

# Administration of the Marine Mammal Protection Act of 1972

*Annual Report*

January 1, 1998 to December 31, 1998



**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:

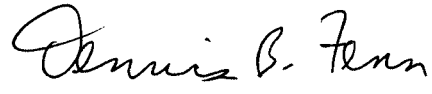
“Within six months after the effective date of this Act [December 21, 1972] and every twelve months thereafter, the Secretary shall report to the public through publication in the *Federal Register* and to the Congress on the current status of all marine mammal species and population stocks subject to 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, 1998, to December 31, 1998, 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 11/22/00



Chief Biologist  
Biological Resources Division  
U.S. Geological Survey  
Dated 12/5/00

# **Administration of the Marine Mammal Protection Act of 1972**

*Annual Report*

**January 1, 1998 to December 31, 1998**

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

# In Memoriam

## *Gerald W. Garner, Ph.D.*

11-14-44 to 2-15-98

Dr. Gerald W. Garner died suddenly February 15, 1998, while attending a workshop on polar bear research and management in Canada. As a seasoned research wildlife biologist with the U.S. Fish and Wildlife Service, and later at the time of his death with the U.S. Geological Survey's Alaska Biological Science Center, Gerald was a leader of the Bering-Chukchi Sea Marine Mammal Program. Through his career, Gerald contributed important scientific knowledge on a variety of terrestrial and marine species from his native Oklahoma to the expanses of the Russian Arctic. After the first official planning session in Sochi, Russia, in 1988, Gerald took the lead in building a program designed to define the populations of polar bears living in the previously unknown Russian territories between Alaska and Norway. This enormous effort required coordination and cooperation of American, Russian, and Norwegian scientists, as well as policy makers. Arduous field conditions and impossible logistical challenges were the order of each and every day, yet Gerald pulled it together. Having established a model of cooperative polar bear research, Gerald expanded that model to the shared Russian-U.S. walrus population. Gerald lived for the challenges of difficult wildlife and logistical problems, and seemed most



USFWS photo by Scott Schliebe

*Gerald Garner*

at home astride a polar bear or walrus and in the remote field camps from which those animals were accessed. As his co-workers carry his mission forward, we all will be able to look back and remember how Gerald helped us get there. Like the animals with which he worked, Gerald has left giant footprints on the tundra, the beaches, and the pack-ice of the North, and on the hearts of all of his co-workers. He will be missed and not forgotten.

# Table of Contents

<b>List of Acronyms</b> .....	iv
<b>Introduction</b> .....	1
Authority .....	1
Species List .....	1
<b>Summary of the 1998 Program</b> .....	2
<i>Appropriations</i> .....	2
Marine Mammal Protection Act Expenditures .....	2
Endangered Species Act Expenditures .....	2
<i>Outer Continental Shelf Operations and Environmental Studies</i> .....	3
<i>Research and Development</i> .....	4
<i>Enforcement</i> .....	14
<i>Permits and Registrations</i> .....	16
Scientific Research Permits .....	16
Public Display Permits .....	17
Enhancement Permits .....	17
Photography Permits .....	17
Registered Agent/Tannery Permits .....	17
Polar Bear Import Trophy Permits .....	17
<i>International Activities</i> .....	18
U.S.- Russia Environmental Agreement: Marine Mammal Project .....	18
U.S.- Russia Pacific Walrus Conservation Treaty .....	18
Walrus Activities Under the Area V Environmental Protection Agreement .....	18
U.S.- Russia Bilateral Polar Bear Agreement .....	19
Review of the 1973 International Agreement on the Conservation of Polar Bears .....	19
<i>Status Reports</i> .....	20
Stock Assessments .....	20
Pacific Walrus .....	20
Northern Sea Otter .....	22
Polar Bear .....	22
Incidental (Small) Take During Oil and Gas Operations .....	25
Marking, Tagging, and Reporting Program .....	26
Sea Otter-Southern .....	32
West Indian Manatee .....	36
Hawaiian Monk Seal and Other Marine Mammal Activities on Pacific Islands .....	38

