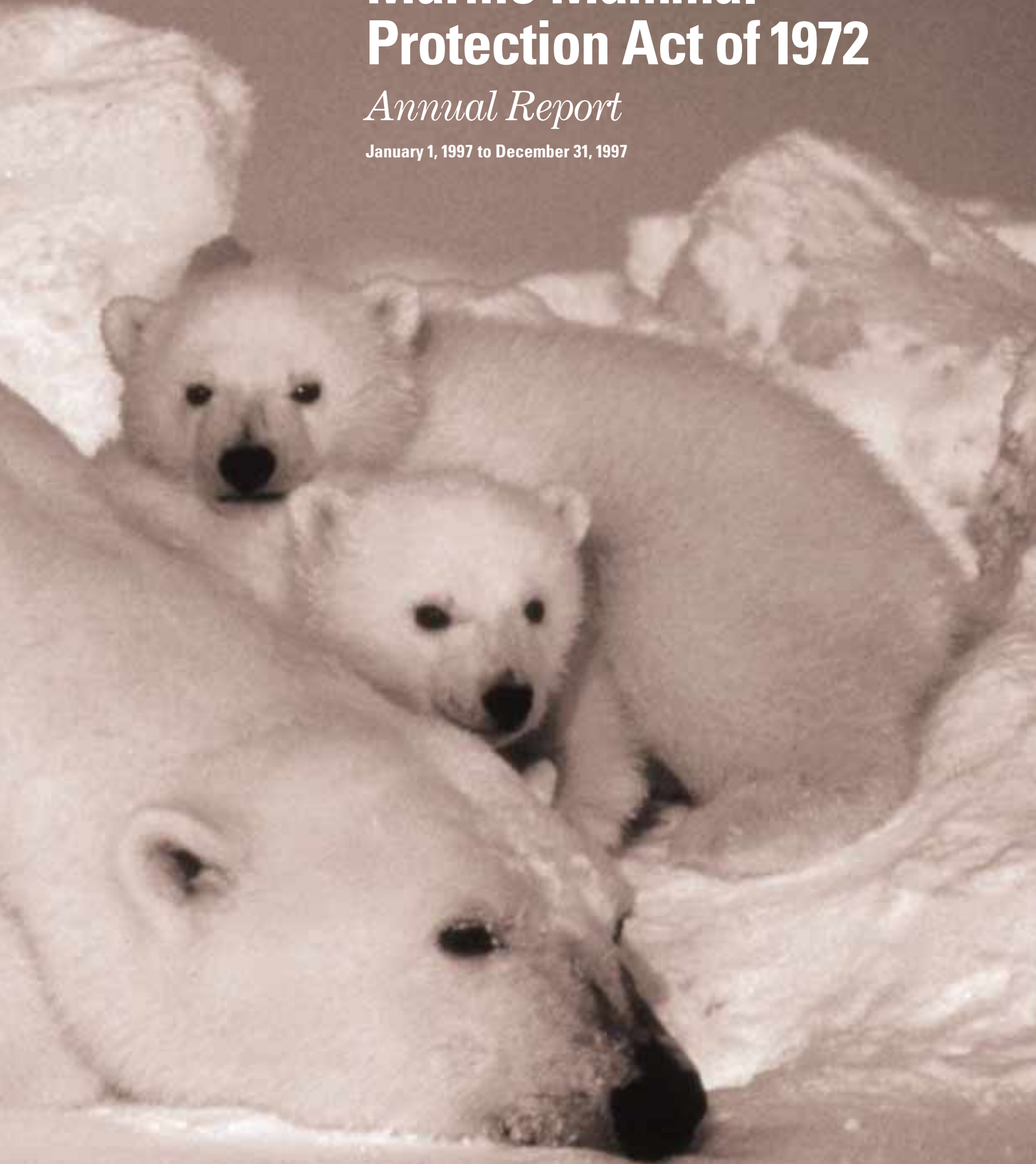


# Administration of the Marine Mammal Protection Act of 1972

*Annual Report*

January 1, 1997 to December 31, 1997



**U.S. Department of the Interior  
U.S. Fish & Wildlife Service  
U.S. Geological Survey/  
Biological Resources Division**

**Marine Mammal Protection Act**

*Report of the Department of the Interior*

The Marine Mammal Protection Act of 1972 (16 U.S.C. 1361-1407, 86 Stat. 1027 (1972)), as amended (95 Stat. 979 (1981), 98 Stat. 440 (1984), 100 Stat. 3741 (1986), 102 Stat. 4755 (1988), and 108 Stat. 532 (1994)), states in Section 103(f) that:

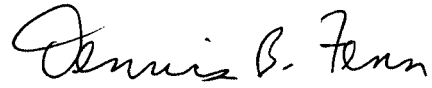
“Within six months after the effective date of this Act [December 21, 1972] and every twelve months thereafter, the Secretary shall report to the public through publication in the *Federal Register* and to the Congress on the current status of all marine mammal species and population stocks subject to the provisions of the Act. His report shall describe those actions taken and those measures believed necessary, including where appropriate, the issuance of permits pursuant to this title to assure the well-being of such marine mammals.”

The responsibility of the Department of the Interior is limited by Section 3(12)(A)(ii) of the Marine Mammal Protection Act to those marine mammals that are members of the Orders Carnivora (polar bear, sea otter, and marine otter), Pinnipedia (walrus), and Sirenia (manatees and dugong). Accordingly, published herewith is the report of the Department of the Interior for the period of January 1, 1997, to December 31, 1997, on the administration of the Marine Mammal Protection Act with regard to those mammals.

Issued at Washington, D.C.



Director  
U.S. Fish & Wildlife Service  
Dated 7/17/00



Chief Biologist  
Biological Resources Division  
U.S. Geological Survey  
Dated 8/18/00

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**January 1, 1997 to December 31, 1997**

**U.S. Department of the Interior  
U.S. Fish & Wildlife Service  
U.S. Geological Survey/Biological Resources Division  
Washington, D.C. 20240**



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# Introduction

## Authority

The passage of the Marine Mammal Protection Act of 1972, hereafter referred to as the Act, gave the Department of the Interior (Department) responsibility for manatees, polar bears, walruses, sea and marine otters, and dugong. Within the Department, the Fish and Wildlife Service (Service) is the primary agency responsible for managing these marine mammals and for enforcing the moratorium on taking and importing marine mammals and marine mammal parts. During 1997, the Biological Resources Division of the U.S. Geological Survey (USGS/BRD) was responsible for conducting marine mammal research.

The Service administers requests for waiving the moratorium and for the transfer of management authority to States, issues permits, enforces provisions of the Act, and publishes rules and regulations to manage marine mammals. The Service also cooperates with the States, and participates in international activities and agreements. In addition, the Service lists and delists species as endangered or threatened and undertakes other Endangered Species Act (ESA)-related responsibilities and maintains a close working relationship with the Marine Mammal Commission (MMC) and its Committee of Scientific Advisors. Prior to Fiscal Year 1994, the

Service conducted the marine mammal research program. Presently, the USGS/BRD has been charged with that responsibility; the Service closely coordinates with the USGS/BRD on marine mammal research needs.

During the period of time covered by this report, there were no significant changes to the listed status of any of the species of marine mammals whose management is the Service's responsibility.

## Species List

Species List and Status of Marine Mammals Under Service Jurisdiction Under the Act and the ESA

<i>Species</i> <i>Common Name</i>	<i>Scientific Name</i>	<i>Marine Mammal Protection Act</i>	<i>Endangered Species Act</i>
Polar bear	<i>Ursus maritimus</i>	Yes	No
Sea otter-Alaska	<i>Enhydra lutris kenyoni</i>	Yes	No
Sea otter-southern	<i>Enhydra lutris nereis</i>	Yes	Threatened
Marine otter	<i>Lutra felina</i>	Yes	Endangered
Walrus	<i>Odobenus rosmarus</i>	Yes	No
Dugong	<i>Dugong dugon</i>	Yes	Endangered*
West Indian manatee	<i>Trichechus manatus</i>	Yes	Endangered
Amazonian manatee	<i>Trichechus inunguis</i>	Yes	Endangered
West African manatee	<i>Trichechus senegalensis</i>	Yes	Threatened

\* *The dugong is listed as endangered throughout its entire historic range except when it occurs in the United States.*

# Summary of the 1997 Program

## Appropriations

For Fiscal Years (FY) 1997 and 1998, the Service's funding authorization was under authority of Section 116(b) of the Act as adopted in the 1994 amendments (108 Stat. 532) to the Act. Calendar Year 1997 covered by this report overlaps FY's 1997 and 1998; funds (in \$000) authorized for both years, as well as funds spent in FY 1997 and projected to be spent in FY 1998, are presented.

	<i>Authorized</i>	<i>Expended</i>	<i>Projected</i>
Fiscal Year 1997 .....	\$9,400	\$4,132	—
Fiscal Year 1998 .....	\$9,900	—	\$3,979

### Marine Mammal Protection Act Expenditures

	<i>Actual FY 97</i>	<i>Projected FY 98</i>
<i>USGS/BRD Research and Development</i>		
Alaska sea otter .....	\$ 205	\$ 238
Polar bear .....	343	372
Misc. marine mammals (including polar bear, walrus, and sea otter) .....	838	608
Total USGS/BRD Research and Development .....	\$ 1,386	\$ 1,218
<i>Management</i>		
Permit activities .....	\$ 100	\$ 115
Law enforcement activities .....	675	675
Other management activities .....	1,971	1,971
Total Management .....	\$ 2,746	\$ 2,761
Grand Total MMPA .....	\$ 4,132	\$ 3,979

### Endangered Species Act Expenditures

<i>Section 6 (Grants-to-States)</i>		
California—sea otter .....	\$ 0	\$ 61
Florida—manatee .....	0	0
Georgia—manatee .....	26	26
Total Section 6 .....	\$ 26	\$ 87
<i>Section 15 (USGS/BRD Research and Development)</i>		
Endangered/threatened otters .....	\$ 389	\$ 389
Manatee .....	556*	600*
Total USGS/BRD Research and Development .....	\$ 945	\$ 989
<i>Section 15 (Management)</i>		
Consultation <sup>1</sup> .....	\$ 320	\$ 320
Recovery <sup>1</sup> .....	353*	379*
Hawaiian monk seal <sup>2</sup> .....	75	75
Total Management .....	\$ 748	\$ 774
Grand Total ESA .....	\$ 1,719	\$ 1,850

\* In Fiscal Years 1997 and 1998, funds shown for USGS/BRD for manatee research and development pursuant to Section 15 of the ESA includes \$152 of Service manatee recovery funds transferred to USGS/BRD to support manatee research (but excludes \$41 and \$5 of State and private funds for FYs 97 and 98, respectively). Section 15 Recovery funds shown were reduced by \$152 in both fiscal years to account for this transfer.

<sup>1</sup> Funded under authority of the ESA of 1973, as amended. Includes funds for all endangered and threatened marine mammals for which the Service engages in consultation and recovery activities.

<sup>2</sup> Although the National Marine Fisheries Service has primary responsibility for Hawaiian monk seals according to Section 3(12)(A)(i) of the Act, the species utilizes the Hawaiian Islands, Johnston Atoll, and Midway Atoll National Wildlife Refuges. Funds reported are spent for monk seal activities on Refuge lands under authority of the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee).



# *Outer Continental Shelf Operations and Environmental Studies*

In 1997, there were no Service actions to report for this activity.

# Research and Development

The USGS/BRD conducted research under the Act during FY 1997 at several Centers and Field Stations. The Alaska Biological Science Center (ABSC) is responsible for polar bear, walrus, and northern (i.e., Alaska) sea otter research. The Western Ecological Research Center (WERC, formerly the California Science Center) is responsible for work on southern sea otters. The Southeastern Biological Science Center (SBSC) is responsible for research on sirenians (manatees and dugongs). The Division of Cooperative Research administers additional research at cooperative units across the country funded by, and in support of, the needs of the Service, other USGS/BRD Research Centers, and other bureaus of the Department.

For each project active during FY 1997, the project title and summary, followed by highlights of FY 1997 accomplishments are given below by species. Previous results and accomplishments can be found in earlier publications.

## 1. Polar bear

### A. Project Title and Summary:

Population definition and estimation of survival, recruitment and number of polar bears in northwestern and northern Alaska.

During March and April, Alaskan polar bears captured in the western portions of Arctic Alaska are permanently marked. Assessment of critical population parameters are achieved through continued analyses of mark/recapture data, catch/effort data, and mathematical simulations. Work also includes the development and implementation of a U.S./Russian polar bear census.

#### *1997 Activities/Accomplishments:*

■ In 1997, three more adult male polar bears were fitted with subcutaneously implanted satellite transmitters in a study to determine the feasibility of the technique for studying movements of free-ranging males. As in 1996, transmitters performed well, but

duration of operation was too brief to guarantee recapture. Hence, causes for premature failures are still not known. In the coming year we will be summarizing what we have learned thus far and re-evaluating future efforts to assess movement patterns of male polar bears.

■ The data base on polar bear movement patterns was expanded in 1997 and an editor for the volumes of satellite data generated over the past several years was established. A main strength of the editorial procedure is that it greatly enhances the ability to see sequential movements of polar bears and to identify and eliminate erroneous locations that periodically enter satellite data sets.

■ USGS/BRD researchers participated with the Service in the annual meeting of the Canadian Polar Bear Technical Committee.

■ Studies of polar bear and sea ice interrelationships are ongoing between Russian Academy of Science researchers and USGS/BRD researchers for a study area in western Russia. Remotely-sensed sea ice data from Russian satellites are being used to determine sea ice types for the Barents and Kara Seas.

■ Micro-satellite analyses of genetic patterns in polar bears of Alaska were completed in 1997. In the coming year a manuscript will be prepared by USGS/BRD personnel describing genetic variation in this region and contrasting it with the variation previously reported in Canada. An international study of polar bear genetics, which includes cooperators from Canada, Denmark, Norway, and Russia as well as the United States (i.e., USGS/BRD) has been completed, and the senior authors are now drafting manuscripts.

■ Final preparations were made to host a *Surveys, Status, and Trends of Marine Mammal Populations Symposium*. The symposium is sponsored jointly by the ABSC and the National Marine Fisheries Service's (NMFS) Marine Mammal Laboratory, and will be held in February

1998. It includes speakers from around the world who are authorities on various aspects of survey. The proceedings will be published in book form with all contributions refereed (Note: The Symposium took place in February 1998, and the refereed proceedings currently are in press.)

### B. Project Title and Summary:

Population status and trends of polar bears in the Beaufort Sea.

In FY 1997, this project entailed completion of data analysis and project writing relative to a longstanding project to refine the boundaries definition of populations of polar bears in the shared U.S./Canada Beaufort Sea region and to reassess, with a new method of modeling, the size and trend in that population. In addition, two methods projects, one to assess denning habitat and one to detect dens, were initiated in pilot phase. These two new projects will be expanded in FY 1998 as separate and distinct units, leaving the original study only as a manuscript completion project in FY 1998.

#### *1997 Activities/Accomplishments:*

■ Population bounds of polar bears in the Beaufort Sea continue to be refined. During 1997, mark and recapture and radio location data for the Canadian region of the northern Beaufort Sea were obtained. Analysis of polar bear location data through measures of central tendency combined with clustering methods indicated a clear delineation between polar bears in the southern Beaufort Sea and polar bears in the northern Beaufort Sea near Banks Island, Canada. Location data of polar bears from the northeastern Chukchi Sea and locations from those captured in the southern Beaufort Sea do not show clear separation. This indicates an undefined degree of mixing between Chukchi and Beaufort Seas stocks. A manuscript is being drafted describing the extent of movements and the degree of sharing of jurisdictions among polar bears living in the region from northern Banks Island to the northeastern Chukchi Sea.

■ Work continues to develop a sound estimate of the population size of polar bears in the southern Beaufort Sea and provide technical advice to the North Slope Borough/Inuvialuit Game Council on polar bear population status. The USGS/BRD developed a new model for estimates of capture and survival probabilities and population size. This new model has fewer required assumptions than other mark-and-recapture models, and appears to provide more reasonable point estimates and narrower interval estimates on all population parameters of interest than previously obtained.

■ Mapping preferred denning habitats of polar bears in northern Alaska: Polar bears construct maternal dens of ice and snow throughout their circumpolar range. In the Beaufort Sea region of northern Alaska, most dens have been found on the flat coastal plain. Hydrocarbon extraction is now occurring or planned along 100 miles of the Beaufort Sea coastline. If development pushes, as expected, into the National Petroleum Reserve, the scope of development could include up to two-thirds of the northern coastal region of Alaska. Human activities are a potential threat to denning polar bears, and resource extraction has generated significant concern for the welfare of denning polar bears and their habitats. While numbers of humans and their activities have increased in northern Alaska, numbers of denning females present along the coast also have increased. In this study, two independent techniques will be used to develop digital maps of habitats in Alaska's Arctic Coastal Plain where polar bears appear to prefer to den. First, high resolution (i.e., 1" = 1500') aerial photos will be examined to attempt to identify distinctive bank habitats that appear to account for greater than 70 percent of previously located maternal dens. Visible features will be transferred directly to topographic maps of the North Slope region between the Canadian border and the Colville River in Alaska. If the maps prove useful, their extent can be increased to cover any areas for which photos are available. To further enhance the ability to predict all habitats in which polar bears may den, the USGS/BRD also will construct a "digital elevation model" (DEM) of polar bear denning habitats in selected areas where British Petroleum, the USGS/BRD's partner in this project, has high resolution (1:6000) maps. Both mapping products will be available in ARC/Info formats that can be

easily transferred among partners or potential users. Initial photo interpretation and digitization was completed in summer of 1996. Final ground-truthing and development of error estimates was to have been completed in summer 1997. However, bad weather intervened, preventing most of that work from occurring. Data that were collected in 1997 will be used for additional digital map adjustments and preliminary error checking, and final ground-truthing will be rescheduled for summer of 1998.

■ Detection of denning polar bears with forward-looking infrared (FLIR) imagery: FLIR was investigated as a tool for detection of active polar bear maternity dens. In FY 1997, two man-made snow caves with heat sources were constructed in order to simulate polar bear maternity dens. The FLIR device detected both snow caves, thus suggesting its potential to locate polar bear dens while the dens are occupied by bears. In autumn 1997, five pregnant female polar bears were fitted with satellite radio collars and subsequently followed to their dens. All five were captured near Prudhoe Bay, which is the location of the FLIR equipped aircraft. Only two bears denned near enough to the operations base of the aircraft for FLIR testing. Unfortunately, one of those bears abandoned her den and the other denned on sea ice, rather than on land. Since only land denning habitats are temporally predictable and easily subject to management actions, dens on the sea ice are not being tested. Two other bears denned on pack ice far offshore in the Chukchi Sea, and the last bear denned on a small island in Canada. To take the best advantage of our limited opportunities for FLIR testing, USGS/BRD made several trips to the nearby sea ice den, and one long trip into Canada to see whether the land den located there was visible. Preliminary results are again encouraging. Both dens were plainly visible upon the first visit by the FLIR. Unfortunately, the Canadian den was too distant to replicate tests; thus, all that is known for sure is that, under the conditions of that day, the den was plainly visible. Several visits to the sea ice den suggest that time of day, amount of ambient light, and ambient temperature can markedly alter den detectability. It is not presently known whether the variation in detectability would be as great for land dens, nor are all of the sources of that variation understood. During the coming year, attempts will be made to instrument additional bears and

test more denning locations in order to determine whether variations in visibility to FLIR can be explained well enough for it to have management application.

## 2. Alaska sea otter

### A. Project Title and Summary:

Biological information necessary to establish a zonal management program for sea otters in Alaska.

In response to real and perceived conflicts between sea otters and commercial and recreational fisheries over shellfish resources, the implementation of a zonal management program for sea otters has been suggested. Genetic and enzyme variation within the sea otter population is determined through the analysis of tissue samples collected from captured sea otters.

#### 1997 Activities/Accomplishments:

■ Several publications and presentations on genetic diversity in sea otter subspecies and populations have been completed. A manuscript entitled, "Population demographics and genetic diversity: case histories from remnant and reestablished populations of sea otters," has been submitted to *Conservation Biology*.

■ Studies under this project were, in part, the basis for two papers in the 1997 Endangered Species Update on comparative demographics and status of sea otter populations. A manuscript entitled, "Life history plasticity and population regulation in sea otters," has been submitted to *Ecology*.

■ Additional work comparing present genetic information with "ancient" DNA samples in sea otters is planned for the purpose of determining the extent of pre-exploitation stock separation. Sea otter bone samples from Prince William Sound have been submitted to cooperators at UCLA.

■ One manuscript on the accuracy and precision in estimating sea otter ages from cementum deposits was published in the *Journal of Wildlife Management*.

### B. Project Title and Summary:

Interactions between sea otters and fisheries in Alaska.

