PLAN IMPLEMENTATION SCHEDULE	TASK				AGENCY		Estimated Fiscal Year Costs (thousands of \$)					Comments
	#	Priority	Duration	Lead	Coop	Year 1 (FY%)	Year 2	Year 3	Year 4	Year 5		
Brief Description of Task	44	A2 B3	ongoing	FWS NBS MLHL	ASOC NPS NMFS	35-NBS	80	80	80	80	80	establish permanent plots
Develop liaisons with other agencies	45	A2 B3	ongoing	FWS ADFG NMS	EPA USFS NPS		0	0	0	0	0	
Monitor health of Bering Sea ecosystem	46			NMFS FWS								
IDENTIFY, AVOID, AND MINIMIZE HUMAN THREATS TO SEA OTTERS AND THEIR HABITAT	5											
Monitor incidental take	51											
Review incidental take data	511	A1 B1	1y	FWS UAF	NMFS		5					
Design studies to reduce mortality in fishing gear	512	A3 B2	nd	NMFS FWS	UAF							as necessary
Implement programs to reduce fishing-related mortality if needed	513	A3 B2	nd	FWS UAF	NMFS							as necessary
Competition for shellfish resources	52											
Compare shellfish use by humans and sea otters	521	A1 B1	2y	FWS	ASOC NBS ADFG		5	20	10			see 46
Determine if sea otter predation on shellfish affects humans adversely	522	A1 B2	.5y	FWS	ASOC ADFG NMFS		20					after 421
Determine effects of sea otter predation on valuable shellfish	523	A1 B1	3y	FWS NBS	ASOC NPS NMFS ADFG		120	120	120			SE Alaska

SEA OTTER MANAGEMENT PLAN IMPLEMENTATION SCHEDULE	TASK						AGENCY					Estimated Fiscal Year Costs (thousands of \$)					
	#	Priority	Duration	Lead	Coop	Year 1 (FY94)	Year 2	Year 3	Year 4	Year 5	Comments	Year 1 (FY94)	Year 2	Year 3	Year 4	Year 5	Comments
Brief Description of Task	524	A3 B2	nd	FWS	UAF												as necessary
Initiate programs to protect sea otters from malicious killing																	
Mariculture and fish farming	53																
Review statutes and regulations for shellfish mariculture	531	A3 B3	.5y	FWS UAF	ASOC	2-FWS											
Determine effects of mariculture on sea otters	532	A3 B2	1y	FWS UAF	ASOC ADFG		10	40	40	40							contract UAF
Oil and gas exploration, development, and transportation	54																
Continue Exxon Valdez restoration	541	A3 B3	7	FWS NBS		240-EVOS	7	7	7	7							funding uncertain
Identify possible impacts of oil-related activities	542	A1 B1	ongoing	MMS ADNR	FWS ADFG		7	7	7	7							lease sale dependent
Implement systematic surveys in areas of oil-related activity	543	A2 B2	periodic	FWS MMS		60-EVOS	0	75	0	75							dependent on restoration funds in 94
Develop and prepare to implement oil spill contingency plans	544	A2 B1	2y	FWS	MMS ADFG	5-FWS	25	30	nd	nd							
Implement post-lease monitoring programs	545	A3 B3	nd	FWS MMS	ADFG												as necessary
Port construction, harbor development, logging and other activities	55																
Determine effects of logging on sea otters and habitat	551	A3 B3	nd	FWS NBS	USFS ADNR		60	60	60	60							not funded; depends on logging schedule
Review regulatory programs to ensure they protect sea otters	552	A3 B3	.5y	FWS	many	3-FWS											

SEA OTTER MANAGEMENT PLAN IMPLEMENTATION SCHEDULE	TASK						AGENCY					Estimated Fiscal Year Costs (thousands of \$)					
	#	Priority	Duration	Lead	Coop	Year 1 (FY94)	Year 2	Year 3	Year 4	Year 5	Comments						
Brief Description of Task																	
Quantify the levels of tourism	553	A3 B3	nd	FWS	AMRTA		nd										
Identify areas of conflict between sea otters and humans	56	A1 B1	ongoing	FWS	ASOC ADFG		45	15	15	15							use OIS
Evaluate management strategies	57	A1 B2	1y	FWS	ASOC ADFG		nd										
ESTABLISH COOPERATIVE PROGRAMS TO FURTHER CONSERVATION AND MANAGEMENT	6																
Maintain open communication	61	A2 B1	ongoing	FWS	many	5-FWS	20	20	20	20							
Establish technical group	62	A2 B1	ongoing	FWS	many	5-FWS	20	20	20	20							convene in FY94
Develop Information and Education Program for sea otters	63	A3 B3	nd	FWS ASOC	ADFG		nd	nd	nd	nd							very desirable
Establish guidelines to prevent harassment from tour boats	631	A3 B3	.5y	FWS	ADFG NHFS		2	nd	nd	nd							follow NHFS lead
Recommend and publicize viewing areas for sea otters	632	A3 B3	nd	FWS	ADFG ASOC		nd	nd	nd	nd							
Consult with State and Federal agencies on sea otters	64	A3 B3	ongoing	FWS	many	1-FWS	1	1	1	1							
Continue cooperative work with Canada and Russia	65	A3 B3	ongoing	FWS	many	15-FWS	0	15	7	7							US-Russia workshop in FY94