# List of Acronyms

**1973 Agreement**—1973 International Agreement on the Conservation of Polar Bears

**ABSC**—Alaska Biological Science Center, USGS

**Act**—Marine Mammal Protection Act of 1972

**ADFG**—Alaska Department of Fish and Game

**AMMTAP**—Alaska Marine Mammal Tissue Archival Project

**ANC**—Alaska Nanuuq Commission

**ASOC**—Alaska Sea Otter Commission

**BBNA**—Briston Bay Native Association

**BPXA**—BP Exploration (Alaska), Inc.

**CDFG**—California Department of Fish and Game

**CFR**—Code of Federal Regulations

**Corps**—U.S. Army Corps of Engineers

**CSC**—California Science Center

**Department**—Department of the Interior

**DNA**—Deoxyribonucleic acid

**ESA**—Endangered Species Act of 1973

**EWC**—Eskimo Walrus Commission

**FCSC**—Florida Caribbean Science Center, USGS

**FDEP**—Florida Department of Environmental Protection

**FDNR**—Florida Department of Natural Resources

**FLIR**—forward-looking infrared imagery

**FY**—Fiscal Year(s)

**GDNR**—Georgia Department of Natural Resources

**GIS**—Geographic Information System

**HCH**—hexachlorocyclohexane

**IGC**—Inuvialuit Game Council

**LOA**—Letter of Authorization

**MIPS**—Manatee Individual Photo-identification System

**MMC**—Marine Mammal Commission

**MML**—Mote Marine Laboratory

**mtDNA**—mitochondrial Deoxyribonucleic acid

**MTRP**—Marking, Tagging, and Reporting Program

**NMFS**—National Marine Fisheries Service

**NSB**—North Slope Borough

**NWHC**—National Wildlife Health Center

**NWR**—National Wildlife Refuge

**PBR**—potential biological removal

**PCB**—polychlorinated biphenyls

**ppm**—parts per million

**PRDNR**—Puerto Rico Department of Natural Resources

**SAR**—stock assessment report

**Service**—U.S. Fish and Wildlife Service

**SFWMD**—South Florida Water Management District

**SNI**—San Nicolas Island

**TDR**—time-depth recorders

**UHF**—ultra-high frequency

**UMMH**—Chukotka Union of Marine Mammal Hunters

**USGS/BRD**—U.S. Geological Survey, Biological Resources Division

**VHF**—very-high frequency

**WERC**—Western Ecological Research Center, USGS

**WHMP**—Walrus Harvest Monitoring Project

# 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 U.S. 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 1998, 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 1998 Program

## Appropriations

For Fiscal Years (FY) 1998 and 1999, 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 1998 covered by this report overlaps FYs 1998 and 1999; funds (in \$000) authorized for both years, as well as funds spent in FY 1998 and projected to be spent in FY 1999, are presented.

	<i>Authorized</i>	<i>Expended</i>	<i>Projected</i>
Fiscal Year 1998 .....	\$9,900	\$3,428	—
Fiscal Year 1999 .....	\$10,296	—	\$3,816

### Marine Mammal Protection Act Expenditures

	<i>Actual FY 98</i>	<i>Projected FY 99</i>
<i>USGS/BRD Research and Development</i>		
Alaska sea otter .....	\$ 238	\$ 360
Polar bear .....	322	373
Pacific walrus .....	72	200
Misc. marine mammals (including polar bear, walrus, and sea otter) .....	200	235
Total USGS/BRD Research and Development .....	\$ 832	\$ 1,168
<i>Management</i>		
Permit activities .....	\$ 100	\$ 115
Law enforcement activities .....	525	525
Other management activities .....	1,971	2,008
Total Management .....	\$ 2,596	\$ 2,648
Act Grand Total .....	\$ 3,428	\$ 3,816

### Endangered Species Act Expenditures

<i>Section 6 (Grants-to-States)</i>		
California—sea otter .....	\$ 60	\$ 0
Florida—manatee .....	0	0
Georgia—manatee .....	26	26
Total Section 6 .....	\$ 86	\$ 26
<i>Section 15 (USGS/BRD Research and Development)</i>		
Endangered/threatened otters .....	\$ 389	\$ 389
Manatee .....	648*	646*
Total USGS/BRD Research and Development .....	\$ 1,037	\$ 1,035
<i>Section 15 (Management)</i>		
Consultation <sup>1</sup> .....	\$ 320	\$ 320
Recovery <sup>1</sup> .....	363*	348*
Hawaiian monk seal <sup>2</sup> .....	75	75
Total Management .....	\$ 758	\$ 743
ESA Grand Total .....	\$ 1,881	\$ 1,804

\* In Fiscal Years 1998 and 1999, funds shown for USGS/BRD for manatee research and development pursuant to Section 15 of the ESA include \$155,000 and \$152,000, respectively, of Service manatee recovery funds transferred to USGS/BRD to support manatee research (but excludes \$5,000 of State and private funds for FY 98). Section 15 Recovery funds shown were reduced by \$155,000 and \$152,000, respectively, in Fiscal Years 1998 and 1999 to account for this transfer.

<sup>1</sup> Funded under authority of the ESA. 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 (NMFS) 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*

During 1998, the Service conducted 117 reviews of NMFS proposed activities involving Outer Continental Shelf resources. These proposed activities included draft fishery management plans and amendments, and ESA activities for fishery resources under NMFS jurisdiction. The Service reviewed no other major proposals of other Federal agencies that could affect marine mammals under our jurisdiction.

# Research and Development

The USGS/BRD conducted research under the Act during FY 1998 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 (CSC), is responsible for work on southern sea otters. The Florida Caribbean Science Center (FCSC) 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 1998, the project title and summary, followed by highlights of FY 1998 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, 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.