Research is being conducted to assess: (1) sea otter diets with an emphasis on the importance of commercial species of shellfish; (2) the impacts of sea otter



*Sea otter*

foraging behavior and activity on sub-tidal benthic communities, status of sea otter populations, and assessment of habitat; and (3) the recovery of the Prince William Sound sea otter population.

*1997 Activities/Accomplishments:*

■ The second full field season of the Nearshore Vertebrate Predator project, designed to evaluate the state of recovery of the *Exxon Valdez* oil spill affected portions of Prince William Sound was completed. One manuscript was published on a modeling procedure to identify potential constraints to sea otter recovery. Data analysis is in progress and one additional year of field work is scheduled. Papers were presented at the 6th Joint Russia/US Workshop in 1997 and the World Marine Mammal Conference in January 1998.

■ Aerial surveys in Glacier Bay National Park have documented the movement of sea otters into previously unoccupied habitat and guided the collection of sea otter foraging data in these areas. A group of at least 80 male sea otters was observed feeding on mussels, clams, and urchins. Various economically valuable species of crabs are being consumed at low rates, however sea otters have not yet found major concentrations of these species in newly occupied areas. Continued monitoring and observation work along with concurrent subtidal benthic surveys will provide information on the effects of sea otter predation on valuable invertebrate populations. As sea

otters continue to reoccupy Glacier Bay, dramatic changes in the structure of the coastal communities can be expected. Changes will include reductions in the abundance of many ecologically and economically valuable marine resources, including crabs, clams, mussels, and urchins. It is likely that changes will also occur in fish populations and perhaps in other bird and mammal populations. The sea otter induced changes in coastal communities will likely preclude detection of potential effects of other activities, such as cruise ships or commercial fishing.

■ A study to determine dive profiles of sea otters in southeast Alaska using pressure modulated sonic transmitters was implemented. The use of this technology provided the first dive profiles of free-ranging sea otters. More than 2,300 dive records are now available from ten individual sea otters. Most diving occurs in water less than 50 meters deep, but two of nine animals regularly dove to depths greater than 60 meters. Maximum dive depths are 86 meters (270 feet). In FY 1997, USGS/BRD recovered 2 of 12 time-depth-recorders. These instruments are the first recovered from this species and provided new data on diving behavior as well as the amount of effort an individual allocates to foraging, a measure likely to be correlated with population status. It is planned to continue this work in FY 1998 to further evaluate foraging activity in relation to prey abundance, and the effect sea otters

have on shellfish populations, including the importance of depth as a refuge from sea otter predation. Papers on the results of the diving studies were presented at the 6th Joint Russia/US Workshop in 1997 and the World Marine Mammal Conference in January 1998.

**3. Miscellaneous Marine Mammals (work units which study several marine mammal species)**

**A. Project Title and Summary:**

Use of DNA to define populations of birds, mammals, and fish of Alaska.

Analyses of mitochondrial and nuclear DNA in animal populations are evaluated to assess their usefulness in quantifying genetic relationships among animal populations. Animal movement patterns are compared with genetic patterns to determine information about current and past levels of gene flow and differentiation of subpopulations. Studies (involving the collection, archiving, and analysis of tissue) are conducted on sea otters, polar bears, and walrus.

*1997 Activities/Accomplishments:*

■ The following papers were published:

Scribner, K., G. Garner, S. Amstrup, and M. Cronin. 1997. Population genetic studies of the polar bear: a summary of available data and interpretation of results. in Dizon et al. (eds). *Molecular Genetics of Marine Mammals*. Special Publication Society for Marine Mammalogy. 3:185-196.

Scribner, K., S. Hills, S. Fain, and M. Cronin. 1997. Population genetic studies of the walrus: a summary of available data and interpretation of results. in Dizon et al. (eds). *Molecular Genetics of Marine Mammals*. Special Publication Society for Marine Mammalogy. 3:173-184.

Scribner, K., J. Bodkin, B. Ballachey, S. Fain, M. Cronin, and M. Sanchez. 1997. Population genetic studies of the sea otter: a summary of available data and interpretation of results. in Dizon et al. (eds). *Molecular Genetics of Marine Mammals*. Special Publication Society for Marine Mammalogy. 3:197-208.

**B. Project Title and Summary:**

Population status and trends in marine mammals in Alaska.

More feasible approaches to evaluation of the status and trends of marine mammal (walrus, polar bear, and sea otter) populations are being developed to

replace present methods which are logistically difficult and very costly. Objectives to accomplish this include: (1) continued development and evaluation of survey methodologies; (2) construction of models to evaluate the dynamics of marine mammal populations; and (3) identification of characteristics of populations and individuals that enable assessment of population condition and status.

■ Plans were finalized to hold the workshop on census methodologies for marine mammals with varying sightability and availability. The workshop, cosponsored by NMFS is scheduled for February 25-27, 1998. Twenty-six presentations covering a spectrum of surveying issues are scheduled.

■ The joint effort between the NMFS Southwest Fisheries Science Center and USGS/BRD's ABSC scientists on applying individual-based models to Pacific walrus population data was completed. The effort to finalize the extensive data accumulated by the late Dr. Bud Fay was completed and the data analyzed by NMFS cooperating scientists. The results of this modeling effort will be included in the above referenced marine mammal census workshop.

■ Blood and tissue samples were again collected from sedated Pacific walrus at Cape Peirce, carcasses, and subsistence hunt kills. These materials are being analyzed to develop baseline blood serum chemistries of Pacific walrus. Additional work was initiated in cooperation with USGS's Geologic Division to use stable isotope technologies to assess trophic structure of walrus based upon analyses of vibrissae.

### **C. Project Title and Summary:**

Alaska Marine Mammal Tissue Archival Project.

This study collects and archives representative marine mammal tissues for future contaminant analyses and documentation of long-term trends in environmental quality potentially associated with oil and gas development in Alaskan waters. Collections are limited to freshly-killed specimens taken under rigorously controlled conditions by researchers associated with ongoing programs or subsistence hunters. Tissue samples are archived with the National Biomonitoring Specimen Bank, National Institute of Standards and Technology.

Tissue aliquots are analyzed for quality control and the results published in annual reports and refereed journals.

### *1997 Activities/Accomplishments:*

■ Work is proceeding as scheduled. Samples have been collected from a variety of marine mammals including ringed, spotted, harbor, bearded and northern fur seals; Steller sea lion; beluga and bowhead whales; polar bears; and Pacific walrus.

■ One of the major accomplishments of this ongoing project is the number of partners that participate in various ways in the archival of tissue samples. Major research collaborators include: Department of Fish and Oceans (Canada); University of Germany; the Service; the North Slope Borough; the State of Alaska; Kawerak and TDX Corporations; the Alaska Sea Grant Program; and the Cook Inlet Marine Mammal Advisory Committee.

### **D. Project Title and Summary:**

Bering-Chukchi Sea Ecosystem Initiative.

The long-term objectives of this initiative are to investigate interrelationships among biotic and abiotic components of the Bering-Chukchi Sea ecosystem, with focus on certain species (major predators or herbivores of management concern) as indicators of ecosystem health, and to link those indicators with oceanographic factors that influence biological production. This broad initiative involves work on polar bears and Pacific walrus, as well as eiders, seabirds, and Arctic-nesting geese. The objectives of the polar bear/walrus work are: (1) to determine the ecological relationships between walrus, polar bears, their respective prey species and the sea ice habitats in the Bering and Chukchi Seas, and to relate those ecological parameters to the trophic structure of the seas; and (2) to determine the ecological significance of radio-nuclide contaminants in the Russian Arctic and the potential of these contaminants for entering the Bering and Chukchi Seas ecosystems. Telemetry technology will be developed and used to define movement and habitat use patterns of polar bears and walrus; remote sensing data will be used to study sea ice characteristics and determine interrelationships with prey species; and standard sampling protocols and systematic sampling from harvested and beach-cast animals will be used to determine environmental contaminant levels. Biological sampling for radio-

nuclides will be conducted from selected sites from the Russian Arctic.

### *1997 Activities/Accomplishments:*

■ Remotely sensed sea ice data and satellite locational data for polar bears in the Bering and Chukchi Seas are being analyzed to study sea ice habitat use and selection. A manuscript on the results of this study is in preparation.

■ The summer movements of satellite instrumented Pacific walrus are being studied to define at sea feeding areas. The associated land-based haulouts have been identified and subsequent studies will examine the species composition of prey items in the identified feeding areas. Dive profile data have been collected from several Pacific walrus in conjunction with the satellite locational data.

### **E. Project Title and Summary:**

Dynamics of Marine Ecosystems in the Bering and Chukchi Seas.

Suitable telemetry technology are being developed and used to define movement and habitat use patterns of top carnivores in the Bering and Chukchi marine ecosystems. Emphasis is placed on interrelationships between seasonal sea ice habitats and prey species of the two apical predators using remotely sensed data on sea ice. Also, potential impacts of environmental contaminants, including radio-nuclides and those related to oil and gas leasing are being assessed. International cooperation will be accomplished through active participation in the North Pacific Marine Science Organization (PISCES), the Conservation of Arctic Flora and Fauna (CAFF) working group, and the International Northern Sea Route Programme (INSROP) during ecological investigations of the Bering and Chukchi marine ecosystems. In FY 1995, the Alaska Science Center (now ABSC) received competitive funding to enhance this effort with funds targeted to assess oil and gas leasing impacts in the Bering and Chukchi Seas for the Minerals Management Service (MMS). Those results are included below.

### *1997 Activities/Accomplishments:*

■ The GPS-linked satellite transmitter data from 1996 are in analysis with some data collected well into the ice season and locational data collected on walrus hauled out on sea ice during the 1977 winter. Dive data were again collected from several adult males at the Cape Peirce haulout.

■ In addition, a variety of PTT, TDR, and VHF telemetry and datalogger units were deployed as part of efforts to develop a better monitoring program for the male walrus haulout complex of Bristol Bay.

■ Bathymetry of the Bering, Chukchi, and Beaufort Seas has been digitized and a geo-referenced ArcInfo coverage has been developed for the areas. These data are presently being served on the ABSC's Web site.

■ Work continued on the Pacific walrus International Database, with Russian cooperators preparing data for input into the database. An integrated master database is intended.

■ Capture methodologies and relocation technologies developed to date for this project are being used to develop a proposal for a study of disturbance of Pacific walrus on sea ice by overflying helicopters. Poor ice conditions in summer 1997 required that field tests be postponed until 1998.

■ Cooperative efforts with the Service were undertaken to develop better models to assess male walrus haulout numbers in Bristol Bay, Alaska. Historical haulout counts have been entered and proofed for statistical analysis. The objective of this effort is to produce a statistically valid, but more cost-effective monitoring protocol for estimating numbers of male walrus at summer haulouts. In addition, tests were completed to assess impacts of time of day, observer, and location on haulout estimates.

#### 4. Manatee and Dugong

##### A. Project Title and Summary:

Movements, Spatial Use Patterns, and Habitat Utilization of Radio-tagged West Indian Manatees (*Trichechus manatus*) along the Atlantic Coast of Florida and Georgia.

Information on movement patterns, areas of importance, and habitat requirements of Florida manatees is needed by Federal and State managers responsible for protecting and recovering this endangered marine mammal. The Service's 1996 Florida Manatee Recovery Plan places a high priority on obtaining these data through the use of radio-telemetry studies. Early telemetry studies on manatees, which pioneered the development of a floating transmitter housing and belt assembly, used solely or



*Florida manatee with calf*

primarily VHF radio-transmitters and were relatively small in spatial and temporal scope. With the advent of satellite-monitored ultra-high frequency (UHF) transmitters, it became feasible to track the movements of these large animals day and night over long distances and for long periods of time. As no manatee telemetry studies had been conducted on the Atlantic coast prior to this study, what little was known of their distribution and movements was mostly obtained through photo-identification studies of uniquely scarred individuals and aerial surveys of particular areas. The intensive time-series of movements generated by satellite tracking opens a different window on manatee biology than that provided by either aerial censuses or photo-identification.

##### 1997 Activities/Accomplishments:

■ The field work for this ongoing study has been nearly completed, spatial database development and quality control continued, and the spatial analysis and data visualization phase was initiated. Eighty-three manatees were tracked between May 1986 and May 1996, resulting in over 70,000 locations between the Florida Keys and Rhode Island (nearly all between southeast Florida and southeast Georgia). Between 18 and 26 manatees were tracked in each full year of field work, for a median duration of seven months (range, 2 days to 6.8 years).

■ Considerable progress was made in updating, error-checking and characterizing four telemetry databases, with emphasis on improving quality

control procedures. The satellite monitored Platform Transmitter Terminal (PTT) telemetry database now encompasses the period from December 1986 through September 1995, while the VHF telemetry and other databases cover the period from May 1986 to May 1996.

■ A progress report describing the field methods, databases, quality control procedures, and preliminary results on movements and spatial use patterns was completed (Deutsch *et al.* 1998). The study has documented individual variation in seasonal movement patterns, migratory behavior in relation to water temperature, areas of high manatee use that vary seasonally, strong site fidelity to warm-season ranges across years, and diel movement patterns.

##### B. Project Title and Summary:

Seagrass ecology in selected manatee feeding areas.

This study was designed to determine the effects of manatee grazing activity on seagrass biomass, species composition, shoot density, and nutritional characteristics, in areas that are exposed to manatee grazing versus those that have been protected from grazing. The results of this research will help biologists to assess impacts and estimate manatee carrying capacity of repeatedly grazed seagrass beds in areas of special significance to manatee conservation. It will also help to document and elucidate the role of manatee grazing in maintaining seagrass species diversity.

Increased awareness of the importance of seagrasses to the future survival of the manatee should also increase public appreciation of the greatly underestimated value of seagrasses in marine and estuarine ecosystems.

*1997 Activities/Accomplishments:*

■ In October 1990, two 12.8 x 12.8 meter manatee exclosures were constructed in a mixed-species seagrass bed in the northern Banana River on the east coast of Florida. A paired open area of the same size was established near each exclosure. Species composition was mapped and random biomass cores were taken of the co-dominant species, *S. filiforme* and *H. wrightii*, in all 4 areas in October, February, and July of 2 consecutive years (through October of 1994). Proximate constituents (protein, carbohydrate, fiber, and total energy) were determined for shoots and roots for both seagrass species in treatment and control areas across seasons. A multivariate analysis of variance (ANOVA) on log-transformed biomass indicated that manatee grazing reduced biomass in the open study areas, but that differences occurred in the impact to and response of *S. filiforme* and *H. wrightii*. The relative frequency of *S. filiforme* and *H. wrightii* changed over time in both open and exclosed areas. The open areas tended toward dominance by *H. wrightii*, the pioneering, early successional species, and the exclosed areas tended toward dominance by *S. filiforme*. It is postulated that, in the absence of manatee grazing, *H. wrightii* is shaded out by the taller, more robust *S. filiforme*. Manatee grazing may help to maintain mixed-species seagrass beds.

**C. Project Title and Summary:**

Determination of manatee use patterns and characterization of seagrass areas important to manatees in Puerto Rico and Vieques Island.

A recovery plan for manatees in Puerto Rico was prepared by the Service in 1986. Tasks outlined in the plan included measures to identify and reduce human-related mortality, identify and protect manatee habitat, and develop criteria and biological information needed for recovery of the Puerto Rico population. Measures for population management and habitat protection specify the need for data from radio-tagged manatees on manatee movements and habitat utilization. Other specific tasks include determination of manatee food habits, mapping the distribution of seagrass beds and sources of fresh water, and

establishing monitoring procedures for important habitat components. As no manatee telemetry studies had been conducted in Puerto Rico prior to this study, what little was known of their distribution and movements was mostly obtained through aerial and ground surveys of particular areas. Remotely monitoring movements of manatees by satellite tracking provides the first insight to the ecology of manatees outside of the continental U.S. Digitizing near shore habitats using aerial photographs enables correlation of manatee use patterns with critical resources.

*1997 Activities/Accomplishments:*

■ Field work for this ongoing study has been completed in eastern Puerto Rico and recently initiated along the western coast. Location databases are handled using the same procedures as those developed for the Atlantic Coast telemetry study conducted by the USGS/BRD. Progress continues on updating, error-checking and characterizing telemetry databases. The PTT telemetry database now encompasses the period from April 1992 through September 1995. Field personnel monitoring the newly tagged individuals have been trained in VHF tracking techniques.

■ Habitat maps for Roosevelt Roads Naval Station (NAVSTAROOSRDS) and draft maps for Vieques Island have been produced. Final reports for the mapping effort are in preparation. Copies will be provided to the U.S. Navy, Puerto Rico Department of Natural Resources (PRDNR), and other interested cooperators.

■ Annual reports to the PRDNR and the U.S. Navy describe the field methods, databases and preliminary results on movements and spatial use patterns. The study has documented individual variation in movement patterns and areas of high manatee use.

**D. Project Title and Summary:**

Reproductive traits and population dynamics of Florida manatees based on photo-identification techniques.

Life history information gleaned from the photo-identification sightings database is needed by Federal and State managers responsible for protecting and recovering this endangered marine mammal. The Service's 1996 Florida Manatee Recovery Plan identifies determination of population parameters based on photo-identification as an

essential action to be taken to prevent the species from declining irreversibly in the foreseeable future. Survival estimates and sighting information are available to all clients to assist with manatee recovery.

*1997 Activities/Accomplishments:*

■ Adult survival estimation for three significant manatee populations (Crystal River, Blue Spring, and East Coast) have been completed for the period from 1977-1993. Photography and accompanying life history data collection are ongoing throughout Florida and southeastern Georgia. Sighting records, identity information, and feature codes, as well as image updates, are entered into the MIPS database on an ongoing basis. Specific queries of the MIPS sightings, feature, and identity databases are reported to State and Federal agencies by request. Survival estimation updates are underway for the years 1994-1996.

■ The MIPS program has been shared with the Florida Department of Environmental Protection (FDEP), and plans are ongoing to enable partners (FDEP, Georgia Department of Natural Resources, Mote Marine Laboratory, and the Service) to access the MIPS database via the Internet.

**E. Project Activities/Accomplishments:**

Manatee response to elimination of a thermal refuge north of the species natural winter range.

The primary objective of this study is to determine manatee response to the loss of a significant warm water refuge in northeast Florida. The USGS/BRD hypothesized that, given elimination of the warm water source in early November 1997: (a) some radio-tagged manatees would move south, particularly to Brevard County, following one or two cold fronts in early winter; (b) some manatees would return to northeast Florida in mid to late winter, depending on cold front patterns and water temperature; (c) manatees staying in northeast Florida would visit the former warm water site at intervals throughout the winter; and (d) manatee movements and general activities in the northeast Florida/southeast Georgia region would be correlated to water temperature fluctuations and tidal regime. The study will also determine manatee use of other thermal refuges in this region, and document manatee mortality in Georgia and northeast Florida during the study period (March 1997-April 1998).

#### 1997 Activities/Accomplishments:

■ Eight manatees were captured and fitted with satellite-monitored radio transmitter assemblies in March 1997, at either the Jefferson Smurfit Corp. effluent basin, or the Georgia Pacific pulp plant in Brunswick, Georgia. Two additional manatees, which had originally been radio-tagged at Jefferson Smurfit in 1996, were re-tagged without capture, one in February 1997 and one in June 1997. Five of these 10 tagged manatees stayed in the study region through Summer 1997; one (TNC-13) ventured as far north as the Broad River in South Carolina. The other 5 travelled south to Brevard County between April and August. Six of the 10 radio-tagged manatees were successfully re-tagged without capture in Summer 1997; the tags of 4 manatees detached at the designed weak-link, and were recovered. We attempted one more capture at Jefferson Smurfit on 10 November 1997, just before the plant shifted their discharge to the off-shore diffuser pipe. A radio-tagged manatee (TGA-04) that had recently arrived in northeast Florida from Brevard County was recaptured with her calf, and found to have recent, deep propeller wounds. These manatees were transported to Sea World for medical care. Another radio-tagged manatee (TGA-06) was killed by a large vessel in the port of Savannah, Georgia, as she began her southward migration in late October 1997. Thus, at the start of the winter study period, 4 radio-tagged manatees remained, 1 in Georgia and 3 in Brevard County.

TNC-13 began her southward migration from South Carolina with a two-month-old calf in early November 1997, much later than anticipated. She stayed in the Savannah River for a month (until mid-December), apparently short-stopped by an industrial discharge. The 25-31°C discharge was sufficient to sustain TNC-13, her calf, and several other manatees sighted at the gypsum plant's discharge pipes, despite ambient water temperatures of 12-16°C. On December 12, when water temperatures dropped below 12°C, TNC-13 and her calf migrated southward. TNC-13 arrived at Jefferson Smurfit on 16 December without her calf. A dead calf was reported at Fort Clinch State Park on 17 December. TNC-13 resumed her southward move, and arrived at a power plant in Brevard County in late December; from there she continued south, reaching Miami in late January 1998.