VII. LITERATURE CITED

- Bailey, E. P., and J. L. Trapp. 1986. Marine birds and mammals in the Islands of Four Mountains, summer 1982. Unpubl. report, U.S. Fish and Wildlife Serv., Anchorage, AK.
- Brueggeman, J. J. 1988. Aerial surveys of sea otters in the northwestern Gulf of Alaska and southeastern Bering Sea. Unpubl. report, Envirosphere, Bellevue, WA.
- Calkins, D. G., and K. B. Schneider. 1985. The sea otter (*Enhydra lutris*). Pages 37-45 in J. J. Burns, K. J. Frost, and L. F. Lowry, eds. Marine mammals species accounts. Alaska Dept. Fish and Game, Game Tech. Bull. 7.
- Costa, D. P. and G. L. Kooyman. 1982. Oxygen consumption, thermoregulation, and the effects of fur oiling and washing on the sea otter, *Enhydra lutris*. *Can. J. Zool.* 60:2761-2767.
- DeGange, A. R., and J. L. Bodkin. In prep. Distribution and abundance of sea otters in Alaska: a current view.
- Estes, J. A. 1980. *Enhydra lutris*. American Society of Mammalogists, Mammalian Species 133. 8pp.
- Estes, J. A. 1990. Action plan for sea otters. Pages 22-28, in P. Foster-Turley (ed.). Otters: an action plan for their conservation. Chicago Zool. Soc.
- Federal Register. 1979. Department of Commerce, National Oceanic and Atmospheric Administration. Final Rule regarding waiver of the moratorium on taking of certain marine mammals. Vol. 44, No. 8, 11 January 1979.
- Garrott, R.A., L.L. Eberhardt, and D.M. Burn. 1993. Mortality of sea otters in Prince William Sound following the Exxon Valdez oil spill. *Mar. Mam. Sci.* 9(4):343-359.
- Garshelis, D. L. 1990. Sea otter. Pages 643-655, in M. Novak, J. A. Baker, M. E. Obbard and B. Malloch (eds.). Wild furbearer management and conservation in North America. Ministry of Nat. Res., Ontario, Canada.
- Garshelis, D. L., J. A. Garshelis, and A. T. Kimker. 1986. Sea otter time budgets and prey relationships in Alaska. *J. Wildl. Manage.* 50:637-647.
- Geraci, J. R. and D. St. Aubin (eds.). 1990. Sea mammals and oil: confronting the risks. Academic Press.
- Hofman, R. J. (ed.). 1985. Workshop to assess possible methods for regulating the distribution and movements of sea otters. San Francisco, CA, 25-26 October 1984. Nat'l. Tech. Inform. Serv., PB85-229250. 39pp.

- Jameson, R. J., K. W. Kenyon, A. M. Johnson, and H. M. Wight. 1982. History and status of translocated sea otter populations in North America. *Wildl. Soc. Bull.* 10:100-107.
- Johnson, A. M. 1982. Status of Alaska sea otter populations and developing conflicts with fisheries. *Trans. N. Amer. Wildl. Conf.* 47:293-299.
- Kenyon, K. W. 1969. The sea otter in the eastern Pacific Ocean. *N. Amer. Fauna* 68. 352pp.
- Kimker, A. T. 1985. A recent history of the Orca Inlet, Prince William Sound Dungeness crab fishery with specific reference to sea otter predation. Pages 231-241 in B. R. Melteff (ed.). *Proc. symposium on Dungeness crab biology and management.* Univ. of Alaska, Alaska Sea Grant Report No. 85-3.
- Monson, D. H., and A. R. DeGange. 1988. Sea otters and Alaska's developing sea farming industry. Unpubl. report. U.S. Fish and Wildlife Service, Anchorage, AK.
- Riedman, M. L., and J. A. Estes. 1990. The sea otter (*Enhydra lutris*): behavior, ecology, and natural history. U. S. Fish and Wildl. Serv., Biol. Report 90(14). 126pp.
- Rotterman, L. M., and T. Simon-Jackson. 1988. Sea otter (*Enhydra lutris*). Pages 237-275 in J. W. Lentfer (ed.). *Selected marine mammals of Alaska: species accounts with research and management recommendations.* Marine Mammal Commission, Wash., D.C.
- Simenstad, C. A., J. A. Estes, and K. W. Kenyon. 1978. Aleuts, sea otters, and alternate stable-state communities. *Science* 200:403-411.
- VanBlaricom, G. R. and J. A. Estes. 1988. The community ecology of sea otters. pp. 247. Springer-Verlag, Berlin, West Germany.
- Wilson, D. E., M. A. Bogan, R. L. Brownell, Jr., A. M. Burdin, and M. K. Maminov. 1991. Geographic variation in sea otters *Enhydra lutris*. *J. Mammal.* 72:22-36.
- Wynne, K. 1990. Marine mammal interactions with the salmon drift gillnet fishery on the Copper River Delta, Alaska 1988-1989. Alaska Sea Grant College Program Tech. Report No. 90-05. 36pp.
- Wynne, K., D. Hicks, and N. Munro. 1991. 1990 salmon gillnet fisheries observer programs in Prince William Sound and South Unimak Alaska. Final report to the Nat'l. Mar. Fish. Serv., Saltwater Inc. 65pp.
- Wynne, K., D. Hicks, and N. Munro. 1992. 1991 marine mammal observer program for the salmon driftnet fishery of Prince William Sound Alaska. Final report to the Nat'l. Mar. Fish. Serv., Saltwater Inc. 53pp.