### 1998 Activities/Accomplishments:

■ In 1998, data collected from male polar bears fitted with implanted satellite radios were edited and tabulated. A manuscript describing the surgical implant procedure was completed and has been accepted for publication. In the coming year we will be analyzing movement patterns of male polar bears

as indicated from data collected last year, and preparing a manuscript describing those movements.

■ The data base on satellite tracking the movement patterns of female western Alaskan and Russian Arctic polar bears was expanded in 1998. A general report based on the volumes of satellite tracking data, generated over the past several years, was written. It is expected that the female polar bear movement patterns will be analyzed during 1999.

■ 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.

■ The USGS/BRD hosted a *Surveys, Status, and Trends of Marine Mammal Populations Symposium* in February 1998. Sponsored jointly by the ABSC and the NMFS's National Marine Mammal Laboratory, the symposium included speakers from around the world who are authorities on various aspects of surveys. The refereed proceedings currently are in press.

### B. Project Title and Summary:

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

In 1998, data analysis and project writing continued relative to a longstanding project to refine the boundaries definition of populations of polar bears in the shared U.S./Canada Beaufort Sea region. A new method was developed to interpret the probabilities of finding bears from different populations in different geographic areas and to reassess, with a new method of modeling, the size and trend in that population. Mapping of denning habitat in Alaska continued and

will be completed in 1999. Testing of forward looking infrared viewing to locate polar bear dens under the snow continued in 1998.

### 1998 Activities/Accomplishments:

Population bounds of polar bears in the Beaufort Sea continue to be refined. 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. Those methods also indicated that bears along Alaska's northern coast actually belong to two groups rather than just one. These eastern Chukchi Sea and Southern Beaufort Sea groups do not show clear separation, but using our new probability assignments, proportions of mixing can now be determined. We are now drafting two manuscripts 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. We also are drafting a manuscript describing the new mathematical procedure used to assign relative probabilities of occurrence in each population or cluster.

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 new model for estimates of capture and survival probabilities and population size is nearly complete. This new model has fewer required assumptions than other mark and recapture models. This model appears to provide more reasonable point estimates and narrower interval estimates on all population parameters of interest than we have obtained before. It also provides new insights into the kinds of data that need to be collected in future mark and recapture census efforts. We anticipate completion of a manuscript describing this model in early summer 1999.

■ Mapping preferred denning habitats of polar bears in northern Alaska: Checking the latest polar bear denning habitat maps on the ground (which had been prevented by bad weather in 1997) was completed in summer 1998. Error rates were shown to be dramatically reduced from earlier versions of our map. Having verified acceptable variances among the parameters estimated by our map, we and British Petroleum cartographers have extended the map extent. Additional ground truthing of the newly mapped area will be conducted in summer 1999, and the final reports on this project should be completed by the end 1999.

■ Detection of denning polar bears with forward-looking infrared imagery (FLIR): We attempted to obtain a large sample of denning bears in 1998 in order to allow the statistical testing of this method of detecting bears in dens. In spring 1998, we instrumented 10 polar bears that could have been pregnant in fall 1998. We also attempted to instrument more bears in the fall of 1998. The worst weather and latest freeze-up on record, however, prevented accomplishment of any work in autumn. Also, the late freeze may have prevented bears out on the ice from reaching land denning areas. Hence, this season was a total failure from the standpoint of testing FLIR. We have redoubled our efforts for the coming year in hopes of obtaining the necessary sample sizes for this important research project.

## 2. Alaska sea otter

### A. Project Title and Summary:

Processes structuring coastal marine communities in Alaska (previously: Interactions between sea otters and fisheries in Alaska).

Studies of interactions between sea otters and prey species are important to assess the effects that sea otters have on composition and productivity of coastal marine communities, and to better understand how re-colonizing sea otter populations may affect commercial, recreational, and culturally valuable marine resources. This information is important to resource managers in identifying potential conflicts, identifying mechanisms of change, and improving the ability to detect change from human induced sources.

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. 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, including reductions in the abundance of many ecologically and economically valuable marine resources such as crabs, clams, mussels, and urchins. It is likely that changes will also occur in fish populations, and perhaps in bird and mammal populations. Sea otter induced changes in coastal communities may preclude detection of potential effects of other activities, such as cruise ships or commercial fishing.

### 1998 Activities/Accomplishments:

Surveys of relative abundance and distribution of sea otters in Glacier Bay and Icy Straits are in progress. Field work on a study of sea otter foraging behavior is underway and data management is in progress. The large increase in the number of sea otters (183) observed in Glacier Bay since 1996 continues, although we caution against their use in estimating the actual abundance of sea otters. We recognize that some proportion of animals are not observed, but we do not estimate that proportion. However, it appears obvious that sea otters are present in increasingly large numbers in Glacier Bay. Further, it appears as though the rate of increase cannot result from intrinsic growth alone but likely is the result of immigration from areas outside Glacier Bay, most likely Icy Straits and Cross Sound, where sea otters have been resident for several years. Annual field reports to Glacier Bay Park on sea otter distribution and food habits are available.