Two of the 3 manatees which had stayed in Brevard County through the fall moved north to the study region in December 1997, presumably because of relatively mild winter conditions in most of Florida. TBC-23 arrived at Jefferson Smurfit on December 15, and stayed for several days in the vicinity of the unheated, former discharge basin. She also visited the nearby Fernandina Beach city sewage discharge, which was up to 6°C warmer than ambient water temperatures depending on the tidal stage. She then moved a short distance north to the Gilman Paper Co. plant on the North River, where she was sighted with several other manatees. Two previously tagged manatees were detected at the Gilman plant discharge by tracking the sonic devices in their belts (part of the radio-tracking assembly). One of these, (TNC-14, a male) was re-tagged on January 17. TNC-15 left Brevard County on December 29, and arrived at Jefferson Smurfit 4 days later (January 2, 1998). By January 4, she had also moved north to the Gilman plant's discharge. Only 1 radio-tagged manatee has stayed in Brevard County, using the thermal effluents of two power plants in the upper Indian River.

Although the sample size is small and the study is still ongoing, it is clear that manatees have a strong affinity for traditional warm water refuges, and do not necessarily respond to the absence of a former refuge by returning to more distant sites further south, where warmer water is assured. Some manatees may have been born in the study region (e.g., TNC-03 and TNC-14), and may not have developed the typical manatee migratory pattern. Ongoing development of population genetics techniques may help to resolve this question. It is also clear that secondary warm water sites are more numerous than was previously known, and should not be underestimated in attempts to evaluate the impact of thermal effluent elimination.

#### F. Project Title and Summary:

Genetic analysis of the West Indian manatee (*Trichechus manatus*).

Long-term field observations, aided by photo-identification and radio tracking technology, have allowed estimation of manatee reproductive parameters and survival. Recent advances in molecular genetic analysis techniques will allow biologists to further their understanding of manatee kinship-groups (paternity), mating behavior, potential reproductive strategies and

success, and analysis of genetic population structure (matrilines). Specifically, the use of microsatellite "fingerprinting" holds great potential for better understanding of manatee population biology and genetic structure. This information will be necessary in evaluating current and future management and research strategies. Studies of mitochondrial DNA haplotype sequencing have recently been completed by researchers at the Sirenia Project and the University of Florida, and show distinct correlations among fragmented populations of West Indian manatees throughout their range. Currently, progress is being made to isolate specific primers (probes) to be used in manatee specific DNA fingerprinting studies. This work is being conducted in collaboration with researchers at the University of Florida as part of a dissertation by the lead investigator. For the past several years the Sirenia Project has assisted with this project by collecting and archiving tissues to be used in future analysis.

#### 1997 Activities/Accomplishments:

■ A 403 base-pair fragment has been examined in 87 individuals from Florida, Puerto Rico, the Dominican Republic, Mexico, Colombia, Venezuela, Guyana and Brazil, and fifteen haplotypes were identified. Three distinctive mtDNA lineages were observed in *T. manatus*, corresponding approximately to Florida and the West Indies, the Caribbean coast and rivers of South America, and the Atlantic coast and rivers of South America (Garcia-Rodriguez *et al.* 1998). The three *T. manatus* lineages may represent relatively old biogeographic partitions, based on the manatees strong affinity for extensive freshwater habitats in South America, and periodic extinctions of the Florida manatee at the northern end of the species' range during the Pleistocene. The USGS/BRD is awaiting samples from other sites throughout the manatee's range, particularly Central America, to extend these studies of the phylogeography of *T. manatus*. DNA from these samples, as well as others from the Amazonian manatee (*T. inunguis*), the West African manatee (*T. senegalensis*), and the dugong (*Dugong dugon*), will be sequenced to address questions related to phylogeny and systematics of the Order Sirenia. Since mtDNA control region sequences reveal no haplotype diversity in Florida, finer resolution assays are proposed using microsatellite analysis.



### G. Project Title and Summary:

Determination and quantification of the diet of Florida manatees in high-use habitats.

Information on habitat requirements of Florida manatees is needed by Federal and State managers responsible for protecting and recovering this endangered marine mammal. The Service's 1996 Florida Manatee Recovery Plan identified food habits studies as necessary for full recovery of the species. Data obtained will be available to all clients to assist with manatee habitat assessment and utilization. The procedures and results also may be useful to researchers involved in diet studies of manatees in other parts of their range.

#### 1997 Activities/Accomplishments:

■ Some of the laboratory work for this ongoing study has been completed. Analyses on 40 stomach samples from Lee County, 104 from Brevard County, 25 from northeastern Florida and Georgia, and 8 from Puerto Rico have been completed. In addition, 50 samples from southwest Florida have been preliminarily analyzed. Hundreds of additional samples from salvaged carcasses are available and will be prioritized for analysis by site and interest from clients. Fecal samples collected from radio-tagged manatees are examined on a regular, ongoing basis to assess the food habits of specific, known individuals.

*Note scars from propeller strike on Florida manatee*



USGS

### H. Project Title and Summary:

Evaluation of releases of captive-born and captive-reared manatees.

The 1996 Florida Manatee Recovery Plan mandates the development of protocols and guidelines for captive manatee reintroduction, and for evaluation of reintroduction success. This study provides information critical to the development of sound reintroduction protocols. Data on manatee survival, movement patterns, food habits, loss of human-friendly behavior, habitat requirements, blood chemistry, and fat metabolism will allow development of protocols and guidelines, which can be used by Federal and State managers and veterinarians to establish policies for future manatee releases. These guidelines and protocols will also be generally useful to periodically assess the condition of wild manatees in other studies, e.g., before and after habitat changes have been imposed.

#### 1997 Activities/Accomplishments:

■ Since April 1993, 17 captive-reared or captive-born manatees have been released with satellite-monitored radio tags at eight different sites in Florida. On the recommendation of the Interagency/Oceanaria Manatee Working Group, the Service constructed a 4.5 acre enclosure on the Merritt Island National Wildlife Refuge, for the specific purpose of assisting manatees in making a transition to natural environmental conditions. Eight manatees received pre-release

conditioning in the 4.5 acre enclosure prior to their release. Of these, 4 were directly released into the Banana River; 2 were released in Biscayne Bay, 1 was released at Blue Spring in the St. Johns River; and 1 was released in Tampa Bay. Nine manatees were released directly (the majority in south Florida), without enclosure conditioning. Three manatees are known to have died, 7 are known to be alive and in good condition, 1 was rescued and is still in captivity, and the remaining 6 have lost their tags. The longest tracking period for an individual manatee thus far is 2.5 years. One captive-born manatee crossed Florida Bay from the east coast to the west coast, and another crossed from the west coast to the east. These are among the first records of manatee movement between the east and west coasts of Florida. The study has documented individual variation in survivability through winters, seasonal movement patterns, areas of high manatee use, strong site fidelity to warm-season ranges across years, and diel movement patterns. Data on blood chemistry, hematology, and body condition (blubber thickness) have been collected both pre- and post-release for most of the manatees studied. Progress reports have been presented at biannual meetings of the Interagency/Oceanaria Manatee Working Group. A workshop hosted jointly by Service, the USGS/BRD, FMRI, and Sea World is being planned for St. Petersburg, Florida, for May 26-27, 1998, to review progress to date, and develop appropriate protocols and guidelines. (Note: This workshop was held as planned.)

## 5. Southern sea otter

### A. Project Title and Summary:

Population biology of sea otters.

The goals of this project are to evaluate trends in the California sea otter population and causes for its low rate of increase. A baseline of information on distribution, abundance, and mortality is necessary to determine current and future population status, which is of particular importance to the Recovery Plan for the threatened California sea otter population. The study obtains demographic and behavioral information for sea otters in California, and from several other populations of known status. Causes and consequences of differences among these populations will be evaluated and population modeling will be used in the analysis. The work is conducted through censuses, coordination of a beached carcass salvage

network and mortality database maintenance, monthly systematic surveys for beach-cast carcasses, and studies comparing demography and behavior of sea otter populations in California, Washington, and Alaska in order to determine the reasons for the low growth rate in the California population. In addition, there are several associated studies of the effects of contaminants on sea otters.

#### *1997 Activities/Accomplishments:*

■ Survey data for the California sea otter population, accumulated from the early 1980s through 1994, indicated a steady rate of increase of about five percent per year. However, population counts made from 1994-96 suggested that the rate of increase in the California sea otter population might be approaching zero or even becoming negative. The 1997 survey data add further to that concern. A cessation of population growth is particularly evident in the spring survey results, which have traditionally been used as the best index of population status and change. The possibility that the sea otter population in California is experiencing an altered growth trajectory is especially notable in view of the fact the recovery criterion, as proposed by the Southern Sea Otter Recovery Team, might not be achieved in the anticipated time frame. It has now become clear that this is the case and that a fundamentally different management strategy might be needed to achieve recovery.

■ Field research on sea otters in Washington continued. Fourteen sea otters were captured in Washington in 1997; thirteen were surgically implanted with radio transmitters. For the first time a winter capture was conducted in February 1997. The objective was to capture and instrument individuals inhabiting the Strait of Juan de Fuca during the winter months so their seasonal movements could be monitored. Otters have reoccupied this area only recently and their numbers decline dramatically during the summer months. All otters captured in February were males. Only one independent male was captured in August; the rest were females and pups. Monitoring of all instrumented otters continued. Data collection on foraging behavior, reproduction, time/activity budgets and movements continued. A second subtidal survey was conducted in 1997 to document changes in nearshore communities as sea otters reoccupy the historic habitat. The subtidal surveys and

increased foraging work were supported by the Olympic Coast National Marine Sanctuary.

■ Field work on similar projects was begun at Adak and Shemya islands in the Aleutian archipelago with support from the Department of Defense and in collaboration with partners including the University of California at Santa Cruz, the Alaska Maritime National Wildlife Refuge, the U.S. Navy, the U.S. Air Force, and the USGS/BRD's Alaska Biological Science Center. The Adak project was completed and a final report has been submitted to the U.S. Navy. This work has led to several unexpected findings. The first was high levels of organochlorines in sea otters at Adak Island. This finding, published in 1997, has led to subsequent research where the USGS/BRD is endeavoring to determine the source of these compounds and their possible effects on sea otter populations. Results indicate that PCB compounds are coming from several specific sites in the Aleutian archipelago, and that elevated levels in the marine ecosystem are limited to localized areas around these sites. Pesticides, in contrast, seem to be coming from more distant sources. The second is that the sea otter population at Adak Island has declined precipitously during the past several years. It is now evident that these declines are widespread throughout at least many of the Aleutian Islands, and that the likely cause is recently increased predation by killer whales. This may represent redirected foraging behavior by the whales following the virtual local extinctions of sea lions and harbor seals from the central and western Aleutian archipelago.

■ Range expansion of the Washington sea otter population to east of Cape Flattery, an area devoid of sea otters since the fur trade period, continues. The July 1997 population survey resulted in a count of 502 which is 16 percent above the 1996 count. The annual rate of population growth since 1989 is about 12 percent, whereas for the period prior to 1989 it was more than 20 percent. Thus, while the sea otter population in Washington continues to grow, the rate of population increase may be declining. A large group of males is now foraging and resting a few kilometers east of where they were in 1996. Additionally, a group of about 30 females and pups is using the area between Tatoosh Island and Neah Bay. The USGS/BRD's subtidal habitat survey has shown that sea urchins are abundant in the waters adjacent to Tatoosh Island,

but the survey did not detect any discernible differences in urchin abundance between 1996 and 1997. However, with the increased use of the area, the USGS/BRD predicts that some major structural changes in the nearshore marine community will begin. It is hoped that these changes will be detected during subsequent habitat surveys.

■ Information on sea otter birth rates and mortality are now available for comparison among Amchitka Island, Kodiak, and central California. These data demonstrate that age-specific birth rates are similar, but patterns of mortality vary substantially. Both Amchitka and California have pre-weaning mortality rates of about 50 percent, whereas the Kodiak rate is closer to 15 percent. Information obtained from Adak Island shows a similar birth rate, but a highly elevated probability of mortality most likely explains the recent population decline in that area.

■ By the end of 1997 over 10,000 foraging records had been accumulated from south of Cape Flattery (Cape); and over 1500, and increasing, records from east of the Cape. Preliminary analysis indicates foraging otters south of the Cape have a catholic diet with no one prey species dominating. East of the Cape, however, about 70 percent of the diet by number taken are red sea urchins (*Strongylocentrotus franciscanus*). This urchin species accounts for less than 1 percent of the sea otter's diet to the south. Subtidal surveys conducted by the Washington Department of Fish and Wildlife and the USGS/BRD indicate urchin populations have declined significantly in some areas east of Cape Flattery. As the period of occupation increases east of Cape Flattery, the prey base undoubtedly will change and this change should be reflected by future foraging observations collected in the study. Sea urchins are expected to become less important as the otter's diet becomes more diverse.

■ Five trips to San Nicolas Island (SNI) were made in 1997 to monitor the translocated sea otter colony. The second highest count of independent sea otters (16) since 1989 was obtained in 1997 (the highest was 17 in 1996). Distribution of otters is changing, with more observations off the north and northwest shores of the island. Five births were documented in 1997, bringing the total number of pups born at SNI to 47. There

is evidence of some recruitment to the colony, but most weaned pups are being lost either to mortality or emigration. This latter finding is surprising in view of: (1) the abundant food resources at SNI; (2) the known tendency of weaned pups, particularly females, to remain within the confines of their parent population, usually near the natal site; and (3) the growth characteristics of relocated colonies of sea otters elsewhere within the species' range.

### **B. Project Title and Summary:**

Interactions between sea otters and nearshore ecological communities.

The goal of this study is to evaluate the generality, breadth, and evolutionary consequences of the interactions between sea otters, the benthic invertebrates on which they prey, and the kelp forest ecosystems in which these invertebrate herbivores graze and sea otters live. Work focuses on the role of sea otter predation on California habitats, but includes additional comparative studies across the Pacific rim and work on indirect influences on other food web components (e.g., coastal fishes, coastal-feeding sea ducks, subtidal asteroids, and kelp assemblages).

#### *1997 Activities/Accomplishments:*

■ A study involving sites in California, Australia, and New Zealand to test the hypothesis that the intensity of predation on benthic invertebrates is less in the southern than the northern hemisphere, was completed. Additional work on the generality of the sea otter's influence on kelp forests in California and Mexico was initiated.

■ Relationships between sea otters and kelp forest communities in British Columbia are similar to those that occur in southeast Alaska. In general, areas lacking sea otters have been deforested by urchin grazing and those with well-established sea otter populations are characterized by well-developed kelp forests. The mechanism of change was found to be closely tied to the behavioral response of sea urchins to damaged conspecifics. Otters discard the uneaten exoskeletons of their prey, which sink to the bottom. Living urchins flee from the remains of dead urchins, thus creating halos within which kelps rapidly recruit and grow.

■ A field study of the population structure and predatory role of subtidal sea stars at Attu Island was completed. This study involved a comparison of data

gathered in the late 1970s and early 1980s when otters were absent from most of Attu, with data gathered in 1994, after otters had become reestablished. Long-term data show that the abundance of predatory sea stars declined by more than an order of magnitude following the recolonization by sea otters. Sea stars prey on mussels and barnacles, and thus the mortality rates of these invertebrates declined substantially with the arrival of otters. Both sea otters and sea stars have been shown to function as "keystone species". These findings are of basic interest to community ecologists because they show how the role of one keystone species can be altered by the influences of another.

■ Sea urchins are an important element of kelp forest ecosystems. The influence of unregulated urchin populations on these ecosystems can be dramatic because of the tendency of urchins to overgraze kelp stands. This tendency seems to depend most strongly on: (1) the extent to which urchin populations are limited by predation, and (2) sea urchin behavior. Over the last several years, USGS/BRD work has begun to focus on the interaction between these two factors. Research on sea urchin refuging behavior shows that where fish predation is strong, the urchins hide during the day and come out at night to forage. Accumulating information suggests that this behavior is genetically fixed in tropical species (where predation intensity is strong) and genetically plastic in temperate species (where predation intensity is spatially and temporally variable).

■ A study of the influence of marine reserves within the Monterey Bay National Marine Sanctuary was completed. Results show that the density and size of rockfish (*Sebastes* spp.), a commercially and recreationally important group of species, are significantly greater in reserve than non-reserve areas.

■ Sea urchins are the main food staple of sea otters in many areas. Results from studies conducted over many years are beginning to show some intriguing geographical patterns in the nature of interactions between sea otters and sea urchins. High density otter populations are capable of reducing the abundant urchin populations to local commercial extinction in a single year. The USGS/BRD has found that urchin populations on oceanic islands are sustained by: (1) heavy annual

recruitment, and (2) emigration from deep water. These processes are responsible not only for maintaining the urchins, but for sustaining remarkably high density otter populations. These processes seem to change along the continental margins, apparently due to changes in coastal currents (which transport urchin larvae away from shore) and the accumulation of shallow-water sediments which block the emigration of urchins from deep water. This may explain why equilibrium density sea otter populations are so much greater on oceanic islands than they are along the continental shelf of North America.

USGS/BRD studies at Amchitka Island have shown that whereas sea otter populations normally are maintained by coastal production, these food webs are occasionally massively subsidized from the oceanic realm in the form of inshore spawning migrations of smooth lumpfishes. These episodic food subsidies appear to release the otter populations from food limitation, thus altering both their foraging behavior and demography.

■ Diving surveys completed in the summer of 1997 have shown that kelp forest ecosystems have collapsed in areas of western Alaska where sea otter populations have declined.

# Enforcement

The Service's Division of Law Enforcement investigates known, alleged or potential violations of the Act involving illegal take or importation of marine mammals or their products for which the Service is responsible. In addition, it assists the NMFS by making apprehensions and conducting investigations in cases involving endangered or threatened species under that agency's jurisdiction. Results of these efforts are referred to the NMFS for its consideration and appropriate action. However, under a NMFS/Service Memorandum of Understanding, the Service retains authority over those investigations that involve endangered or threatened species under the jurisdiction of the Department of the Interior. Violations are referred to the Department of the Interior's Office of the Solicitor for civil action or the Department of Justice for criminal enforcement action.

Service wildlife inspectors are stationed at five designated ports and six border ports in the Pacific Region to closely monitor wildlife entering the country to detect the illegal importation of marine mammals and marine mammal products. Emphasis is placed on the designated wildlife ports of Seattle, Portland, San Francisco, Los Angeles, and Honolulu. Special border ports on the Washington/Idaho-Canada border, the California-Mexico border, and at Agana, Guam, continued to receive special attention. Wildlife inspectors reported a total of 79 incidents involving the illegal importation of marine mammals in 1997. Seizures involved products manufactured from walrus ivory, polar bear, dolphin and whale bone, and sperm whale teeth.

Special agents in California participated in two law enforcement task forces during 1997, both designed to monitor conflicts between human activity and marine mammals and identify any violations of Federal or State laws which protect marine mammals. The Service, along with the California Department of Fish and Game (CDFG), the NMFS, and the U.S. Coast Guard began a series of

off-shore patrols to monitor the rapidly growing "live trap" commercial fishery in California. The growing demand for seafood caught, transported, and sold live, for human consumption has resulted in a dramatic rise in the number of live wells, or traps used by the commercial fishing industry. These traps are baited and as such represent a potential hazard to marine mammals including the southern sea otter. These efforts have not, however, identified any sea otter deaths to date.

The Service was requested and agreed to participate in a multi-agency law enforcement task force along the central coast of California to address the growing problems associated with a large and increasing population of elephant seals in the area of San Simeon, California. The Service is currently in the final stages of acquiring land adjacent to the seal's haul-out area as a national wildlife refuge. Service special agents along with enforcement officers from CDFG, NMFS, California Highway Patrol, and several county sheriff departments have come together to share patrol responsibilities to address the conflicts which arise from tourists (sometimes as many as two hundred per day) who enter areas closed to the public. A public outreach effort has also begun which involves volunteer "docents" who contact people in the area and inform them of the closed areas and why encroachment may be both harmful to the seals and dangerous to them. Several citations for violations of the Act and the National Marine Sanctuary Act have been issued.

Special agents and wildlife inspectors based in southern California continue their active participation in the Asian Medicinal Task Force established to address the rising number of incidents of the unlawful importation of traditional Asian medicines which often contain protected wildlife including marine mammals. The U.S. Customs Service, the Food and Drug Administration, the U.S. Public Health Service, and a number of State agencies have combined their enforcement resources to inspect

shipments entering the United States via passenger baggage, air and sea cargo, and international mail. Additionally, the Task Force has conducted a number of unannounced inspections at facilities known to use and sell these products. These efforts have documented numerous violations ranging from simple seizures of products to criminal indictments.

In the State of Washington during the execution of a search warrant, a fresh walrus tusk was found in the possession of a subject not authorized to possess it. In a subsequent proceeding, the subject pled guilty in U.S. District Court, and was sentenced to six months in jail to be served concurrently with other charges. In another Washington case, a subject working on a commercial fishing boat illegally imported two walrus tusks. He subsequently paid a \$500 fine in U.S. District Court and abandoned the tusks.