VIII. APPENDICES

Appendix A. Sea Otter Management Plan Advisory Team

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Appendix B. Summary of Comments and Responses on the Draft Management Plan

As expected, responses to the draft plan and draft final were diverse. To facilitate the summarization of written comments, they were organized into five groups: Alaska Native organizations; conservation/tourism organizations, Federal/State agencies; individual Alaskans; and individual non-Alaskans. It should be kept in mind that written responses to the draft plan were not necessarily received from a balanced cross-section of individuals and groups within and outside of Alaska. For example, a surprisingly large number of comments were received from individuals in Petersburg, Alaska, concerned about sea otter depredation on commercial stocks of some shellfish species. Similarly, nearly 100 individually signed form letters were received from individuals on Kodiak Island sympathetic with the position of Alaska Natives relative to the draft plan. Because the responses do not represent a valid cross-section of the public, tallies were not kept on the responses to individual policy questions raised in the draft plan.

Alaska Native Organizations: In general Alaska Native organizations did not support the draft plan as it was first presented. They view the draft plan only as a first step in the management planning process, because they believe the FWS developed the draft plan unilaterally. They wish they had more of an opportunity than just to react to the FWS and believe they should be involved as a partner in future planning activities. They believe too much emphasis of the draft plan is placed on the Native harvest, which they view as a non-problem, and they consider the draft plan as a vehicle for the Federal government to gain regulatory control of the Native harvest before depletion, and strongly oppose this effort. Alaska Native organizations strongly feel that the FWS should support the ASOC in its regional management planning efforts and that the FWS should focus its resources on developing a strong information base to support a regional management program. Alaska Native organizations are strongly opposed to the opening of harvest to non-Natives as well as the sale of raw sea otter pelts. They urged the FWS to cooperate on the completion of the Memorandum of Agreement with the ASOC and the State of Alaska.

State/Federal agencies: Concern was expressed that the management options portion of the draft plan was not formally discussed with the planning advisory team and that if it remains in the draft plan, it should be clearly identified as the FWS position only. It was suggested that the management policy material be taken out of the draft plan in order to develop consensus. There was concern that if management positions that depended on changes to the MMPA are kept in the draft plan, the plan will be dated if those amendments are not achieved. It was suggested that roles and responsibilities of the FWS, ASOC, and State of Alaska be more clearly defined in the final plan. The State of Alaska expressed concern about FWS overstepping its bounds concerning State jurisdiction on State lands and waters.

Conservation/Tourism Organizations: These organizations uniformly opposed predator control, allowing non-Natives to harvest sea otters, and the sale of raw sea otter pelts.

Some supported amending the MMPA to give the FWS authority to regulate Native harvest. Tourist organizations wanted the value of sea otters to non-consumptive users better recognized in the draft plan. Some wanted areas set aside as no-hunting zones. In general these organizations believe that the FWS needs better empirical documentation of management conflicts before solutions to these conflicts are implemented. If implementation is proposed, non-lethal methods should be tried. Most of these organizations support a closer working relationship between the FWS and Alaska Natives.

Individual Alaskans: As a group, Alaskans have widely divergent opinions on how sea otters should be managed, ranging from the status quo to opening up a tightly controlled harvest to everyone. Many people are concerned about the effects sea otters have on shellfish stocks exploited commercially and for subsistence and recreation. There was general support for some form of zonal management ranging from protecting sea otters more in some areas to reducing populations in other areas to protect shellfish. However, many of those supporting the concept of zonal management did not embrace the full range of zone types presented in the draft plan. In other words those supporting more protection for sea otters were frequently opposed to predator control, and vice-versa. There was considerable interest in harvesting sea otters by non-Natives residing in coastal areas affected by sea otter predation on shellfish. Many of those individuals, as well as some Alaska Natives, support sale of raw pelts. Opinions on regulating the harvest ranged from status quo to full regulation to return of management to the State.

Non-Alaskans: Most of the responses by individuals from outside of Alaska were concerned about the effects of sea otter predation on shellfish stocks. These individuals wanted to see a balance between sea otters and shellfish by establishing shellfish management zones. They support the harvest by Alaska Natives.