Field work was initiated in 1996 on sea otter diving behavior using ultra-sonic transmitters and time-depth recorders (TDR). Field studies continued in 1997 and 1998 using ultra sonic transmitters. Studies in 1999 will include deployment of 25 TDRs in Southeast Alaska requiring recapture for instrument retrieval. Sonic data from diving studies are under management, manipulation, and analysis. We now have more than 4,000 dive records from 15 individual sea otters. Most diving occurs in water less than 50

meters deep, but two of the 15 animals regularly dove to depths greater than 60 meters. Maximum dive depths are 86 meters (270 feet). Results of this research will ultimately define the economic and ecological depth limit to the effects of sea otters.

Products resulting from this project are:

Shirley, T.C., C.E. O'Clair, S.J. Taggart, and J.L. Bodkin. 1995. Sea otter predation on Dungeness crabs in Glacier Bay, Alaska. Symposia: Biology, management and economics of crabs from high latitude habitats. Alaska Sea Grant College. Anchorage, AK. 10/11-13/95.

Bishop, G.H., T.C. Shirley, S.J. Taggart, C.E. O'Clair, and J.L. Bodkin. 1995. A pilot study of the effects of sea otter predation on Dungeness crab: can these species co-exist. Alaska chapter, American Fisheries Society, Annual meeting. Palmer, AK.

Shirley, T.C., C.E. O'Clair, S.J. Taggart, and J.L. Bodkin. 1997. Sea otter predation on Dungeness crabs in Glacier Bay, Alaska. Proceedings: Biology, management and economics of crabs from high latitude habitats. Alaska Sea Grant College. Anchorage, Alaska.

Bodkin, J.L., B.P. Kelly, and G.G. Esslinger. 1997. Monitoring sea otter dives with ultra-sonic transmitters and time-depth recorders. 6th joint US/Russian Sea Otter Workshop. Forks, WA. November 9-15, 1997.

Bodkin, J.L., B.P. Kelly, and G.G. Esslinger. 1997. Sea otter diving depths and implications to fisheries. World Marine Mammal Conference, Monaco.

### B. Project Title and Summary:

Sea otter population assessment (previously: Biological information necessary to establish a zonal management program for sea otters in Alaska).

Studies of sea otter population status and trends are important to assess the recovery of the populations and the potential effects of human perturbations (e.g., harvest, contaminants, and habitat modifications) on population status and trends. This information is important to resource managers in identifying potential conflicts, identifying mechanisms of change, and improving the ability to detect change from human induced sources. The objectives of this

study are to: (1) develop and test methods to identify the degree of population structuring among north Pacific sea otter populations, (2) evaluate the effects of population reductions and translocations on sea otter genetic variability, (3) develop and test techniques to accurately and precisely estimate the status of sea otter populations, (4) develop and test methods to identify cause(s) of change in the status and numeric trends of sea otter populations, and (5) develop and test methods to determine the ecological consequences of changes in sea otter populations.

*1998 Activities/Accomplishments:*

Work was completed on applying mitochondrial Deoxyribonucleic acid (mtDNA) molecular genetics to discriminate sea otter populations throughout the species range. Work on evaluation of the effects of population bottlenecks on sea otter genetics was completed. Work continued on methods to assess sea otter population status. Work continued on the collection and archival of biological specimens acquired in cooperation with the Service and the Alaska Sea Otter Commission (ASOC) to be used in population assessment studies.

Products resulting from this project are:

Bodkin, J.L. and B.E. Ballachey. 1996. Monitoring the status of the wild sea otter population: field studies and techniques. *Endangered Species Update*. University of Michigan. Vol 13(12):14-20.

Estes, J.A., D.F. Doak, J.L. Bodkin, R.J. Jameson, D. Monson, J. Watt, and T. Tinker. 1996. Comparative demography of sea otter populations. *Endangered Species Update*. University of Michigan. Vol.13(12):11-14.

Bodkin, J.L., J.A. Ames, R.J. Jameson, A.M. Johnson, and G.M. Matson. 1997. Accuracy and precision in estimating age of sea otters using cementum layers in the first premolar. *J Wildlife Management*. 61(3):967-973.

Scribner, K.M., J.L. Bodkin, B.E. Ballachey, S.R. Fain, M.A. Cronin, and M. Sanchez. 1997. Population genetic studies of the sea otter (*Enhydra lutris*): A review and interpretation of available data. *Proceedings: Marine Mammal Genetics Symposium*, La Jolla, CA. Sept. 1994.

Bodkin, J. L. and M.S. Udevitz. 1998. Status of attempts to estimate population trends of sea otters. *Symposium on*

surveys, status and trends of marine mammal populations. Feb. 25-27, 1998. Seattle, WA. Abstract.