In January, an Oregon man pled guilty to one Lacey Act felony count for purchasing Alaskan polar bear hides, which he would cut into small strips and sell nationally as fly-tying material. The man explained to a Service undercover agent how he concealed his illegal activity by claiming the polar bear fur came from old clothing trimmed with the fur which would be exempt from the provisions of the Act. The subject was sentenced in Portland in April, receiving a \$2,000 fine, three years of supervised probation, and 200 hours community service.

A joint task force operation was conducted on the Banana and Indian Rivers in Brevard County, Florida, as a result of a request from Service biologists who supplied data indicating that an inordinate number of manatee deaths were resulting from collisions with boats. During a five week period in July and September, 1997, a total of 53 Service enforcement officers (special agents and refuge officers) enforced boat speed restrictions in areas posted by the State of Florida, which were established for the protection of manatees. Service officers apprehended 313 boat operators violating

boat speed restrictions in the manatee protection areas. Of the 313 violators, 297 forfeited \$29,710 in fines; one was found guilty after trial before the local magistrate and fined \$200 plus a \$10 special assessment; two were acquitted after trial (civil cases have been filed); and cases are pending on the remaining thirteen.

Guards at the Palmer Correctional Facility north of Anchorage, Alaska, requested assistance from Service agents twice during the year. The first time, they intercepted a cooler containing two walrus skulls and four walrus tusks which had been delivered to one of the inmates. The guards became suspicious when Service tags affixed to the items appeared to have been tampered with, and one skull and two tusks appeared to have been dyed to make them appear fossilized. Agents determined that the tags had been fraudulently attached to these items, probably in an attempt to "hide" illegal ivory. The investigation continues.

Guards at the same facility alerted agents a second time when they intercepted two more walrus tusks which again bore tags that appeared to have been tampered with. Agents determined that the tags used were actually issued to ivory from an animal of a different sex and different size. Civil action is pending in this case.

In May, special agents from the Fairbanks, Alaska, field office responded to information received from a Service employee regarding the suspected wasteful take of walrus at Little Diomed Island, an island in the Bering Sea along the Russian border. Traveling to the Island by helicopter and conducting interviews with hunters and other residents, agents determined that eight Alaska Native hunters had returned to the Island from a walrus hunting trip with 33 walrus heads in their boat and far less meat and other parts required by the Act and by Service policy. Five of the hunters had been charged in 1992 with wasteful take of walrus and served jail sentences.

An investigation involving the wasteful take of a walrus on St. Paul Island was successfully resolved through an agreement between the Service and the St. Paul village government. The subject, who killed the walrus and took only the head, completed 100 hours of community service and alcohol abuse counseling under the direction of the village

government. The walrus head, which had been seized by agents, was donated to the village school for education purposes.

During the first week of November, Alaska Special Agents, in cooperation with the Service's Marine Mammals Management Office in Anchorage and the Eskimo Walrus Commission, participated in the 1997 Walrus Harvest Monitoring Project conducted by the Service by attending hunter meetings in Native villages on St. Lawrence Island and the Seward Peninsula. The meetings serve as a cooperative forum for the mutual exchange of information, updating hunters on current events, and the discussion of policies and results related to walrus harvesting. Agents are involved in similar outreach activities in other areas of Alaska throughout the year.

Anchorage agents received three separate complaints from high school students at Chignik Bay, a remote village over 500 miles southwest of Anchorage on the Alaska Peninsula, regarding the illegal shooting of a sea otter. Agents investigated and identified a suspect who subsequently confessed. The man was cited and paid a \$500 fine.

An Idaho man was cited for illegally obtaining raw walrus ivory from Alaska Natives near Togiak. The man worked as a sport-fishing guide during the summer at a lodge that specialized in fishing trips within the Togiak National Wildlife Refuge. Investigation by Alaska Special Agents revealed that he was trading alcohol for the ivory. Many villages in the area prohibit the sale or possession of any alcoholic beverage. During the investigation, agents seized several walrus tusks that the individual was attempting to mail in tubes labeled "fishing rods" to a location in Utah. The man was cited for violating the Act and the Lacey Act and paid \$1,500 in fines.

Agents investigated the sale of a walrus head and tusks to a Seldovia man from a man in Nelson Lagoon who reportedly found the head on the beach. Both men cooperated and claimed ignorance of the law. The buyer voluntarily abandoned the head and tusks; the seller was cited and paid a \$250 fine.

Agents received a tip from biologists on the Togiak National Wildlife Refuge that a hunting party from Togiak had killed a walrus on the refuge and took only the tusks and a very small amount of meat, leaving the rest to rot. Agents investigated and subsequently obtained

an admission from a Togiak hunter; he was cited and paid a \$250 fine.

A Barrow man has been charged with three counts of violating provisions of the Act related to his offering to sell a polar bear hide in Anchorage and Oregon. The final offer was made to a Service undercover agent who seized the hide in an Anchorage hotel. Prosecution is pending.

The Clark R. Bavin National Fish and Wildlife Forensics Laboratory, located in Ashland, Oregon, analyzed 12 cases in 1997 that involved marine mammals; species identified included dugong (2), manatee (1), sea otter (3), polar bear (2), and sperm and killer whales (4).

Marine mammal research conducted by Laboratory personnel resulted in three scientific publications in 1997: Scribner, et al, Population Genetic Studies of the Walrus: A Summary of Available Data and Interpretation of Results; Scribner, et al, Population Genetic Studies of the Sea Otter: A Summary of Available Data and Interpretation of Results; and Kretzmann, et al, Low Genetic Variability in the Hawaiian Monk Seal.

# Permits and Registrations

The Act prohibits the take or import of marine mammals and marine mammal products. Exceptions may be made under permits for scientific research, public display, import of sport-hunted trophies of polar bears taken in Canada, photography for educational or commercial purposes, beached or stranded marine mammals that are designated as non-releasable under the Act, or to enhance the survival or recovery of a species or stock. Another exception streamlines the permitting process for conducting scientific research by allowing a General Authorization for the incidental take of marine mammals by Level B harassment in the course of bona fide scientific research.

In order to enable marine mammal hides to be tanned and to facilitate trade of products among Alaskan Natives, registered agent/tannery permits may be issued to non-Alaskan Natives (i.e., persons other than Alaskan Indians, Eskimos, or Aleuts). Registered agents may purchase and sell raw parts and tanned skins from, and to, Alaskan Natives or other registered agents, provided that only authentic Alaskan Native handicrafts or clothing may be purchased or sold in interstate commerce. Raw parts may be transferred (not sold) to registered tanners for further processing. Registered tanners may transfer (not sell) parts received for processing to Alaskan Natives or registered agents only.

Section 104 of the Act authorizes the Director of the Service, acting on behalf of the Secretary of the Interior, to issue permits for the activities identified above. Applicable provisions are found in Title 50 of the Code of Federal Regulations—50 CFR 18.23(d) for registered agent/tannery permits, 50 CFR 18.30 for sport-hunted polar bear imports, and 50 CFR 18.31 for scientific research or public display permits. During 1997 the Service finalized the regulations proposed in 1995, to establish application procedures and make legal and scientific findings to allow for the issuance of permits under section 104(c)(5)(A) of the Act to import personal

sport-hunted polar bear trophies taken in Canada. Regulations will be developed for issuance of

permits for enhancement of the survival or recovery of a species or stock, photography for educational or commercial purposes, and beached or stranded marine mammals that are designated as non-releasable under the Act.

During 1997 four new permits were issued, and three permits were amended or renewed for scientific research. Ten permits were issued for public display. Eleven parties either registered or renewed their registration as agents and/or tanneries. One hundred and thirty one permits were issued for import of sport-hunted polar bears from Canada (Table 1).

The following is a brief description of other permit actions taken in 1997.

## Scientific Research Permits

1. Permit 766818, reissued February 7, 1997, through February 7, 2002, to the Alaska Biological Science Center for scientific research of Alaskan sea otters and California sea otters as described in the 1993 annual report.

2. Permit 801562, amended July 17, 1997, and October 1, 1997, through December 31, 2000, to the Alaska Biological Science Center for scientific research of Pacific walrus. The permit was amended in July to include the use of specific alternative drugs for immobilizing walrus and authorize helicopter over-flights. The October amendment authorizes the use of unspecified new drugs and new drug combinations to immobilize walrus.

3. Permit 740507, reissued May 15, 1997, through May 15, 2002, to the Alaska Biological Science Center for scientific research of Alaskan sea otters as described in the 1994 annual report.

**Table 1. Polar Bear Trophy Import Permits Issued in 1997 by Population<sup>1,2</sup>**

<i>Approved Populations</i>	<i>Permits Issued</i>	<i>Deferred Populations (Pre-Amendment only)</i>	<i>Permits Issued</i>
McClintock Channel	24	Baffin Bay	3
Northern Beaufort Sea	40	Davis Strait	2
Southern Beaufort Sea	32	Foxe Basin	5
Viscount Melville	5	Gulf of Boothia	1
		Lancaster Sound	19
Subtotals	101		30
<b>Total = 131</b>			

<sup>1</sup> Populations approved or deferred as per the Service's February 18, 1997, final rule [62 FR 36382]. The Norwegian Bay and Kane Basin populations are new populations and are presently considered "deferred" populations by the Service.

<sup>2</sup> No applications for permits were received for bears taken in the following populations: (Approved) Western Hudson Bay; (Deferred) Southern Hudson Bay, Queen Elizabeth Islands, Norwegian Bay, and Kane Basin.

4. Permit 831922, issued September 3, 1997, through September 3, 2002, to Sea Research Foundation for import of up to 200 polar bear serum samples previously obtained by Canadian researchers for scientific research related to morbillivirus infection.

5. Permit 832903, issued December 22, 1997, through December 22, 2002, to the University of Alaska Museum, for import of polar bear and Pacific walrus biological samples from Canada and the Russian Federation and for re-import of polar bear and Pacific walrus biological samples previously loaned to researchers in foreign countries.

6. Permit 834120, issued October 30, 1997, through October 30, 2002, to the Alaska Biological Science Center, for import of up to 100 salvaged specimens of sea otter for the purpose of scientific research including investigations of die-off events and collection of biological information.

7. Permit 834406, issued November 26, 1997, through November 25, 2002, to the Mote Marine Laboratory, for opportunistic take of blood samples from manatees held in captivity in Florida for scientific research of the manatee cellular immune function.

#### **Public Display Permits**

1. Permit 824699, issued April 3, 1997, through April 3, 2002, to Luther College to import a polar bear skull, salvaged by the Ontario Ministry of Natural Resources, for purposes of public display and scientific research.

2. Permit 822531, issued January 21, 1997, and amended and re-issued effective February 18, 1997, through January 21, 2002, to the Point Defiance Zoo to import two orphaned polar bear cubs from Canada for the purpose of public display. The permit was amended to correct identification information.

3. Permit 823259, issued January 27, 1997, through January 27, 1998, to the Oregon Coast Aquarium to import and re-export one northern sea otter from, and to, Vancouver Aquarium, Canada, for the purpose of public display.

4. Permit 821744, issued February 19, 1997, through February 19, 2002, to the Chicago Zoological Park to import three Pacific walrus for the purpose of public display.

5. Permit 823560, issued February 24, 1997, through February 24, 2002, to Sea World, Inc., Orlando, Florida, to import one captive-born female polar bear from Germany for the purpose of public display.

6. Permit 823561, issued February 24, 1997, through February 24, 2002, to Sea World, Inc., Orlando, Florida, to import one captive-born male polar bear from Germany for the purpose of public display.

7. Permit 834418, issued November 20, 1997, through November 20, 2002, to The Seattle Aquarium to take for public display one female northern sea otter which was recovered as an orphaned pup in Alaska.

8. Permit 827717, issued November 3, 1997, through November 3, 1998, to Helmuth Pfennig to import for the purpose of public display one fully mounted polar bear legally hunted in the Northwest Territories, Canada.

9. Permit 832098, issued September 15, 1997, through March 14, 1998, to Le Grand Aquarium de Saint-Malo to take up to 24 and export two northern sea otters to France for public display.

10. Permit 834423, issued September 15, 1997, through March 14, 1998, to Oceanario de Lisboa to take up to 24 and export six northern sea otters to Portugal for public display.

#### **Registered Agent/Tannery Permits**

1. Permit 704234, renewed the registration of Richard Stewart, The Bears Den, Inc., Olympia, Washington, as an agent on November 24, 1997.

2. Permit 748545, renewed the registration of Alaskan Treasures, Anchorage, Alaska, as an agent on February 19, 1997.

3. Permit 764052, renewed the registration of D. Cohn Fur Processors, Inc., Greenville, South Carolina, as a tannery on September 16, 1997.

4. Permit 797559, renewed the registration of Chukotka-Alaska, Anchorage, Alaska, as an agent on March 21, 1997.

5. Permit 799658, renewed the registration of Prince of Wales Taxidermy, Craig, Alaska, as an agent on July 10, 1997.

6. Permit 809257, renewed and amended the registration of Jenny Pompura, Anchorage, Alaska, as an agent on February 19, 1997.

7. Permit 824291, The Wildlife Gallery, Inc., Blanchard, Michigan, was registered as an agent on February 5, 1997.

8. Permit 826563, Association of Village Council Presidents, Bethel, Alaska, was registered as an agent on March 26, 1997.

9. Permit 827696, Louie Szurleys, Ward Cove, Alaska, was registered as an agent on April 28, 1997.

10. Permit 831167, Shawn McCrary, Palmer, Alaska, was registered as an agent and a tanner on July 10, 1997.

11. Permit 831726, Quality Fur Dressing Company, Spring, Texas, was registered as a tannery on November 26, 1997.

# International Activities

## **U.S.-Russia Environmental Agreement: Marine Mammal Project**

The Service, in partnership with the USGS/BRD, NMFS, State of Alaska, and colleagues from universities and non-governmental organizations, joined staff of the Russian State Fisheries Committee, Russian Academy of Sciences, and Russian State Committee for Environmental Protection in conducting marine mammal management and research activities in 1997. Under the auspices of the bilateral marine mammal project, four U.S. personnel traveled to Russia, while 26 Russians traveled to the U.S. for cooperative activities.

One Russian walrus specialist cooperated with staff of the University of Alaska in Fairbanks for two weeks in January for analysis and reporting of data pertaining to Pacific walrus morphometrics.

A nine person Russian delegation attended the fourteenth biennial U.S.-Russia Marine Mammal Project meeting, held on Oahu, Hawaii, in April. The two sides reported on research and management activities and developed plans for cooperative field work.

One Russian scientist visited the U.S. for three weeks in April to participate in gray whale (*Eschrichtius robustus*) cow-calf surveys in California waters.

Three Russian marine mammal specialists attended the 25th Anniversary Meeting of Area V of the U.S.-Russia Environmental Agreement held in Washington, D.C., in June. Presentations addressed the history of bilateral wildlife conservation efforts. Russian Chairman of the State Committee on Environmental Protection, Viktor Danilov-Danilyan, addressed the group. U.S. Department of the Interior Secretary Bruce Babbitt also met with meeting participants.

One Service specialist visited Russia for one month in the third quarter of the year to discuss Pacific walrus abundance and distribution, and to conduct examinations of Chukotka Peninsula haulouts.

In August, a Russian researcher joined U.S. colleagues in Alaska for studies of ice-associated harbor seals (*Phoca vitulina*).

One Russian specialist visited Alaska in September and November for work with Alaska Department of Fish and Game (ADF&G) scientists to complete analyses of satellite tag data on spotted seals (*Phoca largha pallas*) and prepare the results for publication.

The sixth biennial U.S.-Russia Sea Otter Workshop was held in Forks, Washington, in November. The Workshop was attended by eight delegates from the Russian Federation, and thirty-six Federal, university and non-governmental delegates from the United States. Additionally, the attendance of representatives from Canada and Japan was welcomed. Topics included population status and trends, ecology and resource interactions, health status, mortality patterns, genetics, and captive biology and husbandry.

Cooperative research and monitoring of gray whales (*Eschrichtius robustus*) off Sakhalin Island was addressed at a November meeting in Seattle, Washington, attended by two Russian specialists.

In December, one NMFS cetacean specialist traveled to Moscow to meet with Russian officials during the annual meeting of the U.S.-Russia Area V Working Group on Cooperation in the Field of Environmental Protection. The U.S. Area V marine mammal project leader (NMFS) and Area V coordinator (Service) also participated in the meeting.

Throughout 1997, the U.S. and Russian sides continued their dialogue on improved management of the shared Alaska-Chukotka population of polar bears.

## **Review of the 1973 International Agreement on the Conservation of Polar Bears**

The provisions described in this section concern both the domestic and international review of the effectiveness and implementation of the 1973 International Agreement on the Conservation of Polar Bears, and consultation with Russia concerning cooperative research and management programs.

In 1995 the United States conducted a review of U.S. implementation of the Agreement, as directed in the 1994 amendments to the Act. A draft report to Congress has been prepared and is pending review within the Department.

Regarding international implementation of the 1973 Agreement, Section 113 of the Act requires the Secretary of the Interior to consult with the other signatories to the Agreement to review its effectiveness and to establish a process for future reviews. In February 1997, the Service initiated this review by writing to the four other contracting parties. By the end of 1997, responses had been received from Canada, Greenland, and Norway. A response from Russia is expected in 1998.

Canada believes that the 1973 Agreement is being effectively implemented in Canada and that further review is unwarranted. Improvement can be made for populations that lack adequate population and/or harvest data.

The hunting regulations in Greenland address the provisions of the 1973 Agreement through the protection of denning females and females with cubs, encouragement of traditional hunting practices, and protection of certain habitat areas from hunting. Although the current population and harvest data are poor and the concept of sustainable harvest is not well developed, effort is being made to improve harvest monitoring. As of January 1993, Greenland residents are required to obtain permits to hunt polar bears; this requirement has allowed for increased



monitoring and collection of information. Greenland considers the 1973 Agreement to be successful and does not believe that further review is warranted.

In Norway, hunting polar bears is prohibited and all important habitat, except offshore in the Barents Sea, is protected. Development of industry and tourism in the Barents Sea has the potential to impact polar bears and is of concern with respect to compliance with Article II of the 1973 Agreement. An Environmental Impact Assessment to address oil and gas development in the northern Barents Sea is being developed. As with Greenland and Canada, Norway considers further review of the effectiveness of the 1973 Agreement unnecessary.

Overall, the countries party to the 1973 Agreement believe that the 1973 Agreement is working well and provides a sound foundation for conservation and management of polar bears in the Arctic region. The United States, Canada, Greenland, and Norway agree that oversight of the 1973 Agreement through the Polar Bear Specialist Group is an adequate means for periodically reviewing the implementation and effectiveness of the 1973 Agreement and that further review is unwarranted.

#### **U.S.- Russia Bilateral Polar Bear Agreement**

The Service continues work on the development of a conservation agreement between the United States and Russian governments. The purpose of this agreement is to provide for effective conservation and management of the polar bear population in the Chukchi/Bering Seas through regulation of take, conservation of habitat, and coordinated research and management programs. The treaty between the United States and Russia would provide the basis for developing a unified and comprehensive management program which includes provisions for regulation of take (quotas), enhanced bio-monitoring and research opportunities, increased habitat conservation, and non-consumptive as well as consumptive uses. The treaty between governments would be implemented in part through a companion Alaska-Chukotka Native-to-Native agreement and would be consistent with the 1973 Agreement. Oversight of the implementation would be through a joint commission of government and Native representatives from each country. (Note: Delegates from the United States and Russian



Steve Arnstrup

*Arctic walrus*

Federation Government, and Native representatives from Alaska and Chukotka attended a meeting in Eastsound, Washington, during February 6-13, 1998, the purpose of which was to negotiate the treaty language.)

#### **Walrus Activities Under the Area V Environmental Protection Agreement**

The Pacific walrus is represented by a single stock of animals which inhabits the Bering and Chukchi Seas. The population ranges across the international boundaries of the U.S. and Russia, and both nations share common interests with respect to the conservation and management of this species. Over the past 25 years, the U.S. and Russia have carried out many cooperative studies on walrus under the Area V Environmental Protection Agreement.

In April 1997, Service staff attended a Marine Mammal Working Group meeting to exchange walrus harvest information and plan for future cooperative studies. In August, a Service biologist traveled to Chukotka Russia to participate in walrus haulout monitoring studies at Rudder and Meechkin Spits, the two main walrus haulouts in the Gulf of Anadyr. One of the goals of this trip was to discuss development of coordinated Russia/U.S. walrus haulout and harvest monitoring programs.

#### **U.S.- Russia Pacific Walrus Conservation Treaty**

The need to address international conservation issues such as monitoring the status and trend of the Pacific walrus

population, meeting Native subsistence needs, and assessing potential impacts resulting from commercial activities, are recognized priorities for Government officials and Native leaders in both countries. In 1995, representatives of the U.S. and Russia met in Petropavlovsk-Kamkchatskiy, Russia, for discussions on joint conservation and management activities and the need for a bilateral agreement for the conservation of Pacific walrus. During the meetings, joint protocols were issued that established a basis for future discussions leading towards bilateral agreements that would provide for the conservation, research, habitat protection, and Native subsistence use of Pacific walrus.