Bodkin, J.L., B.E. Ballachey, M.A. Cronin, and K.T. Scribner. in press. Population demographics and genetic diversity in sea otters. *Conservation Biology*.

Bodkin, J.L., A.M. Burdin, and D.A. Ryzanov. In press. Equilibration in a recovering sea otter population. *Marine Mammal Science*.

Bodkin, J.L. and M.S. Udevitz. In press. An aerial survey method to estimate sea otter abundance. in: Garner, G.W., S.C. Amstrup, J.L. Laake, B.F.J. Manly, L.L. McDonald, and D.G. Robertson, (eds.) *Marine mammal survey and assessment methods*. Balkema Press, Netherlands.

### C. Project Title and Summary:

Mechanisms of impact and potential recovery of nearshore vertebrate predators.

The *Exxon Valdez* oil spill in Prince William Sound in 1989 caused extensive mortality in marine bird and mammal populations, including sea otters. A lack of pre-spill data limited our understanding of the effects of the spill on many populations. This same lack of data has made determining recovery and restoration difficult. The purpose of this research is to provide improved methods of sea otter population assessment, identify potential constraints to recovery of affected sea otter populations, and provide improved data to evaluate effects of future perturbations.

*1998 Activities/Accomplishments:* Research into the effects of the *Exxon Valdez* oil spill on sea otter populations has been underway since 1989. Significant contributions to our knowledge of sea otter natural history and their role in coastal communities has resulted. Current research efforts are aimed at identifying potential mechanisms constraining recovery of sea otters in the most severely impacted areas of Prince William Sound, including food, continued oil exposure, or intrinsic limits to growth. Preliminary results indicate significant growth in the Prince William Sound sea otter population affected by the spill. Since 1993, an increase of about 800 sea otters has been observed in western Prince William Sound. However, in some of the most heavily impacted areas around northern Knight Island, where sea otter mortality may have approached

90 percent, no similar trend in growth has been observed. Further, the number of animals observed at this site (five year average of 77) is less than the number of animals estimated removed in 1989 (165, based on carcasses and other removals).

Products resulting from this project are:

Bodkin, J.L. and B.E. Ballachey. 1998. *Restoration Notebook Series: Sea Otter (Enhydra lutris) Exxon Valdez Oil Spill*. Trustee Council. Anchorage, AK.

Ballachey, B.E., J.L. Bodkin, D.H. Monson, and L. Holland-Bartels. 1998. Evaluating recovery of sea otters following the *Exxon Valdez* oil spill: an ecosystem approach. *World Marine Mammal Conference*, Monaco. January 20-25, 1998. Abstract.

Ballachey, B.E., P.W. Snyder, J.L. Bodkin, D.H. Monson, and A.H. Rebar. 1997. Bioindicators of oil exposure in sea otters. *6th Joint Russia/U.S. Sea Otter Workshop*. November 15-19, 1997. Forks, WA. Abstract.

Adkison, M.D., B. Ballachey, J. Bodkin, and L. Holland-Bartels. In press. Integrating ecosystem studies: a Bayesian comparison of hypotheses. In: F. Funk, J.N. Ianelli, T.J. Quinn II, and P.J. Sullivan (eds.) *Proceedings of the international symposium on fishery stock assessment models for the 21st century*. Alaska Sea Grant College Program.

### 3. Pacific walrus

#### A. Project Title and Summary:

Pacific walrus telemetry studies.

The purpose of this work is to investigate seasonal migration patterns, haulout use, and diving behavior of adult male walrus in the Bering Sea. The information will be used to identify important walrus foraging areas in Bristol Bay and track trends in the utilization of Bristol Bay haulouts by walrus. The work will also provide the framework to expand telemetry studies to other segments of the population in different geographical areas.

*1998 Activities/Accomplishments:*

■ Preliminary analysis of TDR data collected from five walrus in late 1997 was completed. Three general dive types were identified. Feeding trip durations ranged from a few to ten days and haulout periods ranged from one-half to three days. Further analysis will include estimations of time activity budgets and

time spent at the surface. A manuscript containing results from the TDRs is in preparation for publication.

■ Thirteen satellite transmitters were deployed on walrus at Round Island and Cape Peirce in Bristol Bay in the summer of 1998 as part of ongoing work from the previous three years. A manuscript describing feeding areas and haulout fidelity is in preparation for publication.

■ A manuscript entitled, "Response of Pacific walrus to disturbances from capture and handling activities at a haulout in Bristol Bay, Alaska," was published in *Marine Mammal Science*.

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

Population trends of Pacific walrus.

Estimates of walrus population trends are critical for effective management. The purpose of these studies is to evaluate trends in the walrus population through the establishment of new surveys and the evaluation of past data collected from monitoring programs in the U.S. and Russia. These studies will provide critical information for tracking trends of the Pacific walrus population.

#### *1998 Activities/Accomplishments:*

■ A manuscript pertaining to estimations of animal abundance at aggregation sites was published in the proceedings of, "Surveys, status, and trends of marine mammal populations," held in Seattle, Washington, in February 1998.

■ Plans are underway to investigate the feasibility of conducting a spring aerial survey for walrus in the Bering Sea. A workshop will be held in late 1999 to make recommendations on whether a survey should be planned and, if so, what pilot studies should be conducted beforehand.

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

Use of stable isotopes and heavy metals in studies of Pacific walrus movements and dietary habits.

The purpose of this work is to explore the use of stable isotope techniques and measures of heavy metals as a tool for studying large-scale movements and dietary habits of walrus. The stable isotope ratios of nitrogen and carbon will be measured in vibrissae and blood samples of free-ranging male walrus in Bristol Bay and females and their calves in the northern Bering Sea.

#### *1998 Activities/Accomplishments:*

■ Carbon and nitrogen isotope ratios along the length of vibrissae from 25 walrus have been analyzed. Peaks in nitrogen levels in some individuals and the lack of peaks in others suggest differential fasting or differences in feeding locations among individual males in Bristol Bay. Isotope methods appear promising for elucidating movements or dietary habits and warrant further investigation.

■ Measures of heavy metals in walrus tissues have not been analyzed to date, however, walrus tissues have been collected and preserved in 1998 for heavy metal analyses in 1999.

#### **4. Miscellaneous Marine Mammals**

(work units which study several marine mammal species)

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

Use of Deoxyribonucleic acid (DNA) to define populations of birds, mammals, and fish of Alaska.

Analyses of mtDNA 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.

#### *1998 Activities/Accomplishments:*

The following paper was submitted:

Greene, B.A., K.T. Scribner, and C. Gorbics. Verification of field-reported sex of sea otters using DNA testing. Submitted to *Marine Mammal Science*.

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

Alaska Marine Mammal Tissue Archival Project (AMMTAP).

The 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.

#### *1998 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; North Slope Borough (NSB); State of Alaska; Kawerak and TDX Corporations; Alaska Sea Grant Program; and the Cook Inlet Marine Mammal Advisory Committee.

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

Sea ice mapping.

During 1998, the third of a four-year study, the ABSC and the Russia Academy of Sciences continued collaborative sea-ice mapping of the Barents and Kara Seas. Using image classification methods developed earlier, weekly ice maps were created from 280 Russian radar satellite images spanning October 1995 through December 1997. The Russian OKEAN satellite has the unique capability of simultaneously collecting both passive and active microwave image data, which provided this study with new methods to map broad-scale sea-ice conditions throughout the year, regardless of cloud-cover and darkness.

#### *1998 Activities/Accomplishments:*

■ The OKEAN images were collected in space and time to optimally coincide with locations of 20 polar bears that were concurrently monitored with satellite transmitters under a separate ABSC cooperative study with Russia. Also during 1998, all polar bear tracking data were reviewed and validated in preparation for 1999's spatial-temporal analysis of the seasonal relationships between polar bear movement patterns and sea-ice characteristics of the Barents and Kara Seas.

## 5. 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 are 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 primarily very-high frequency (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.

### 1998 Activities/Accomplishments:

The field work for this long-term study was completed, spatial database development and quality control were nearly finished, and the spatial analysis phase was continued. The Argos satellite-monitored telemetry database, and associated tagging history database, were updated to encompass the period from December 1986 through May 1998. Quality control was completed on the field-monitored, VHF radio-telemetry database, which covers the period from May 1986 through May 1996. Accuracy and precision of Argos-determined locations were analyzed based on field experiments. Visualization of tagged manatee movements in relation to water temperature, reproductive events, and other variables was realized with the acquisition of Tracking Analyst extension for ArcView.

A peer-reviewed paper focusing on the technology and methodology of radio-tracking manatees in Florida and Puerto Rico was published in the *Marine Technology Society Journal* (32: 18-29). It also discusses the strengths and limitations of this approach for understanding manatee movement patterns, habitat use, and life history. 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 7 months (maximum = 6.8 years). The study has documented individual variation in seasonal movement patterns, migratory behavior in relation to temperature, areas of high manatee use that vary seasonally, strong site fidelity to warm-season ranges across years, and diel movement patterns.

Presentations on some of this research were made at the following scientific conferences and workshops: World Marine Mammal Science Conference (Monte-Carlo, Monaco); Natural Resources Forum '98: Linkages in Ecosystem Science, Management and Restoration (Gainesville, FL); Marine Animal Telemetry Tagging Workshop (Boston, MA); and the Manatee Geographic Information System (GIS) Working Group Meeting (Tallahassee, FL). Technical assistance was provided to the Service, the Florida Department of Environmental Protection (FDEP), the Georgia Department of Natural Resources (GDNR), and to independent researchers and organizations.

### B. Project Title and Summary:

Seagrass ecology and manatee diet in selected high use habitats

Seagrasses are an important part of the West Indian manatee's diet. 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.