In November 1997, an informal working group consisting of representatives of Federal and State agencies, Alaska Native organizations and non-government organizations held a meeting to consider proposed objectives and guiding principles for a walrus conservation agreement between the United States and Russia. Participants agreed that international coordination would further the conservation of the Pacific walrus population, and recommended that Alaskan Natives should be fully involved in the development of the proposed conservation agreements. The working group also recommended that initial efforts to develop an international conservation agreement for walrus should focus on consultations with affected parties in the United States.

# Status Reports

## Stock Assessments

The 1994 amendments to the Act included new Section 117 requiring the Service and the NMFS to prepare, in consultation with Scientific Review Groups created by Section 117, stock assessment reports that assess the current status of all marine mammals occurring in waters of the United States. Each stock assessment report is to include a description of the stock's range, a minimum population estimate, current population trends, current and maximum net productivity rates, optimum sustainable population levels, and estimates of annual human-caused mortality and serious injury; and a potential biological removal level is to be calculated and included. The Act defines potential biological removal level as the "...maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population."

Appropriately, the Service during 1995 completed Stock Assessment Reports for all marine mammal species under Service jurisdiction occurring in waters of the United States. These include Pacific walrus, polar bears, and sea otter in Alaska, sea otters in Washington State and California, and manatees in the southeastern United States. Notice of their completion and availability was announced in the FEDERAL REGISTER on October 4, 1995 (60 FR 52008). These reports contained information regarding the distribution and abundance of the stocks, population growth rates and trends, estimates of human-caused mortality from all sources, descriptions of the fisheries with which the stocks interact, and the status of each stock.

Section 117 also requires the Service, consistent with any new information that indicates that the status of a stock has changed or can be more accurately determined, to revise these reports annually for strategic marine mammal stocks (as defined in Section 3(19) of the

Act), and every three years for stocks determined to be non-strategic. During 1996, the Service reviewed all eight of its 1995 Stock Assessment Reports and determined that it would be appropriate to revise Reports for the southern sea otter in California, the northern sea otter in Washington State, and the Florida and Antillean stocks of West Indian manatees from the southeastern United States and Puerto Rico, respectively. Although the Service decided to revise these Reports, the status of the four stocks has not changed; both West Indian manatee stocks and the southern sea otter stock in California are still classified as strategic, while the northern sea otter stock in Washington State is still classified as non-strategic. By the end of 1996, work was underway to develop these draft revised Stock Assessment Reports. On April 25, 1997, the Service published a FEDERAL REGISTER notice (62 FR 20201) to announce their availability for public review; the 90 day comment period expired on July 24, 1997. By the end of 1997, the completion of these revised documents was pending final approval.

For polar bear, Pacific walrus, and northern sea otter in Alaska, the Service determined during its 1996 review process that no significant new information was available that would provide substantial benefit to these stocks, or necessitate revising Stock Assessment Reports for these marine mammals during the review cycle. However, during 1997 the Service reviewed and developed draft, revised stock assessment reports for northern sea otter, polar bear, and Pacific walrus in Alaska. Based upon these reviews and subsequent draft documents, stocks of all species remained non-strategic and no changes were proposed to the estimated potential biological removal level for polar bear or walrus stocks.

In developing draft, revised stock assessment reports, the Service worked with the Alaska Scientific Review Group and the NMFS on the development of guidelines and protocols for stock assessments. Some proposed changes

were made to Stock Assessment Reports for Pacific walrus and northern sea otter. For walrus these included minor formatting and editing changes to allow for better consistency with other stock assessment reports, and updated fisheries and harvest information. The inclusion of the latest fisheries and harvest information resulted in a slightly lower estimate of average annual human-caused mortality. Proposed changes to the northern sea otter Stock Assessment Report include the delineation of three population stocks (i.e., southeast, southcentral, and southwest) in Alaska with all stocks remaining non-strategic. (Note: The Service published in the FEDERAL REGISTER on March, 5, 1998, a public Notice of Availability of Draft Revised Marine Mammal Stock Assessment Reports for Alaska Sea Otter, Walrus, and Polar Bear (63 FR 10936). The comment period for this Notice closed on June 3, 1998. Subsequently, on September 14, 1998, the Service published a FEDERAL REGISTER Notice of Availability of Revised Marine Mammal Stock Assessment Reports for Pacific Walrus and Polar Bear in Alaska (63 FR 49132). Final revised sea otter stock assessments were neither completed nor announced as available in this Notice; the Notice explained that "...sea otter stock assessments for Alaska are not final pending resolution of a request by the Alaska Sea Otter Commission for a proceeding on the record (pursuant to Section 117(b)(2) of the MMPA. This request is related to the Service's identification of three sea otter stocks in Alaska in the draft stock assessment reports...as opposed to the one stock identified in the [Service's original October 4,] 1995 report." The Service further explained that the finalization of the sea otter stock assessments would not occur pending final action on the proceeding on the record.)

## Incidental (Small) Take During Oil and Gas Operations

The Act authorizes the Secretary of the Interior to allow, upon request, the incidental, but not intentional, taking of

small numbers of marine mammals in a specified activity within a specified geographical region if it is found that the total of such taking will have a negligible impact on the species or stock and will not have an unmitigable adverse impact on the availability of such species or stock for subsistence uses. General implementing regulations in the Code of Federal Regulations (at 50 CFR 18.27) provide for development of specific regulations to govern incidental take activities and for issuance of Letters of Authorization (LOA) to applicants proposing to conduct activities under the specific regulations. Regulations can be issued for a period of not more than five consecutive years. LOA's prescribe specific stipulations and monitoring requirements for each applicant and must be reviewed annually.

On November 16, 1993, the Service issued regulations, "Marine Mammals; Incidental Take During Specified Activities" [58 FR 60402], for the incidental, but not intentional, take of small numbers of polar bears and Pacific walrus during oil and gas operations (exploration, development, and production) year-round in the Beaufort Sea and adjacent coast of Alaska. On August 14, 1995, the Service modified and extended the regulations through December 15, 1998 [60 CFR 42805].

During calendar year 1997, 13 LOA's were issued under the Service's implementing regulations that authorize and govern the incidental, unintentional take of small numbers of polar bears and walrus during oil and gas operations year-round in the Beaufort Sea and adjacent northern coast of Alaska (Table 2).

### Marking, Tagging, and Reporting Program

The Act established a moratorium on the taking (i.e., hunting, harassing, capturing, or killing) of marine mammals. Coastal Alaska Natives were granted an exception and may legally harvest marine mammals in order to continue traditional lifestyles through subsistence practices and creation of handicrafts. The Service's Marking, Tagging, and Reporting Program (MTRP) was implemented in October 1988 to monitor the subsistence harvest of polar bear, sea otter, and walrus by coastal Alaska Native people. The MTRP collects biological information from the harvest and assists in controlling illegal activities in specified marine mammal parts. During 1997, MTRP staff traveled to 50 coastal villages to hold village meetings, hire and replace taggers, provide training, and

**Table 2. Letters of Authorization Issued in 1997 for the Beaufort Sea and Adjacent Northern Coast of Alaska.**

<i>Date</i>	<i>Company</i>	<i>Activity</i>
05/02/97	BP Exploration (Alaska) Inc.	Exploration
05/16/97	BP Exploration (Alaska) Inc.	Exploration
05/16/97	BP Exploration (Alaska) Inc.	Development
05/21/97	Fairweather E&P Services	Exploration
11/07/97	Western Geophysical	Exploration
11/07/97	Western Geophysical	Exploration
11/07/97	Western Geophysical	Exploration
11/07/97	BP Exploration (Alaska) Inc.	Exploration
11/07/97	BP Exploration (Alaska) Inc.	Exploration
11/14/97	Western Geophysical	Exploration
12/09/97	Northern Geophysical	Exploration
12/09/97	ARCO Alaska, Inc.	Exploration
12/16/97	ARCO Alaska, Inc.	Exploration

work with hunters to gain better compliance with MTRP requirements. To help inform village residents of these requirements, 12 school presentations were made during the village visits. MTRP staff hired or replaced 16 taggers and added 6 new villages to the program.

The MTRP currently has 139 taggers and 30 alternates located in 103 villages throughout coastal Alaska (Table 3). Usually, local Native residents are hired and trained to tag polar bear and sea otter hides and skulls, and walrus tusks in the villages where they live. The MTRP employs 57 sea otter, 28 polar bear, and 91 walrus taggers. The number of taggers per village varies depending on the magnitude of the harvest. Some villages have several taggers for each species, while a few village taggers tag more than one species where the harvest numbers are low. Numbered, color coded, locking tags are placed on all polar bear and sea otter skulls and skins presented for tagging. Premolar teeth are extracted for aging purposes from each bear and otter skull. A lead-headed wire tag is attached through a hole drilled in the root section of each walrus tusk tagged and a liquid marker is applied to two sides of the tusk. Tag numbers, location and date of tagging, place of kill or find, sex, age, and measurements of specified parts are recorded by taggers. Harvest data were reported from 56 villages during 1997.

Twenty-five sea otter taggers reported 631 otters being tagged in 1997 (Tables 4, 5). Sea otter hides are used to make hats, gloves, slippers, blankets, and other arts and crafts. A few hunters trade sea otter hides for walrus ivory, polar bear and seal

skins, or other items that are used in making crafts. Compliance to the tagging regulation by sea otter hunters appears to be high.

Sixty-one polar bears were tagged in 10 villages during the 1996-97 hunting season (Tables 6, 7). Compliance by the polar bear hunters to the tagging rule appears to be good.

Forty-two walrus taggers reported tagging 1,154 walrus in 1997. Walrus tusks sometimes become separated before they are tagged. In order to accurately account for the harvest, a weight factor variable is added that interprets each record in terms of take. Estimation of the total harvest is made by summing this weight factor. Walrus records where only a single tusk was tagged are given a weight factor of 0.5, because the possibility exists that the second tusk may be tagged at a later date. For analytical purposes, the lower estimate is calculated with the assumption that single-tusk records in the database represent half of one walrus. The upper estimate is calculated assuming that each record represents a whole walrus. If all walrus tusks are tagged as pairs, the upper and lower bounds are equal. As a conservative approach to management, the upper estimate is considered to be the actual figure for the walrus harvest (Tables 8, 9).

Hunter success varied greatly from village to village and between hunters. Many hunters reported poor weather and marginal ice conditions during the walrus migration making hunting conditions difficult. Often the villagers could hear or

**Table 3. Villages With MTRP Taggers and Species Tagged.**

<i>Village</i>	<i>Species*</i>	<i>Village</i>	<i>Species</i>	<i>Village</i>	<i>Species</i>
Adak	SO	Hydaburg	SO	Pilot Point	SO/W
Akhiok	SO	Ivanof Bay	SO	Platinum	W
Akutan	SO	Juneau	SO	Point Hope	PB/W
Aleknagik	W	Kake	SO	Point Lay	PB/W
Anchorage	SO/PB/W	Kaktovik	PB/W	Port Graham	SO
Angoon	SO	Karluk	SO	Port Heiden	SO/W
Atka	SO	Kenai	SO/W	Port Lions	SO
Barrow	PB/W	Ketchikan	SO/W	Quinhagak	W
Bethel	SO/W	King Cove	SO	Sand Point	SO/W
Brevig Mission	W	King Island	W	Savoonga	PB/W
Buckland	W	King Salmon	SO/W	Seldovia	SO
Chefornak	W	Kipnuk	W	Shaktoolik	W
Chenega Bay	SO	Kivalina	PB/W	Seward	SO
Chevak	W	Klawock	SO	Shishmaref	PB/W
Chignik	SO/W	Kodiak	SO/W	Sitka	SO/W
Chignik Lagoon	SO	Kongiganak	W	St. George	W
Chignik Lake	SO/W	Kotzebue	PB/W	St. Michael	W
Clarks Point	W	Koyuk	W	St. Paul	SO/W
Cold Bay	SO/W	Kwigillingok	W	Stebbins	W
Cordova	SO/W	Larsen Bay	SO	Tatitlek	SO
Craig	SO	Little Diomedea	PB/W	Teller	PB/W
Deering	W	Manokotak	W	Togiak	W
Dillingham	SO/W	Mekoryuk	W	Toksook Bay	W
Egegik	SO/W	Naknek	W	Tuntutuliak	W
Elim	W	Nelson Lagoon	SO	Tununak	W
Emmonak	W	Newtok	W	Twin Hills	W
English Bay	SO	Nightmute	W	Unalakleet	W
Fairbanks	SO/PB/W	Nikolski	SO	Unalaska	SO/W
False Pass	SO	Nome	PB/W	Valdez	SO
Gambell	PB/W	Nuiqsut	PB	Wainwright	PB/W
Golovin	W	Old Harbor	SO	Wales	PB/W
Goodnews Bay	W	Ouzinkie	SO	Wrangell	SO
Homer	SO/W	Pelican	SO	Yakutat	SO
Hoonah	SO	Perryville	SO/W		
Hooper Bay	W	Petersburg	SO		

\*Species Key: SO = Sea Otter PB = Polar Bear W = Walrus

For names, addresses, and telephone numbers of village taggers, contact the U.S. Fish and Wildlife Service; Marine Mammals Management Office; Marking, Tagging, and Reporting Program; 1011 East Tudor Road; Anchorage, Alaska 99503. Telephone: (800) 362-5148.

even see the walrus but because of bad ice conditions they were unable to get close to them.

Compliance with the MTRP regulations by walrus hunters needs improvement. Despite an aggressive campaign by the MTRP staff and Law Enforcement special agents, some walrus hunters still do not comply with the tagging rule. Village meetings, radio and newspaper

announcements, letters, and posters were utilized in 1997 to encourage the hunters in all villages to have every kill recorded. The most common reason for ivory not being tagged was that hunters carve their own harvested ivory; some hunters do not see the use of tagging their ivory if they are going to use it themselves. In the past, when raw ivory was sold to the village store or registered agents, compliance with the rule was high.

Assessment of compliance is subjectively based on personal observation and discussions with village taggers and others. We have not determined a feasible way to quantify the levels of compliance. Enforcement of the tagging rule has been limited to only a few cases and those were related to other enforcement actions. However, information from the MTRP data base was valuable in several enforcement

**Table 4. Sea Otters Tagged by Tagging Location and Year.**

<i>Location</i>	<i>Pre-Rule</i>	<i>1988</i>	<i>1989</i>	<i>1990</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>Total</i>
Adak	0	0	0	0	0	2	0	0	0	0	0	2
Akhiok	1	0	0	0	0	0	0	0	0	0	0	1
Akutan	0	0	0	0	0	1	10	0	0	0	0	11
Anchorage	117	2	44	11	8	25	9	56	37	50	22	381
Angoon	0	0	0	0	0	0	4	39	56	0	0	99
Atka	0	0	0	0	0	0	0	2	0	0	0	2
Bethel	4	0	0	0	1	0	0	0	0	0	0	5
Chenega Bay	0	0	0	0	0	0	0	0	14	6	0	20
Chignik	1	0	9	5	0	0	0	6	0	0	0	21
Chignik Lake	0	0	0	0	0	0	0	2	0	0	0	2
Cold Bay	0	0	0	1	0	0	8	0	0	0	0	9
Cordova	31	0	12	9	34	13	50	120	171	173	34	647
Egegik	0	0	0	0	0	0	0	0	0	1	0	1
English Bay	0	0	0	0	0	0	17	6	0	12	0	35
Fairbanks	0	0	0	0	0	0	2	0	0	0	0	2
False Pass	0	0	0	0	0	0	0	0	10	3	3	16
Homer	18	22	9	9	0	0	25	14	0	24	8	129
Hoonah	0	0	0	0	0	51	230	7	4	0	3	295
Hydaburg	0	0	0	0	0	0	0	0	0	7	20	27
Juneau	11	0	1	26	0	14	27	93	21	3	33	229
Kake	0	0	0	0	0	0	18	2	3	5	0	28
Kenai	0	0	8	6	33	0	0	19	0	0	0	66
Ketchikan	2	0	0	0	0	194	83	6	11	3	24	323
King Cove	8	0	0	25	0	8	1	5	1	0	13	61
King Salmon	0	0	0	0	0	0	1	0	0	0	0	1
Klawock	57	3	118	10	74	4	220	19	52	25	98	680
Kodiak	157	0	31	16	5	27	120	6	30	41	23	456
Larsen Bay	31	0	0	0	17	14	2	16	7	77	22	186
Mekoryuk	5	0	0	0	0	0	0	0	0	0	0	5
Nikolski	0	0	0	0	0	0	0	0	0	0	1	1
Old Harbor	0	0	0	0	0	0	0	0	0	0	53	53
Ouzinkie	0	0	0	0	0	0	29	0	0	0	0	29
Pelican	0	0	0	0	0	0	0	0	0	8	4	12
Perryville	0	0	0	0	0	2	2	0	0	0	0	4
Petersburg	0	0	0	0	0	0	0	0	0	0	10	10
Pilot Point	1	0	0	0	0	0	0	0	1	0	0	2
Port Graham	0	3	0	0	1	6	6	101	32	13	0	162
Port Heiden	1	0	5	0	0	1	0	1	2	7	0	17
Port Lions	11	0	0	1	0	0	0	23	3	18	0	56
Sand Point	0	0	1	0	0	0	0	0	0	0	0	1
Seldovia	0	0	1	0	0	12	20	8	0	0	27	68
Sitka	44	25	35	47	39	163	218	131	38	67	59	866
Tatitlek	0	0	0	0	19	27	4	0	0	0	0	50
Unalaska	0	0	0	0	0	0	5	0	0	0	0	5
Valdez	0	0	0	0	0	73	102	135	121	56	164	651
Wrangell	0	0	0	0	0	0	21	2	0	3	0	26
Yakutat	0	0	0	0	0	0	14	13	15	4	10	56
<b>Totals</b>	<b>500</b>	<b>55</b>	<b>274</b>	<b>166</b>	<b>231</b>	<b>637</b>	<b>1,248</b>	<b>832</b>	<b>629</b>	<b>606</b>	<b>631</b>	<b>5,809</b>

**Table 5. Sea Otters Tagged by Age Class, Sex, and Year.**

	<i>Pre-Rule</i>	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total
<b>Adults</b>												
Female	88	9	35	15	44	172	426	166	99	82	72	1,208
Male	231	44	182	120	149	367	585	466	442	420	407	3,413
Unknown	121	0	19	2	23	17	39	80	25	38	54	418
<b>Subadults</b>												
Female	8	1	2	9	5	25	55	25	18	20	35	203
Male	8	1	15	16	3	35	74	66	26	31	37	312
Unknown	14	0	3	0	3	5	7	21	2	3	10	68
<b>Pups</b>												
Female	0	0	0	1	1	5	3	1	2	5	4	22
Male	1	0	2	3	0	6	7	5	5	5	9	43
Unknown	6	0	1	0	1	2	3	1	8	2	3	27
<b>Unknown</b>												
Female	0	0	1	0	0	1	7	0	0	0	0	9
Male	0	0	1	0	2	1	0	0	0	0	0	4
Unknown	23	0	13	0	0	1	42	1	2	0	0	82
<b>All Ages</b>												
Female	96	10	38	25	50	203	491	192	119	107	111	1,442
Male	240	45	200	139	154	409	666	537	473	456	453	3,772
Unknown	164	0	36	2	27	25	91	103	37	43	67	595
<b>Totals</b>	500	55	274	166	231	637	1248	832	629	606	631	5,809

actions in past years. In most cases, enforcement has had a positive effect and heightened awareness.

Success of the MTRP depends on a village presence by the Service and routine contacts with taggers. MTRP staff will continue to hold village meetings, train and retrain taggers as necessary, work with Native leaders and organizations, and expand the use of informational and educational materials that relate to the MTRP and other marine mammal issues.

Because of the extensive exposure of the MTRP staff throughout coastal Alaska, MTRP personnel are often called upon by other programs in the Service that need an introduction to, or assistance working in, a village. MTRP staff will continue to provide information that is obtainable only by being acquainted with the residents of remote villages and/or familiarity with traditional village life.

The Service's Alaska Region Marine Mammals Management Office continued to publish and distribute a quarterly bulletin to all taggers and other interested people. The bulletin has proven to be a valuable tool in disseminating pertinent information in a

timely manner to a state-wide village audience.

In May 1997, the Service, the USGS/BRD, the Alaska Sea Otter Commission, the Association of Village Council Presidents, the Eskimo Walrus Commission, the Indigenous Peoples Council on Marine Mammals (IPCOMM), and the Alaska Nanuuq Commission developed a co-management vision document for the subsistence use of sea otters, polar bears, and walrus. The document is intended to guide the development of cooperative agreements by mutual biological goals and objectives.

#### **Co-Management with Alaska Natives of the Subsistence Use of Marine Mammals**

Recognizing the importance of marine mammals as resources for subsistence and materials for handicrafts for Alaska Natives, the 1994 amendments to the Act included provisions for funding certain co-management activities regarding subsistence uses of marine mammals. In 1997, Native organizations, Federal, and State agencies completed a series of co-management agreements and plans for guiding future resource management practices and increasing involvement of Alaska Natives in the development of management policies, prioritization of

research needs, and collaboration on monitoring programs and research projects. In August 1997, an umbrella Memorandum of Agreement was completed between the Service, the USGS/BRD, the NMFS, and the Indigenous People's Council for Marine Mammals. It provides a framework for preparing co-management agreements and the transfer of co-management funds from the Service to Native organizations.

To facilitate co-management activities in 1997, the Alaska Nanuuq Commission (ANC), the Eskimo Walrus Commission (EWC), and the Alaska Sea Otter Commission (ASOC) completed individual cooperative agreements with the Service for the implementation of Section 119 which was added to the Act in 1994. The co-management framework in Section 119 outlines shared responsibilities for implementation of marine mammal conservation programs. The separate agreements included scopes of work for co-management activities conducted in 1997 and funded under Section 119. During 1997, the Service transferred funds (of which \$250,000 was appropriated for co-management of subsistence uses pursuant to Section 119) to the ANC, the EWC, and the ASOC for co-management activities.

**Table 6. Polar Bears Tagged, by Tagging Location and Harvest Year.<sup>a</sup>**

<i>Location</i>	<i>1987/ 88</i>	<i>1988/ 89</i>	<i>1989/ 90</i>	<i>1990/ 91</i>	<i>1991/ 92</i>	<i>1992/ 93</i>	<i>1993/ 94</i>	<i>1994/ 95</i>	<i>1995/ 96</i>	<i>1996/ 97</i>	<i>Total</i>
Anchorage	2	0	3	4	4	0	0	0	0	0	13
Barrow	12	31	14	14	22	24	29	11	15	28	200
Brevig Mission	0	0	1	0	0	0	0	0	0	0	1
Fairbanks	1	0	0	0	0	0	0	0	0	0	1
Gambell	25	13	10	11	4	4	28	9	0	7	111
Kaktovik	6	8	0	0	0	3	5	1	1	2	26
Kivalina	5	1	5	3	2	1	1	2	0	0	20
Kotzebue	0	0	4	0	0	1	1	0	1	1	8
Little Diomede	15	9	6	3	6	6	8	10	0	1	64
Nome	3	0	1	0	0	0	0	2	0	0	6
Nuiqsut	3	2	0	0	0	0	3	1	1	0	10
Point Hope	9	8	22	14	7	12	6	19	2	11	110
Point Lay	2	2	0	0	0	3	1	1	0	5	14
Savoonga	13	13	9	12	6	0	23	10	0	1	87
Shishmaref	13	23	14	6	3	5	5	17	2	0	88
Wainwright	9	13	7	6	3	4	10	7	14	4	77
Wales	5	9	3	3	2	3	1	2	0	1	29
<b>Total</b>	<b>123</b>	<b>132</b>	<b>99</b>	<b>76</b>	<b>59</b>	<b>66</b>	<b>121</b>	<b>92</b>	<b>36</b>	<b>61</b>	<b>865</b>

<sup>a</sup> Harvest year is from July 1 to June 30 of the following year.**Table 7. Polar Bears Tagged by Age Class, Sex, and Harvest Year.<sup>a</sup>**

	<i>1987/ 88</i>	<i>1988/ 89</i>	<i>1989/ 90</i>	<i>1990/ 91</i>	<i>1991/ 92</i>	<i>1992/ 93</i>	<i>1993/ 94</i>	<i>1994/ 95</i>	<i>1995/ 96</i>	<i>1996/ 97</i>	<i>Total</i>
<b>Adults</b>											
Female	8	3	13	6	5	10	15	11	1	10	82
Male	12	5	28	41	25	25	29	40	12	18	235
Unknown	0	0	0	0	0	2	5	2	7	1	17
<b>Subadults</b>											
Female	0	0	7	7	13	3	10	10	4	15	69
Male	1	2	27	12	12	13	26	18	10	11	132
Unknown	0	1	0	0	0	2	2	0	1	1	6
<b>Cubs</b>											
Female	0	0	2	0	0	2	6	4	0	1	15
Male	3	0	4	2	1	5	7	2	0	3	27
Unknown	0	0	0	0	0	2	0	1	1	2	7
<b>Unknown</b>											
Female	38	31	1	1	3	0	14	0	0	0	88
Male	58	78	6	5	0	2	4	4	0	0	157
Unknown	3	12	11	2	0	0	2	0	0	0	30
<b>All Age Classes</b>											
Female	46	34	23	14	21	15	45	25	4	26	253
Male	74	85	65	60	38	45	65	60	20	32	544
Unknown	3	13	11	2	0	5	10	3	8	3	58
<b>Totals</b>	<b>123</b>	<b>132</b>	<b>99</b>	<b>76</b>	<b>59</b>	<b>66</b>	<b>121</b>	<b>92</b>	<b>36</b>	<b>61</b>	<b>865</b>

<sup>a</sup> Harvest year is from July 1 through June 30 of the following year.

**Table 8. Walrus Harvest Estimate, From MTRP Data, by Tagging Location and Year.**

<i>Location</i>	<i>Pre-Rule</i>	<i>1988</i>	<i>1989</i>	<i>1990</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>Total</i>
Anchorage	295	0	37	19	19	3	3	13	15	8	5	417
Barrow	1	1	11	7	23	22	31	16	10	12	35	169
Bethel	13	0	10	18	18	24	13	7	1	1	10	115
Brevig Mission	3	0	0	6	1	27	4	3	2	1	47	94
Chevak	11	0	2	1	2	4	4	3	2	0	0	29
Chignik	1	0	0	0	0	0	0	0	0	1	3	5
Chignik Lake	2	0	0	0	0	0	0	0	0	0	1	3
Clarks Point	8	0	1	0	14	5	0	0	3	0	0	31
Cold Bay	0	0	0	0	0	1	1	1	0	0	0	3
Cordova	13	0	0	0	0	0	0	0	0	0	0	13
Deering	0	0	0	0	0	0	0	0	0	0	6	6
Dillingham	25	0	10	15	5	9	24	48	37	63	61	297
Egegik	0	0	0	0	0	1	0	2	0	3	0	6
Elim	0	0	0	2	4	0	1	0	1	1	1	10
Emmonak	0	0	0	0	0	0	3	0	0	0	0	3
Fairbanks	9	0	2	0	1	0	2	1	0	0	3	18
False Pass	0	0	0	0	0	0	0	0	0	0	2	2
Gambell	12	4	188	756	629	403	464	522	287	676	353	4,294
Golovin	1	0	0	0	1	3	0	1	1	1	2	10
Goodnews Bay	4	0	2	1	1	2	0	2	0	0	0	12
Homer	0	0	0	0	2	2	2	0	0	0	0	6
Hooper Bay	3	0	1	15	5	3	2	3	1	1	8	42
Kaktovik	0	0	0	0	0	0	1	0	0	0	0	1
Kenai	2	0	0	0	0	0	0	0	0	0	0	2
Ketchikan	1	0	0	0	0	0	0	0	0	0	0	1
King Cove	0	0	0	0	0	0	0	0	0	0	3	3
King Island	2	0	0	7	77	346	30	12	0	120	8	602
King Salmon	3	0	0	1	3	2	2	0	2	0	1	14
Kipnuk	3	0	0	3	1	1	2	5	1	23	0	39
Kivalina	0	0	46	0	0	1	0	0	1	12	11	71
Kodiak	2	0	0	0	0	0	0	0	0	0	0	2
Kongiganak	1	0	3	0	4	6	3	6	3	5	0	31
Kotzebue	30	0	0	0	3	0	0	0	0	22	15	70
Koyuk	0	0	0	2	5	0	0	0	1	0	0	8
Kwigillingok	3	0	0	2	1	6	0	1	1	0	0	14
Little Diomede	3	0	1	236	532	99	91	377	197	89	152	1,777
Manokotak	3	0	1	0	0	0	0	2	0	0	0	6
Mekoryuk	23	0	4	14	49	22	25	7	10	8	13	175
Naknek	3	0	0	3	1	1	1	0	0	1	0	10
Nelson Lagoon	0	0	0	0	0	0	0	0	0	0	3	3
Newtok	0	0	0	0	0	0	0	0	1	0	0	1
Nome	50	0	1	15	39	14	16	19	4	47	3	208
Perryville	0	0	1	0	0	0	0	0	0	0	0	1
Petersburg	0	0	0	0	0	0	0	0	0	0	2	2
Pilot Point	0	0	0	0	1	0	0	0	0	0	3	4
Platinum	20	0	9	5	2	10	3	0	3	0	14	66
Point Hope	3	0	2	5	0	5	5	6	0	0	3	29
Point Lay	0	0	0	0	0	0	1	1	4	4	7	17
Port Heiden	5	0	0	0	2	4	5	1	3	12	0	32
Quinhagak	0	0	0	0	3	0	0	0	0	0	0	3
Sand Point	1	0	0	1	9	0	0	0	0	0	0	11
Savoonga	426	0	221	198	520	545	302	158	394	329	265	3,358
Shaktoolik	0	0	0	0	0	0	0	0	0	2	0	2
Shishmaref	491	0	122	87	35	69	50	7	12	65	24	962
Sitka	15	0	0	0	6	0	0	0	0	0	0	21
St. George	1	0	0	1	1	0	0	0	0	0	0	3
St. Paul	0	0	0	2	1	1	5	0	1	1	0	11
Stebbins	0	0	1	5	17	0	8	0	0	0	0	31
Teller	0	0	0	0	0	3	11	1	4	0	0	19
Togiak	13	1	9	25	6	6	24	32	17	43	37	213
Toksook Bay	4	0	0	0	2	3	4	2	0	5	3	23
Tuntutuliak	0	0	0	0	2	1	2	5	4	0	0	14
Tununak	1	0	0	0	0	0	0	1	0	2	0	4
Unalakleet	6	0	1	5	5	0	0	2	2	0	0	21
Wainwright	4	0	43	0	32	48	44	68	83	24	48	394
Wales	10	0	10	10	81	15	3	0	8	1	2	140
<b>Totals</b>	<b>1,530</b>	<b>6</b>	<b>739</b>	<b>1,467</b>	<b>2,165</b>	<b>1,717</b>	<b>1,192</b>	<b>1,335</b>	<b>1,116</b>	<b>1,583</b>	<b>1,154</b>	<b>14,004</b>



**Table 9. Walrus Harvest Estimate, from MTRP Data, by Age Class, Sex, and Year.**

	<i>Pre-Rule 1988</i>	<i>1989</i>	<i>1990</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>Total</i>	
<b>Adults</b>												
Female	236	0	215	530	895	743	427	720	480	622	437	5,305
Male	606	6	351	518	883	727	603	501	490	687	617	5,989
Unknown	585	0	154	55	63	104	86	52	21	52	40	1,212
<b>Subadults</b>												
Female	5	0	2	4	16	7	6	7	11	14	2	74
Male	26	0	6	21	39	53	22	28	20	38	19	272
Unknown	49	0	3	8	6	6	10	1	4	15	4	106
<b>Calves</b>												
Female	0	0	0	0	61	0	2	0	0	0	0	63
Male	0	0	0	0	58	1	3	1	0	0	0	63
Unknown	1	0	4	331	144	74	32	25	90	155	35	891
<b>Unknown</b>												
Unknown	22	0	4	0	0	2	1	0	0	0	0	29
<b>All Ages</b>												
Female	241	0	217	534	972	750	435	727	491	636	439	5,442
Male	632	6	357	539	980	781	628	530	510	725	636	6,324
Unknown	657	0	165	394	213	186	129	78	115	222	79	2,238
<b>Totals</b>	<b>1,530</b>	<b>6</b>	<b>739</b>	<b>1,467</b>	<b>2,165</b>	<b>1,717</b>	<b>1,192</b>	<b>1,335</b>	<b>1,116</b>	<b>1,583</b>	<b>1,154</b>	<b>14,004</b>

**Sea Otter-Alaska**

The ASOC and the Service continued to work together on the development of regional and local management plans; collection and use of traditional Native ecological knowledge; sharing of scientific information; implementation of the biological monitoring program, implementation of the MTRP, and ASOC input into certain ongoing Service activities. Mortality surveys were conducted by Alaska Native villagers in the villages of False Pass and Cordova.

**Pacific Walrus**

This was the first year of a cooperative management agreement with the Eskimo Walrus Commission (EWC) as authorized under Section 119 of the Act. The agreement provided for operational funds for the EWC, programs for increasing cooperation in law enforcement and harvest monitoring efforts, and initiating preliminary discussions with Russia Naive counterparts to develop a bilateral native-to-native agreement for the conservation and management of Pacific walrus.

**Polar Bear**

Last year was the first year of a Cooperative Management Agreement with the ANC, which represents Native issues and concerns on the conservation, subsistence use, and management of

polar bears in Alaska. The ANC represents Native villages in Northern and Northwest Alaska. (Note: The ANC summarized its accomplishments and progress on co-management operations, and the draft U.S.- Russia Bilateral Agreement for the Conservation of Polar Bears, at the second ANC meeting held in Nome, Alaska, on January 12-13, 1998.)

The allocation of funds under Section 119 and scopes of work are negotiated annually. During 1997, these funds were used for a variety of activities such as overseeing development of the Native-to-Native Agreement for the

conservation of polar bears in the Chukchi/Bering Seas, conducting village meetings to discuss subsistence issues and progress on the draft U.S.- Russia Bilateral Polar Bear Agreement and the related Native-to-Native Agreement, participating in a National Public Radio live broadcast, and assisting in the development of a co-management agreement.

**Northern Sea Otter**

During 1997, the Alaska sea otter program was involved in the following activities. Several constitute co-management activities and were done in cooperation with the Alaska Sea Otter Commission (ASOC).

**Biological Monitoring Program**

The Service, in cooperation with Alaska Natives and the ASOC, continued the ongoing training of Alaska Native hunters in standard sea otter necropsy techniques. By the end of 1997, more than 40 Alaska Natives had been trained in communities throughout Alaska. This has resulted in the collection of sea otter biological samples for contaminant analyses and life history studies. One-hundred-eighteen sea otters (hunted and beach-found dead) were sampled during 1997 by Native samplers and Service biologists.

**Local Population Trend Surveys**

A new effort aimed at monitoring local sea otter population trends in various Alaska communities was initiated in 1997. The Service developed survey methodologies and training programs suitable for implementation by local Alaska residents to be initiated by the Service and the ASOC on a pilot basis in 1998. This program will provide local Alaska Native communities with the ability to annually track distribution and relative numbers of sea otters available to hunters in their communities. The Service is hopeful that this data, although limited in geographic extent, may be of future use in identifying areas of concern if sea otter distribution or abundance changes are noted by Native surveyors.

### *Mortality Surveys*

Sea otter mortality or carcass surveys were continued in Cordova, Alaska, and initiated in False Pass, Alaska. Although additional communities were contacted (Kodiak and Sitka), local interest was not sufficient to complete surveys in 1997. Additional efforts will be made by the ASOC in subsequent years.

### *Contaminants Monitoring*

A three-year program was initiated by the Service in 1997 to monitor pollutant levels in sea otter tissues. Over the duration of the study, it is anticipated that liver and kidney tissues from over 50 sea otters from throughout the State will be analyzed for heavy metals and organochlorines. The Service anticipates completing the analytical work by 1999. To date, sea otters from the following areas have been included in this study: southeast Alaska (16 otters), Prince William Sound (11), Kodiak archipelago (5), Cook Inlet (2), Alaska Peninsula/Aleutian Islands (4) and the Russia Kamchatka Peninsula (2).

Initial 1997 results from the organochlorine screens indicate low concentrations of certain compounds in a subset of the submitted samples. (Rigorous application of quality assurance criteria have not been completed, therefore, this information should be considered preliminary in nature.) Of the 21 sea otter kidneys sampled in 1997, three had concentrations of PCBs that equaled or exceeded detection limits, 15 had concentrations of beta BHC that equaled or exceeded detection limits, and one had concentrations of p,p'-DDE that exceeded detection limits. Of the 21 sea otter livers sampled in 1997, four had concentrations of PCBs that equaled or exceeded detection limits, two had concentrations of beta BHC that equaled or exceeded detection limits, and three had concentrations of dieldrin that equaled or exceeded detection limits.

*Research Activities in Conjunction With the USGS, UC Santa Cruz Cooperative Field Unit, and University of Washington Cooperative Field Unit*  
The Service provided continuing support to the USGS/BRD (i.e., the Alaska Biological Science Center (ABSC) and the University of Washington Cooperative Field Unit) and the Exxon Valdez Trustee Council on restoration projects following the Exxon Valdez oil spill. These projects continue to monitor the recovery and recovery mechanisms of sea otter populations injured as a result



*Arctic Sea otter*

Steve Amstrup

of the spill. Although there is some evidence of ongoing recovery of sea otter abundance, the slow recovery rate and mechanisms which are confounding recovery are not yet understood. Additional collaborative efforts in 1998 between the ABSC and the Service will focus on detection of hydrocarbons in sea otter tissues as well as ongoing mortality assessments, abundance surveys, and evaluation of food resources.

Additionally, the Service provided assistance in the conduct of a research project considering the diving behavior and habitat use of sea otters through the use of sonic tags and time-depth recorders. The Service remains interested and supportive of this work as it will provide needed information to evaluate the impacts of the burgeoning southeast Alaska sea otter population on commercial and subsistence important crab stocks.

Efforts undertaken by the USGS/BRD's Cooperative Field Unit (UC Santa Cruz) continue to highlight a precipitous decline in sea otter numbers in areas of the Aleutian archipelago. Service biologists continued to provide assistance and logistical support to researchers on Adak and Amchitka in 1997.

*Placement of Stranded Sea Otter*  
During 1997, one "abandoned" sea otter pup was picked up in Kodiak, Alaska, and successfully placed in permanent captivity at the Seattle Aquarium. Additional efforts are being undertaken to educate the public to "Leave Pups Alone in the Wild."

### *Aleutian Island and Yakutat Sea Otter Survey Reports*

Two reports were completed which summarize results of (1) 1992 sea otter abundance survey throughout the Aleutian Archipelago and (2) 1995/1996 sea otter abundance and distribution survey in Yakutat Bay and adjacent northern Gulf of Alaska areas.

### **Pacific Walrus**

#### *Subsistence Walrus Hunt on Round Island, Bristol Bay, Alaska*

The year 1997 marked the third year since the resumption of subsistence walrus hunting on Round Island, Walrus Islands State Game Sanctuary, Bristol Bay, Alaska. A 35-year prohibition on hunting was amended in 1995 after the Alaska State Board of Game adopted a proposal to resume hunting on Round Island from the village of Togiak. Consequently, in 1995, the Service entered into a cooperative management agreement with the Qayassiq Walrus Commission, the Eskimo Walrus Commission, and the Alaska Department of Fish and Game (ADF&G). The agreement outlined a co-management approach for the harvest of walrus on the island. In 1997 the agreement was modified to increase the Native's self-imposed harvest limit to 20 walrus and shift the hunting season to the period between September 20 and October 20, 1997. Hunt activities were monitored by the Service, the ADF&G, and the Native walrus commissions to assess the impact of the harvest on walrus abundance and behavior.

Between September 13 and October 8, 1997, biologists from the Service and the ADF&G were stationed on Round Island to monitor walrus responses to hunting activities and to collect biological information from each walrus harvested. Hunters participated in the hunt monitoring program by coordinating hunting activities with walrus behavioral observations and by providing the Service with biological samples collected from harvested walrus.

In the fall of 1997, 15 of the 20 allocated walrus were harvested from Round Island, an additional 4 were struck and lost. Samples collected from each animal included: teeth for age determination; tissue samples for contaminant, histological, and genetic studies; and, tissue samples for the Alaska Marine Mammals Tissue Archival Project (AMMTAP). The AMMTAP is an interagency project dedicated to the collection and long-term storage of marine mammals tissues suitable for determining levels of organic and inorganic toxic substances.

Walrus fled the beaches in response to the presence of hunters or shooting. Although weather prevented hunt monitors from watching cleared beaches every day, it appeared that some walrus returned to deserted haulouts within 3 days after hunting activities. At this time, limited hunting in the late fall does not appear to affect long-term use of the Round Island haulouts.

#### *Pacific Walrus Research Activities*

At 5-year intervals between 1975 and 1990, the United States and Russia collaborated on a series of aerial, ice-edge walrus surveys to attempt to assess the status and trend of the Pacific walrus population. These surveys have provided the best available estimates of the walrus population. However, because of methodological problems such as the inability to determine the number of walrus present but under water (and undetectable to observers) during counts and the extreme variability of the distribution of walrus aggregations, the reliability of the estimates and their utility for determining population trend are limited. Re-evaluation of aerial survey data indicated that with current methods, the amount of effort required to detect population trend is impractical. Because of these limitations and the expense, range-wide surveys have not been repeated since 1990. Recently, encouraging results have been obtained from satellite imagery which appears to be potentially useful in

detecting and counting walrus on land and on ice. This technique may potentially be more accurate and cost effective than traditional aerial surveys. Its usefulness is under further assessment by the Service.