### 1998 Activities/Accomplishments:

Results from a five-year cooperative study (Sirenia Project, NMFS, Florida Department of Natural Resources — FDNR, and MMC) and recent research in Puerto Rico and Vieques were reported at the International Meeting of the Society for Conservation Biology Seagrass Conservation Symposium held in Sydney, Australia in July 1998. A paper reporting major findings of this research will be published in the journal *Pacific Conservation Biology*.

Two benthic surveys were conducted to determine species composition and relative abundance at a study site in the northern Banana River, Brevard County. The northern Banana River is a *de facto* sanctuary that is heavily used by manatees throughout most of the year. In cooperation with Kennedy Space Center personnel, the Sirenia Project is monitoring recovery of seagrasses at a study site in this region. A decline in salinity in 1996 caused a shift in seagrass species composition from dominance by *Halodule wrightii* and *Syringodium filiforme* to *Ruppia maritima*. Manatees consume all of these species. Work was completed and papers published on manatee food habits in Puerto Rico and relative capabilities of dugongs and West Indian manatees to masticate seagrasses.

### 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 include 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 U.S. Digitizing near shore habitats using aerial photographs enables correlation of manatee use patterns with critical resources.

#### *1998 Activities/Accomplishments:*

Radio tagging and tracking field work for this ongoing study has been completed in eastern Puerto Rico and recently initiated along the western coast. In 1998, manatee captures were again conducted at the Guanajibo River. Tracking data from four manatees tagged at this location have revealed movement and habitat use patterns including specific areas where manatees feed, rest, and obtain fresh water. Sirenia Project personnel continue to cooperate with the Service's Caribbean Field Office and to train field personnel with the Caribbean Stranding Network in radio tracking techniques. Location databases are handled using the same procedures as those developed for the Atlantic Coast telemetry study conducted by this office. Satellite and field-determined locations from 1992 to 1997 in eastern Puerto Rico are being summarized for publications.

Detailed maps of near-shore benthic habitats at Roosevelt Roads Naval Station were produced in 1995 to display the resources available to manatees and other aquatic organisms. In 1998, a similar map and report for habitats around Vieques Island was finalized and presented to the U.S. Navy. This GIS mapping effort utilized existing (1:9600 scale) color aerial photographs to delineate and map benthic habitats. Extensive groundtruthing was used to accurately delineate habitats for approximately 71 miles of shoreline along Vieques Island. The computer-generated habitat maps were created in a format compatible with PC Arc Info. Copies will be provided to the U.S. Navy, Puerto Rico Department of Natural Resources (PRDNR), the Service, and other interested cooperators. Annual reports to the PRDNR and the U.S. Navy have detailed progress in tracking and mapping efforts. Portions of satellite location data and habitat maps from eastern Puerto Rico were presented in a publication on tracking techniques.

In addition to radio tracking efforts in western Puerto Rico, preparations are underway for seagrass and manatee habitat use studies. Because Antillean manatees in Puerto Rico are found almost exclusively in marine habitats, they are dependent on seagrasses for

food. Very little is known about seagrass beds in Puerto Rico, which differ in many respects from those in temperate and subtropical zones. Objectives of future studies will be to develop a more detailed characterization of the seagrass beds near Roosevelt Roads and Vieques Island and to establish a baseline of response indicator parameters that can be used to assess the long-term ecological status of the seagrass resources and the animal communities that depend upon them. This work will include additional mapping and characterization of seagrass beds important for manatees in western Puerto Rico.

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

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

Long-lived Florida manatees occupy an extensive range of habitats in the southeastern United States. During winter cold periods, they aggregate at natural and man-made warm water sites, affording non-intrusive opportunities to record life history observations and photographically document numerous individuals. The manatee photo-identification study focuses on the identification of individual manatees based on photographic records of permanent and unique features, which are primarily scars from collisions with boats. The resulting data have been developed into a computerized, long-term database (>20 years) of photographic and life history information known as the Manatee Individual Photo-identification System (MIPS), developed in collaboration with scientists at the Midcontinent Ecological Science Center. The MIPS currently includes specific identity and feature description data, photographic images, and over 17,000 sighting records for nearly 1,200 individual manatees.

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 Florida Manatee Recovery Plan (U.S. Fish and Wildlife Service 1995) 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.

#### *1998 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. These results were published in *Ecology* in 1998. 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 1994-1997, and variation in female reproduction at Crystal River is currently being analyzed.

The MIPS program has been shared with the FDEP and Mote Marine Laboratory (MML), and plans are underway to enable partners (FDEP, MML, and the Service) to access selected data on the MIPS database via the Internet.