In their efforts to study walrus movements and habitat needs, the USGS/BRD is testing methods of tagging and tracking free-ranging walrus with various telemetry devices. During the summer of 1997, 18 satellite tags were deployed on adult male walrus in Bristol Bay with the hopes of following them north as they leave their summer feeding grounds for winter breeding areas. In addition, five time-depth recorders were successfully deployed and recovered from walrus in Bristol Bay. Information gathered by these devices will provide insight into diving and foraging patterns of walrus at sea.

Future research plans by the USGS/BRD include continuing telemetry studies and exploring alternative methods for evaluating status and trend of the walrus population, including monitoring changes in animal body condition, and reproductive parameters.

#### *Bristol Bay Walrus Haulout Monitoring*

During the summer months of 1997, the Service continued to participate in a cooperative program involving its Marine Mammals Management Office, the Togiak National Wildlife Refuge, and the ADF&G to monitor walrus at three of the four largest terrestrial walrus haulouts in North America: Round Island, Cape Peirce, and Cape Newenham in Bristol Bay, Alaska. Results from counts in 1997 indicate that as many as 9,400 (an increase of 15 percent over the last 5-year average) walrus were present at these northern Bristol Bay haulouts.

#### *Walrus Harvest Monitoring Project*

The Service continued two programs to monitor the size and structure of the walrus harvest. The already discussed MTRP assessed the number of walrus harvested at all coastal Alaska villages through the collection of tusk registration certificates by village taggers. The Walrus Harvest Monitoring Project (WHMP) monitored the spring harvest in the walrus hunting villages of Gambell, Savoonga, Diomed, and Wales. These communities are responsible for 60-80 percent of the annual reported U.S. walrus harvest. Service and village technicians worked together to collect information on the size and demographics of the spring harvest by conducting hunter interviews and obtaining

biological samples. This information was used to assess the size and composition of the harvest and to study aspects of walrus population dynamics and life history. Samples collected through the WHMP included teeth for age determination, adult female reproductive tracts to determine reproductive status, and occasional anomalous tissues which were used to identify specific pathologies.

In 1997, a total of 859 harvested Pacific walrus were recorded during spring subsistence hunts in Alaska at the Native villages of Little Diomed, Gambell, Savoonga, and Wales. The recorded harvest consisted of 142 calves (16.5 percent), 11 yearlings (1.3 percent), 54 subadults (6.3 percent), 647 adults (75.3 percent), and five animals of unknown age class (0.6 percent). The sex ratio of the walrus harvest was 55 percent females to 45 percent males. Frequency distributions of age estimates indicated suggest differences in age structure of the harvest between sexes; the mean age of sampled females was lower than the mean age of sampled males. The age-sex composition of the harvest also varied between villages. Examination of sampled female reproductive tracts indicated that approximately 34 percent of the mature females had ovulated in the most recent reproductive cycle. Approximately 49 percent of the mature female samples examined indicated recent birth of a calf.

#### **Polar Bear**

##### *Harvest Summary*

The Service's MTRP in 1997 continued to collect information from polar bears taken by Native hunters for subsistence purposes. The 1996/97 Alaska harvest (Beaufort, Chukchi/Bering Seas populations) of 85 bears was comprised of 42 males, 31 females, and 12 with sex unknown (Table 10). This harvest was more representative of long-term averages than the low harvest recorded during the 1995/96 season. This is the second consecutive year that the harvest from the Chukchi/Bering Seas population has been well below the mean harvest of 73 for this population. The late arrival of the ice and relatively warm temperatures during November 1997 may have resulted in low polar bear harvests from the Southern Beaufort Sea and Chukchi/Bering Seas stocks, similar to the 1995/96 harvest season.

Statewide, polar bears were harvested in every month except June, July, and August. The peak monthly harvest occurred in October (30 percent) and

during the period from February through April (44 percent) (Table 11). The sex ratio of polar bears of known-sex during the 1996/97 harvest season was 58 percent males to 42 percent females. This represents an increase in the number of females taken when compared to the long-term sex ratio average of 66 percent males to 34 percent females.

Analysis of ages from cementum annuli of the first premolar, by sex and age class for the 1995/96 harvest season, was completed during this reporting period. The mean age and age class are presented in Table 12 and Table 13, respectively. Teeth were obtained from only 47 percent of the bears harvested during the 1995/96 season. The mean age for females (6.3 years) and males (5.6 years) in the harvest for the 1995/96 season was close to the long-term average of 7.2 and 6.4 years, respectively. Age determinations from tooth annuli are based on completed years of life.

Although the sample size was small, the age class of the harvest approximated the long-term average of 50 percent adults, 32 percent subadults, and 18 percent cubs. Using this system, cubs are 0-2.3 years old, subadults are >2.3-5 years old, and adults are >5 years old. Complete sex and age information from the hunter was obtained for 81 percent of the kill during the 1996/97 season.

#### *Polar Bear Management Agreement, Beaufort Sea Stock*

The harvest for villages of the North Slope party to the management agreement with the Inuvialuit, was 51 animals; 23 males, 20 females and 8 of unknown sex. The harvest of known-sex animals (85 percent) was 55 percent male and 45 percent female. The mean age for females (n=2) and males (n=8) harvested during the 1995/96 season was 4.0 years and 5.75 years, respectively. Fifty percent of the polar bears were harvested in October 1996. All bears were taken during the prescribed season which extends from September 1 to May 31.

The harvest from the Alaska region of the southern Beaufort Sea represented 60 percent of the total Statewide harvest. Normally, 66 percent of the bears harvested in Alaska come from the Chukchi/Bering Seas population and 34 percent from the Beaufort Sea population. Although the Southern Beaufort Sea stock polar bear harvest was 11 over the allocation of 40 animals, the mean yearly harvest since 1988 is 36, which is four below the harvest guidelines of 40 indicated in the North

**Table 10. Village Polar Bear Harvest, Alaska, 1996/1997.**

<i>Village</i>	<i>Male</i>	<i>Female</i>	<i>Unknown</i>	<i>Total</i>
Kaktovik*	1	1	2	4
Nuiqsut*	–	–	–	0
Barrow*	18	18	2	38
Atkasuk*	–	1	–	1
Wainwright*	4	–	4	8
Point Lay	4	2	–	6
Point Hope	7	3	2	12
Kivalina	–	–	–	0
Kotzebue	–	1	–	1
Shishmaref	–	–	–	0
Wales	–	1	1	2
Ageklekak	–	–	–	0
Little Diomede	3	–	1	4
Savoonga	1	1	–	2
Gambell	4	3	–	7
<b>Total</b>	<b>42</b>	<b>31</b>	<b>12</b>	<b>85</b>
<b>Percent</b>	<b>(49.4)</b>	<b>(36.5)</b>	<b>(14.1)</b>	<b>(100)</b>

\* Denotes villages party to the IGC/NSB management agreement. Harvest season extends from July 1, 1996, to June 30, 1997.

Slope Borough/Inuvialuit Game Council Agreement. The North Slope Borough and Inuvialuit Game Council meeting of Joint Commissioners and Technical Advisors will take place March 18-20, 1998, in Inuvik, Northwest Territories, Canada.

#### *Polar Bear Bio-Monitoring*

The second year of the polar bear bio-monitoring program to document contaminant levels in polar bears in Alaska, began in fall/winter 1997-98. The Service, working cooperatively with the North Slope Borough, the Alaska Nanuuq Commission, and Alaska Native hunters is collecting liver, kidney, muscle, and fat tissues from 50 adult male bears to determine metal and organochlorine concentrations.

Twenty five adult males were taken during the 1996/97 subsistence harvest but we received contaminant specimens from only eight adult males and two subadult males. To date we have collected samples from 12 adult males. The number of polar bears harvested in any one season is very dependent on the movement of sea ice. During years with low harvest, the ice often remains offshore until late in the fall and then breaks up early and recedes quickly in the spring. In addition to the ice conditions, the number of samples collected from the available adult males

during normal subsistence activities is dependent upon hunter selectivity and participation.

All the specimens received during the 1996-97 season were submitted to labs for analysis. To date the Service has received only the results on organochlorine analysis. Levels of total PCBs (S-PCB ppm, wet weight) averaged 2.89 ppm (range 1.31-7.55 ppm), but were not high compared to levels found in Hudson Bay, Canada, and Svalbard, Norway, two areas which have some of the highest documented levels in polar bears. The highest levels of S-PCB were found in the two subadults from Point Lay (7.55 ppm and 3.26 ppm) and one adult male from Barrow (5.05 ppm). Six congeners (99, 153, 138, 180, 170, and 194) constituted approximately 92 percent of the S-PCB in the sample.

Mean levels of total hexachlorocyclohexane (S-HCH ppm, wet weight) for the 12 bears recently analyzed was 0.732 which is similar to the relatively high levels reported for the Chukchi and Bering Seas by Norstrom et al. (in press). Beta-HCH, the most persistent HCH isomer, constituted about 92 percent of the sum HCHs. The levels of S-HCH in the Chukchi and Bering Seas are some of the highest reported levels within the Arctic region. Suspected sources are from Asia and

**Table 11. Monthly Polar Bear Harvest, Alaska, 1996/1997.**

Village	Month												Total
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Kaktovik*	–	–	1	1	–	–	–	1	–	1	–	–	4
Nuiqsut*	–	–	–	–	–	–	–	–	–	–	–	–	0
Barrow*	–	–	–	22	5	1	1	2	5	–	2	–	38
Atkasuk*	–	–	–	1	–	–	–	–	–	–	–	–	1
Wainwright*	–	–	–	2	1	–	1	–	1	–	3	–	8
Point Lay	–	–	–	–	–	1	1	3	–	1	–	–	6
Point Hope	–	–	–	–	–	–	1	–	6	4	1	–	12
Kivalina	–	–	–	–	–	–	–	–	–	–	–	–	0
Kotzebue	–	–	–	–	–	–	–	1	–	–	–	–	1
Shishmaref	–	–	–	–	–	–	–	–	–	–	–	–	0
Ageklekak	–	–	–	–	–	–	–	–	–	–	–	–	0
Wales	–	–	–	–	–	–	1	1	–	–	–	–	2
Diomede	–	–	–	–	–	1	–	2	–	1	–	–	4
Savoonga	–	–	–	–	–	–	–	–	1	1	–	–	2
Gambell	–	–	–	–	–	–	–	2	4	1	–	–	7
<b>Total</b>	0	0	1	26	6	3	5	12	17	9	6	0	85
<b>Percent</b>	0	0	1.2	30.2	7.0	3.5	5.8	14.0	19.8	10.5	7.0	0	100

\* Denotes villages party to the NSB/IGC management agreement. Harvest season extends from July 1, 1996, to June 30, 1997.

**Table 12. Mean Age\* of Polar Bears Harvested in Alaska, 1991-1996.**

Sex	1991/92 <sup>a</sup>			1992/93 <sup>a</sup>			1993/94 <sup>a</sup>			1994/95 <sup>a</sup>			1995/96 <sup>a</sup>		
	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD
Male	(22)	11.8	7.4	(24)	9.6	6.7	(52)	7.2	7.4	(48)	7.6	7.1	(9)	5.6	4.0
Female	(12)	8.2	4.8	(12)	11.5	7.2	(39)	7.0	5.5	(24)	6.1	6.4	(3)	6.3	4.0
Unknown	(0)	–	–	(1)	3.0	–	(2)	8.0	2.8	(1)	3.0	–	(8)	5.5	5.9

\* Ages are based on cementum annuli of the first premolar. N = Number of Bears Analyzed. M = Mean Age. SD = Standard Deviation.

<sup>a</sup> Harvest season extends from July 1 to June 30.

**Table 13. Age Class\* of Polar Bears Harvested in Alaska, 1991-1996.**

Age Class	1991/92 <sup>a</sup>	1992/93 <sup>a</sup>	1993/94 <sup>a</sup>	1994/95 <sup>a</sup>	1995/96 <sup>a</sup>	Total
Adults (5+ yrs)	26 (76)	24 (65)	44 (47)	30 (41)	9 (45)	133 (52)
Subadults (3-4 yrs)	5 (15)	10 (27)	33 (36)	32 (44)	7 (35)	87 (34)
Cubs (0-2 yrs)	3 (9)	3 (8)	16 (17)	11 (15)	4 (20)	37 (14)
Unknown Age	30	39	32	22	23	146
<b>Total</b>	64	76	125	95	43	403

\* Ages are based on cementum annuli of the first premolar. Two year old bears are considered subadults after April 30. ( ) = percentage by harvest year.

<sup>a</sup> Harvest season extends from July 1 to June 30.

Russia. One common source of HCH is lindane which is used as an insecticide to treat seeds. Lindane, a highly water-soluble neurotoxin, has been linked to reproductive, liver, and immune system dysfunctions.

#### *U.S./Russia Den Survey*

The priority for polar bear management in Alaska is to determine the population size for the Chukchi/Bering Seas stock of polar bears. An aerial census of the Chukchi/Bering Seas population using icebreaker support is proposed and the methods have been developed and tested in a joint project between the Service and the USGS/BRD. However, inadequate funding has precluded implementation of this study. As an alternative, polar bear biologists from the United States and Russia have been developing methods for conducting a den survey as an index of status and trends for this shared population. In December of 1996, a workshop was held in Anchorage, Alaska, to standardize protocols for conducting a joint U.S./Russia den survey on Wrangel Island, Russia; workshop proceedings are in preparation. The protocols provide the technical guidance for developing the best method to conduct polar bear dens surveys in the Chukchi/Bering Seas.

#### *Marine Mammal Carcass Surveys*

In August 1995, the Service completed development of the *Habitat Conservation Strategy for Polar Bears in Alaska* (Strategy) in accordance with the requirements set forth in regulations allowing the incidental, unintentional take of small numbers of polar bears during year-round oil and gas operations in the Beaufort Sea and adjacent northern coast of Alaska (58 FR 60402). One purpose of the Strategy was to develop and implement measures to identify and conserve habitat important to polar bears for denning, feeding, and seasonal movements. In Alaska, marine mammal carcasses represent tons of potential food for polar bears and may be particularly important for the survival of females with cubs and younger bears during the fall.

In the Strategy, areas along the coasts of the Bering, Chukchi, and Beaufort Seas were identified by knowledgeable Native residents as important polar bear feeding areas. The Service conducted aerial surveys from 1995 to 1997 along the coastline of the Bering, Chukchi, and Beaufort Seas to determine the distribution and abundance of marine mammal carcasses and their availability to polar bears as a food source. The study

area included the coastline and seaward side of barrier islands between Nome (Bering Sea) and Demarcation Point (U.S.-Canada border, Beaufort Sea). Table 14 provides a summary of preliminary findings. A final report is expected to be completed by the end of March 1998.

The use of marine mammal carcasses by polar bears as a food source raises three primary questions: (1) where are the carcasses distributed; (2) what sex/age class of polar bears is using marine mammal carcasses; and (3) what is the energetic value of marine mammal carcasses as a food source to polar bears? The first question has been addressed through the aerial carcass surveys. To address the second question, the Service proposes to conduct a pilot study in Kaktovik (alternate, Barrow) in the fall when polar bears feed on hunter-harvested whale carcasses.

In 1994, the Service collected local knowledge concerning polar bear habitat use in Alaska. A Technical Report: *Collection of Local Knowledge Regarding Polar Bear Habitat Use in Alaska*, was completed in August 1997. This information, which was incorporated into the Service's final Strategy in August 1995 has greatly increased the knowledge of polar bear denning and feeding habitats and has been used to guide management decisions concerning human uses of polar bear habitat.

#### **Sea Otter-Southern**

Sea otters historically ranged throughout the north Pacific from Hokkaido, Japan, through the Aleutian Islands, the Alaskan peninsula, and south along the Pacific coast to Baja California, Mexico. In the mid-1700's, sea otters were recognized as a valuable fur-bearing animal and were subject to an intense commercial harvest. By the early 1900's, the species had been extirpated from most of its historic range except for 13 remnant populations, including one numbering approximately 50 individuals in central California. This remnant population in the near-shore waters of California is referred to as the southern sea otter, and was first recognized as a subspecies in 1904. The historical sea otter population size in California is estimated to have numbered 16,000-18,000 individuals. Today, the southern sea otter population numbers over 2,200 (Table 15) and its range extends between Pigeon Point, San Mateo County, to Purisima Point, Santa Barbara County.

The Service listed the southern sea otter as threatened under the ESA in 1977 because of its small population size, limited distribution, and its risk of exposure to oil spills throughout its range. The most serious threat to the southern sea otter is a major oil spill from a tanker in the waters in the vicinity of its range.

The USGS/BRD, the California Department of Fish and Game (CDF&G), and the Service continued the spring and fall population surveys in 1997. The area surveyed included the entire 220-mile long established range of the southern sea otter, from Point Año Nuevo in Santa Cruz County to the Santa Maria River in San Luis Obispo County, plus additional peripheral habitat. The number of otters counted during the Spring 1997 survey was 2.2 percent below the Spring 1996 count (Table 15). This represents the second consecutive year that the spring population counts have declined. This is coupled with three consecutive years of record high mortality (as indicated by beached sea otter carcasses). The spring population count has declined by 6.2 percent since the record high count of 2,377 in 1995. Spring counts are consistently higher than fall counts, and this may be the result of more favorable sighting conditions in the spring than in the fall. Most otters are sighted between Año Nuevo, San Mateo County, and Avila Beach, San Luis Obispo County.

#### *Translocation of Southern Sea Otters*

Between 1987 and 1990, 139 southern sea otters (31 males, 108 females) were translocated to San Nicolas Island (SNI), off of southern California, in an effort to establish a second breeding colony. The purposes for establishing a second colony were two-fold: (1) to eliminate the possibility that more than a small proportion of the population would be decimated by any single natural or human-caused catastrophe; and (2) to obtain data for assessing translocation and containment techniques, population status, and the influence of sea otters on the structure and dynamics of the near shore community. The latter information is particularly important in attempting to understand the characteristics and impacts of a sea otter population at its optimum sustainable population level as required by the Act.

Public Law 99-625 provides the authority and establishes the guidelines for carrying out the translocation program. The regulations designating the colony as an experimental population (50 CFR

**Table 14. Number of Marine Mammal Carcasses Observed During Aerial Surveys of the Bering, Chukchi, and Beaufort Seas Coastline of Alaska, 1995-97.**

	<i>Jul 26-28, 1995</i>	<i>Sep 25 and 27, 1995</i>	<i>Sep 25-26, 1996</i>	<i>Jul 22 and Aug 9-10, 1997</i>	<i>Sep 25-27, 1997</i>
Pacific walrus	83	68	168	229	148
Whale species	6	6	0	5	22
Seal species	79	20	10	23	12
<b>Total</b>	168	94	178	257	182

**Table 15. Comparison of Southern Sea Otter Counts Since Spring 1982.<sup>a</sup>**

<i>Season</i>		<i>Number of Independent Otters</i>	<i>Number of Pups</i>	<i>Total</i>
1982	Spring	1,124	222	1,346
	Fall	1,204	147	1,351
1983	Spring	1,156	121	1,277
	Fall	1,060	163	1,223
1984	Spring	1,180	123	1,303
	Spring <sup>b</sup>	1,151	52	1,203
	Fall	No survey		
1985	Spring	1,119	242	1,361
	Fall	1,065	150	1,215
1986	Winter <sup>c</sup>	1,231	181	1,412
	Spring	1,358	228	1,586
	Fall	1,091	113	1,204
1987	Spring	1,435	226	1,661
	Fall	1,260	110	1,370
1988	Spring	1,504	221	1,725
	Fall	No Survey		
1989	Spring	1,571	285	1,856
	Fall	1,492	115	1,607
1990	Spring	1,466	214	1,680
	Fall	1,516	120	1,636
1991	Spring	1,700	241	1,941
	Fall	1,523	138	1,661
1992	Spring	1,810	291	2,101
	Fall	1,581	134	1,715
1993	Spring	2,022	217	2,239
	Fall	1,662	143	1,805
1994	Spring	2,076	283	2,359
	Fall	1,730	115	1,845
1995	Spring	2,095	282	2,377
	Fall	2,053	137	2,190
1996	Spring	1,963	315	2,278
	Fall	1,858	161	2,019
1997	Spring	1,919	310	2,229
	Fall	2,008	197	2,205

*a* In 1992, survey data since Fall 1982 was reviewed and counts were corrected as appropriate.

*b* California Department of Fish and Game aerial survey with ground truth stations.

*c* Experimental.

17.84) established the boundaries of a Translocation Zone to which otters would be translocated and given protection similar to that of the source population, and a Management Zone to be maintained otter-free by non-lethal means.

#### *Status of Colony*

Sea otters surveys are conducted quarterly by the USGS/BRD. In the past, these surveys were conducted every other month. During 1997, counts of independent otters ranged from 9 to 16; five new pups were verified in 1997. By the end of 1997, 49 pups are known to have been born at SNI. Because pups are not marked, assessment of recruitment into the population is difficult.

#### *Containment*

The containment program is designed to prevent sea otters from colonizing the Management Zone through a cooperative effort between the Service and the CDF&G. The containment operation, as outlined in the Translocation Plan and the Service's Containment Plan, consists of three interrelated and interdependent activities: surveillance of the Management Zone, the capture of sea otters in the Management Zone, and post capture relocation.

Since 1987, 20 independent (10 males, 10 females) sea otters and 4 dependent pups have been captured in the Management Zone. Eleven of the otters had been translocated to SNI, four had apparently swam down from the mainland range, and nine either swam down from the mainland range or were born in the Management Zone or at SNI. Two of the otters mentioned above were captured and removed from the Management Zone twice.

In February 1993, all sea otter containment activities were halted following the deaths of 2 independent otters that died shortly after their release. By that date, four (16 percent) of the total of 24 sea otters relocated were known to have died shortly after being moved for containment purposes. An evaluation of containment techniques proved to be inconclusive, and recommendations were made to continue sea otter containment activities with modifications. Since 1993, sea otter containment activities have been limited by funding within both the Service and the CDF&G.

During 1997, the Service received only a few reports of sea otters in the Management Zone. Reports of sea otters were coordinated with the CDF&G. Although the containment activities have been substantially decreased since 1993, no sea otter colonies were observed in the designated Management Zone in 1997.

#### *Law Enforcement*

Sea otters have been intentionally harassed, shot, clubbed, and found drowned in legally and illegally set commercial fishing gear in past years. Service law enforcement officers conduct surveillance operations and investigations, and seek prosecution of individuals who harm sea otters.

There were no sea otters known to have died of gun shot wounds in 1997 (three were identified in 1996). Identified cases of shot sea otters likely represent a fraction of southern sea otters killed annually by malicious activities. In 1996, six incidences of shooting were under investigation by Service law enforcement agents. However, due to lack of evidence identifying suspects, these cases were closed. There were no new cases in 1997.

#### *Incidental Take Within the Mainland Range*

Several lines of direct and indirect evidence indicate that incidental drowning of sea otters in gill and trammel entangling nets has been a significant source of mortality. There is currently no monitoring of fishing activities to identify incidental take of sea otters. Based on 1997 stranding reports, no mortalities of southern sea otters were attributed to entanglement in fishing gear. In summation, from June 1982 to December 31, 1997, a total of 75 otters have been observed or otherwise known to have drowned in legally set commercial fishing nets: 6 in 1982, 6 in 1983, 16 in 1984, 12 in 1985, 3 in 1986, 5 each in 1987 and 1988, 11 in 1989, 9 in 1990, 0 in 1991 and 1992, 1 each in 1993 and 1994, and 0 in 1995, 1996, and 1997.

California Senate Bill #2563, which provides additional restrictions on the use of gill and trammel nets in coastal waters, was enacted in 1990 and promulgated on January 1, 1991. This bill prohibits the use of gill and trammel nets in waters shallower than 30 fathoms between Waddell Creek in Santa Cruz County and Point Sal in Santa Barbara County. The 30 fathom contour was selected based on analysis and recommendation by the Service using data obtained during a study by the

Minerals Management Service. The analysis indicated that currently only an extremely small number of sea otters use waters deeper than 30 fathoms. The Service recommended to the NMFS that a 30 fathom closure should be implemented to likely reduce the incidental take of sea otters to near zero. The state legislation has significantly reduced the number of sea otters found drowned in fishing nets. The NMFS and the CDF&G will continue observations of the set net fishery occurring in waters outside this restricted area.

The small group of sea otters, currently found at Purisima Point, Santa Barbara County, are at risk of incidental take. Purisima Point is between Point Sal and Point Conception, Santa Barbara County, an area in which no restriction of gill or trammel net fishing exists for the protection of sea otters. Observations of set-net fishing activity in this area is not convenient and therefore not covered by any observer program. The Service has requested that the CDF&G enact an emergency closure and close the area to set-net fishing. The CDF&G has chosen not to close the area because there is no direct evidence that sea otters are being taken by the set-net fishery in the area.

The crab and lobster pot fisheries continue to be a concern as a source of mortality for otters. Sparse data and anecdotal records indicate that southern sea otters are incidentally taken in the pot fishery. Sea otters are known to be taken occasionally in Alaska's crab pot fishery. However, Alaska's pot fishery utilizes different types of gear and is not directly comparable to the California fishery. The Service continues to evaluate incidental take in crab and lobster pots.

A live finfish (trap) fishery continues along the coast. This fishery is unregulated, i.e., there are no regulations regarding the number of fishers allowed in this fishery, or the types of traps or their design that can be used. Traps for finfish are set within the kelp beds near shore. In areas where this fishery occurs, the number of beach cast carcasses has increased. The Service is concerned about the potential impact from this fishery on the southern sea otter population.

#### *Sea Otter Mortality*

Over 100 sea otter carcasses wash ashore every year. In 1997, 152 southern sea otter carcasses were recovered from beaches, 27 less than the record high recorded in 1996. Although a short-term

elevated mortality event occurred this year, it did not compare to the mass mortality event observed in Monterey Bay during July 1995.

The USGS/BRD's National Wildlife Health Center (NWHC) has conducted necropsies on fresh, beach cast sea otter carcasses since 1992. The immediate goals of this program are to identify the major causes of death in sea otters and to establish their relative frequencies. The necropsy program at the NWHC continued in 1997; however, due to increasing costs and workload, the number of carcasses submitted for necropsy was reduced to 25 percent of past levels.

In 1996, 52 southern sea otter carcasses were necropsied by pathologists at the NWHC. Most sea otter deaths have been attributed to infectious diseases (42 percent); other causes of death were trauma (17 percent), emaciation (6 percent), other factors (16 percent), and undetermined (19 percent).

From 1992-1996 a total of 247 sea otters were examined. Of these, most deaths were attributed to infectious disease (40 percent). These diseases include acanthocephalan peritonitis (32 percent), protozoal encephalitis (21 percent), coccidioidomycosis (9 percent), bacterial (35 percent), and uncertain, probably infectious (3 percent). Other sources of mortality include various types of trauma including shark bite, lacerations, etc. (19 percent); emaciation (9 percent), and other causes including gastro-intestinal conditions, neoplasia, and miscellaneous (13 percent). The cause of death of 19 percent of animals is undetermined at this time.

#### *Stranding and Rehabilitation Program*

The Monterey Bay Aquarium has been the primary facility involved in the rescue and rehabilitation of stranded southern sea otters. In 1994, the Service authorized a second facility, The Marine Mammal Center of Sausalito, California, to rescue and rehabilitate stranded southern sea otters for the purpose of returning them to the wild. Most strandings are cared for by the Monterey Bay Aquarium. A total of 14 sea otters (6 male and 8 female of which 10 were pups—3 male and 7 female) were cared for by the Monterey Bay Aquarium in 1997. Six pups were released of which three are still in the wild.

Rehabilitated sea otters that lack the skills to survive in the wild are placed in



permanent housing in a number of facilities. As of 1997, those facilities include the Monterey Bay Aquarium, Sea World of San Diego, the Aquarium for Wildlife Conservation (New York), and the New England Aquarium. (In the 1996 report, we reported that the Oregon Coast Aquarium was housing southern sea otters; in actuality, sea otters housed there are Alaskan animals).

#### *Section 7 Consultations*

Pursuant to Section 7 of the ESA, the Service reviews proposed Federally funded, conducted, or permitted activities that may affect the southern sea otter. The Service received no requests for formal consultation in 1997.

#### *Section 6 of the ESA*

No ESA Section 6 funds were provided for the southern sea otter in 1997 (FY 1997).

#### *Oil Spill Activities*

The Service's sea otter oil spill contingency plan is still in draft and needs to be revised to incorporate pertinent aspects of the Federal Oil Pollution Act of 1990, and California Senate Bill #2040 which created a new oil spill division within the CDF&G. The ramifications of both Federal and State legislation have yet to be realized or applied to the existing document. The Service, in coordination with the CDF&G, plans to update and make final the contingency plan. The completion date is still to be determined.

In 1997, the Service was invited by the Monterey Bay National Marine Sanctuary and the U.S. Coast Guard to participate as a member of a working group assembled at the direction of Congress to develop a proposal that would reduce oil spill risk to the Monterey Bay Sanctuary. This group is looking at various vessel routing schemes, reporting requirements, and possible regulations that would reduce oil spill risk and have a likely probability of being implemented. The proposal will be completed and released for public review in 1998.

#### *Guadalupe Oil Field*

The Union Oil Company of California (Unocal) has operated the Guadalupe Oil Field in San Luis Obispo County since 1953. A thinning agent, called K-D diluent, which has been used to improve oil production, has been found to be the source of extensive contamination in and around the oil fields, including the local marine environment. An estimate of 8-20

million gallons of diluent have been released into the soil, ground water, and local marine environment in the past 34 years. Full determination of the extent of contamination is underway. The southern sea otter is one of several listed species that may have been affected by these releases. Since 1994, the Service has participated as a trustee representative for the Department's trust resources. The settlement for resource damages is still being discussed.

#### *Avila Beach Oil Spill Settlement*

Unocal and the trust resource agencies, the Service, and the CDF&G, reached a settlement agreement for \$100,000 to be used for sea otter restoration activities resulting from natural resource damages sustained during the a 1992 oil spill near Avila Beach, San Luis Obispo County. Approximately 60 otters were in the Avila Beach area at the time of the spill. At least four sea otters came in contact with the oil. Two were found dead, covered with oil; one was captured and died while being transported to a rehabilitation facility (this otter apparently died of coccidioidomycosis although it was oiled at time of capture); and one oiled otter was captured, cleaned, and released.

Projects for settlement monies for sea otter restoration have been identified and evaluated. Contracts for restoration have not yet been awarded.

#### **Sea Otter-Washington State**

*Enhydra lutris kenyoni* historically ranged throughout the Aleutian Islands, originally as far north as the Pribilof Islands and in the eastern Pacific Ocean from the Alaska Peninsula south along the coast to Oregon (Wilson et al. 1991). This subspecies was extirpated from most of its range during the 1700's and 1800's as the species was exploited for its fur. In 1969 and 1970, a total of 59 sea otters captured at Amchitka Island, Alaska, were released in Washington. The estimated carrying capacity in Washington has not been determined.

For management purposes pursuant to the Act, the range of this stock currently is being considered as within the borders of the State of Washington. The Washington population currently ranges from Neah Bay south to Destruction Island.

The reintroduced population was not surveyed between 1970 and 1977. In 1977, the Service surveyed the coast and counted only 19 sea otters. The population was surveyed again in 1978.

Between 1981 and 1989 the population was surveyed every other year. Since 1989, data on size and distribution of the Washington sea otter population have been gathered annually using combined aerial and ground counts. Beginning in Fiscal Year 1994, this survey work was conducted by the Department's then newly created National Biological Survey (later changed to the National Biological Service, and now the Biological Resources Division of the U.S. Geological Survey, i.e., USGS/BRD).

#### *Minimum Population Estimate and Current Trend*

Based on the 1997 summer survey count, the minimum population size is 502 animals. This represents an increase of nearly 17 percent compared to the 1996 count.

Based on count totals from 1977 to the present, the Washington sea otter population is continuing to increase. Since 1989 (when the current survey method was initiated) through 1997, the population has grown at an average rate of 12 percent per year. Counts since 1989 are: 1989 (208), 1990 (212), 1991 (276), 1992 (313), 1993 (307), 1994 (360), 1995 (395), 1996 (430), and 1997 (502).

#### *Mortality and Incidental Take*

Sea otters are susceptible to drowning in gill nets in Washington's coastal gill net fisheries conducted by tribal fishermen, but documented incidental takes are rare. At least three sea otters are reported to have been killed in a tribal fishery chinook salmon set-net in the vicinity of Point of Arches (Spike Rock) on the north Washington coast. At present, there has been only one recorded otter-fishery take in the current sea otter range in Washington. Set gill nets are used by Makah fishermen to catch salmon along the north coast of Washington and the Strait of Juan de Fuca. This fishery operates out of Neah Bay. As the Washington sea otter population moves north and east into the strait, or if the fishery moves south, the probability of fisheries-related incidental take will increase. There was no known fishery-related sea otter mortality in 1997.

As sea otters expand their range north or south, they will encounter several sport and commercial shellfish fisheries (urchins, razor clams, Dungeness crabs) along the coast. Evidence from California and Alaska suggests that incidental take of sea otter in crab traps may occur.

Other sources of human-caused mortality affecting the Washington population of sea otters are not well documented. Documented sources of human-caused mortality for the southern sea otter include shooting, boat strikes, capture and relocation efforts, oil spills, and possibly elevated levels of polychlorinated biphenyls (PCBs) and other toxic contaminants. In Washington, an uncertain number of sea otters may have been killed in recent years by oil spills.

### **West Indian Manatee**

The West Indian manatee in Florida represents the northernmost and largest remaining component of a manatee population once found throughout the Caribbean basin in suitable coastal habitat. Geographically isolated from its counterparts, the manatee in Florida has historically been viewed as rare and declining in number. The manatee was first afforded protection by the State of Florida in 1893. The manatee is now variously protected by the State of Florida's Manatee Sanctuary Act of 1978, the ESA, and by the Act.

As a Federally listed endangered species, efforts to recover the species are guided by the Service's manatee recovery program. This program, through the revised Florida Manatee Recovery Plan of 1996, coordinates Federal, State, local and private manatee recovery efforts. Recovery activities incorporate both research and management. Research efforts have focused on monitoring the status of the manatee and its habitat and on better defining various components of its life history. Management initiatives have concentrated on protecting essential manatee habitat and reducing human-related causes of manatee mortality. National Wildlife Refuges administered by the Service have played an integral role in the manatee recovery process.

More than twenty years of manatee research and management initiatives have shown that the manatee's future depends upon a better understanding of its status and life history and on better protecting the manatee and its habitat from direct and indirect impacts. The protection of these essential components in the face of increasing human population, development, and use of watercraft underscores the need to continue to balance the needs of the manatee with its human neighbors.

### *Status*

A total of 242 manatees died in 1997. While this number is down significantly from 1996 when a record 415 manatees died, it is the second worst year for manatee deaths since 1974 when the carcass salvage program began. Included in the year's mortality were fifty-five manatees that died from watercraft collisions, eight that were crushed and killed in flood gates and water control structures, and eight that died from other human-related causes.

The Florida Department of Environmental Protection (FDEP) coordinates a series of synoptic aerial surveys during peak cold periods. These surveys focus on warm water aggregation sites and are used to assess manatee abundance. Two statewide surveys were flown in 1997. One, flown on January 19-20, 1997, yielded a count of 2,229 manatees (900 on Florida's east coast and 1,329 on the west coast). During the second survey (flown on February 13, 1997) 1,709 manatees were counted (719 on the east coast and 918 on the west coast). Despite record mortalities observed on Florida's west coast in 1996, the January 1997 west coast count included the highest number of manatees ever recorded in that area.

Based on synoptic surveys and other information, it has been suggested that the Florida manatee population has been stable or slowly increasing since the mid-1970s. This general trend has been attributed, in part, to a number of factors including, but not limited to, the cessation of hunting, an abundance of native and exotic food plants, the establishment and enforcement of manatee protection zones, the relatively recent existence of non-natural warm water refuges, and public education. Despite these factors, the rate of population increase may have been slowed or even reversed by recent record mortalities.

### *Management*

Manatee behavior and habitat have been closely monitored for more than 20 years through the carcass salvage program, USGS/BRD's photo-identification system, aerial surveys, tracking projects, and other studies. These studies have provided a wealth of information, most of which has been made available to managers through a variety of media, including Geographic Information Systems (GIS). These data are used to develop population models and to assist Federal, State, and local agencies in protecting manatees from direct threats

such as watercraft and water control structures, and from indirect threats such as habitat loss.

Comprehensive manatee protection plans are being developed on a county-by-county basis throughout Florida. These plans address ways to reduce human impacts to manatees. At this time, these plans are in varying stages of completion. Twelve of the 13 counties involved in this process have either permanent or interim county-wide speed restrictions in effect and the remaining county is partially protected in certain critical areas. The counties are also addressing such issues as guidance on boat facility siting, recommendations for limiting boat densities in certain areas, and sea grass protection, and most counties have summarized these in draft form. The FDEP has taken a primary role in this initiative and is supported in its efforts by the Service.

Service efforts to protect manatee habitat rely heavily on Section 7 of the ESA. The Section 7 process involves a Service review of Federal actions for impacts to listed species, including the manatee. If it is determined that an action may affect manatees, the Service requests consultation with the action agency to evaluate the effect of the action on the manatee and its habitat.

An emergency sanctuary was designated near the Service's Crystal River National Wildlife Refuge at Three Sisters Springs. The spring is a place used by wintering manatees and heavily visited by the public, who recognize the site as an area where they can interact with manatees. The sheer number of visitors and the undisciplined actions of a few individuals cause these animals to leave the area at a time when they need it most. To minimize harassment, a sanctuary was created to give manatees a warm water area free from visitors. The Service plans to permanently designate a sanctuary at this site in 1998.

Water control structures have been a persistent source of manatee mortality. Manatees are crushed or impinged by these structures, which are owned and operated by the South Florida Water Management District (SFWMD) and the U.S. Army Corps of Engineers (Corps). Through the Section 1135 process of the Water Resources Development Act of 1986, the Corps has secured funding to retrofit problem structures with devices to reduce mortality. The Service has reviewed and commented on SFWMD

and Corps proposals to reduce the number of manatees being killed by these structures and takes an active role on the task force that plans and reviews these actions.

Besides addressing manatee mortality and habitat protection, recovery efforts also support a manatee rescue and rehabilitation network. Injured or sick manatees often require some form of assistance. In 1997, thirty-four rescues were completed. A network of rescue teams has been developed and each team responds as necessary. Manatees requiring rehabilitative care are typically taken to one of five authorized facilities for treatment. Due to serious statewide overcrowding problems, the Service authorized three out-of-state facilities in 1997 to operate rehabilitative care facilities. Fifty-one manatees were in rehabilitation facilities as of the end of 1997.

In an effort to reduce the number of deaths and injuries associated with watercraft, the Service formed a law enforcement task force to patrol high mortality areas in Brevard County, Florida. Officers stopped more than a thousand violators and issued over 300 citations to boaters caught speeding in manatee protection areas.

A contingency plan for catastrophic manatee rescue and mortality events was completed in 1997. This plan identified risk factors that might cause a manatee mortality event, listed agencies, support personnel, and facilities that could be called upon to help during an event, and provided a framework for coordinating Service and FDEP activities.

#### *Summary*

The long-range recovery goal for the Florida manatee, as required by the Act is to maintain the health and stability of the marine ecosystem and to determine and maintain manatee numbers at optimum sustainable levels in the southeastern United States. In 1997, significant progress was made toward this goal. Recovery team members furthered efforts to reduce water craft- and water control structure-related mortality. Various habitat conservation initiatives promoted and enhanced essential manatee habitat areas. Researchers continued to identify manatee habitat and to assess manatee distribution, abundance, and the status of the manatee.

#### **Hawaiian Monk Seal**

Service personnel from the Pacific Remote Islands National Wildlife Refuge Complex cooperate regularly with NMFS personnel on various research and recovery actions recommended in the Hawaiian Monk Seal Recovery Plan. Refuge staff provide a variety of support services, including transportation of equipment and supplies aboard Service-funded charters, radio-monitoring and message relays and maintenance of the Tern Island Field Station. As part of production and population surveys, Service biologists worked with NMFS researchers on Refuge islands tagging weaned monk seal pups, resighting tagged seals, and reporting seals entangled in marine debris. Service biologists assisted with the deployment of satellite tags and critter cams. They also conducted regular population censuses of monk seals at French Frigate Shoals and Midway Atoll, as well as intermittent surveys on other Refuge islands.

Service staff actively patrol and remove nets and other entangling debris from Refuge beaches and reefs to reduce the likelihood of entanglement of monk seals. Seals occasionally became disoriented or entrapped behind the deteriorating seawall at Tern Island. Refuge staff freed entrapped seals.

The Service funded the Army Corps of Engineers to produce a report outlining options for shore protection at Tern Island. The report was completed during 1997 and provides options and cost estimates for shore protection measures to reduce erosion on the Island and minimize entrapment of Hawaiian monk seals.

Refuge staff served on the NMFS Animal Care Committee.

Observations of other marine mammals, including spinner dolphins, bottlenose dolphins and humpbacked whales were logged in station, camp and expedition records following sightings.

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