#### **E. Project Activities/Accomplishments:**

Manatee use of thermal refuges and response to their elimination

The original objective of this study was to determine manatee response to the loss of a significant warm water refuge in northeast Florida. An interagency (USGS/BRD, GDNR, and FDEP) research team studied manatee response to the elimination of a thermal refuge in the northern part of the species' range. The warm-water effluent produced by the Jefferson Smurfit Corp.'s pulp mill in Fernandina Beach, Nassau County, Florida, was eliminated (by switching to a diffusion system) at the start of the 1997-1998 winter season. Satellite-monitored radio-tracking, field observations of tagged and untagged manatees, automated VHF tracking stations, and temperature recorders were used to document manatee distribution and movements in relation to ambient and effluent water temperatures in Georgia and northeastern Florida from October 1997 through April 1998. Manatee mortality in the study region was documented by FDEP staff. Preliminary results of this research were presented at an interagency meeting on manatee use of warm water refuges held in Jacksonville in August 1998, and are summarized below.

In addition to preparing a report on the above study, current activities include collection of winter water temperature data at several manatee aggregation sites on the Atlantic coast, in cooperation with the FDEP, and summarizing Atlantic coast telemetry and photo-identification data to reflect manatee migration patterns and warm water effluent use in response to seasonal temperature fluctuations. This information will be presented at a workshop to be held in August 1999 on manatees and warm water refuges.

*1998 Activities/Accomplishments:*

Fifteen manatees were captured, radio-tagged, and tracked in the study region between March 1995 and April 1998. Of these: nine died or were rescued, all but one between October 1997 and March 1998; three were known to have survived in the wild to the end of the study; and the fate of three others is unknown. The six mortalities and two rescues in 1997-98 occurred between Savannah, Georgia, and Ormond Beach, Florida; one of the rescued animals later died in captivity. Causes of death or reasons for rescue were as follows: watercraft strike (3), natural (1 cold-related rescue, 1 possible cold-related death), and undetermined (4). Of 11 manatees carrying transmitters in 1997-98, six (55 percent) died or were rescued within one year, compared with no deaths or rescues in the tagged samples of 1995-96 and 1996-97.

Eleven manatees were tracked for varying time periods between March 1997 and April 1998. Five of these manatees

*A radio-tagged Florida manatee.*



USGS/BRD

stayed in the study region through the summer, four traveled to Brevard County between April and August 1997, and two lost their transmitters during this period. At the start of the winter period, four manatees were still radio-tagged: one in Georgia and three in Brevard County, Florida. We tracked a total of five manatees in Georgia and northeastern Florida during the 1997-98 winter. Primary conclusions are as follows:

- An unusually large proportion of radio-tagged manatees died during the winter of 1997-98, despite the relatively mild winter.
- Tagged manatees responded to the lack of warm water at the Jefferson Smurfit site by seeking alternative warm-water sites in the region, including the Gilman paper mill effluent, the Fernandina Beach sewage discharge, and possibly formerly used warm-water discharge sites in Brunswick and Jacksonville. Only one of four tagged manatees migrated south to manatee aggregation sites at power plants in Brevard County and in south Florida; two adult females remained in the study region, despite their familiarity with warm-water sites in Brevard County.
- The Gilman effluent was the only significant source of warm water in the study area; both tagged and untagged manatees in the region relied on it to survive. The high manatee mortality, however, suggests that it was not adequate to sustain manatees through the winter. This may be related to its

discharge schedule: warm water was only released during high tide, when manatees would typically be elsewhere in the river feeding on shoreline grasses.

- Manatees can tolerate prolonged exposure to colder temperatures than was previously realized. For example, “Knicky” survived temperatures below 15°C for a two-week period before migrating southward out of the study region. Chronic exposure to cold does not necessarily lead to depletion of fat reserves and may leave relatively little “signature” on manatee carcasses or live animals, except for skin lesions in some cases. The physiological effects of chronic exposure to cold, and the extent to which manatees can acclimate to cold conditions, need further investigation.
- The existence of industrial thermal discharges far north of the manatee’s typical winter range can disrupt normal migratory patterns and expose manatees to physiological stress and mortality. Manatee use of such discharges should be monitored, and short- and long-term plans should be developed to protect manatees from discharge-related risks.

**F. Project Title and Summary:**

Genetic analysis of the West Indian manatee

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 mtDNA 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. A paper on this work was published in *Molecular Ecology*.

*1998 Activities/Accomplishments:*

Currently, progress is being made to isolate specific nuclear DNA primers



(probes) to be used in manatee population analysis. This work is being conducted in collaboration with researchers at the University of Florida and the USGS/BRD Leetown Science Center in West Virginia as part of a dissertation by the lead investigator. This lead investigator received intensive training at Leetown in development and screening of microsatellite DNA primers. She has developed four primers in one month, and has successfully demonstrated by using one of them that two captive manatees are the parents of a third manatee. Approximately ten primers will be needed to achieve the level of resolution desired. For the past several years, the Sirenia Project has assisted with this project by collecting and archiving tissues to be used in future analysis.

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

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

In the last decade, the Sirenia Project radio-tagged and tracked over 30 manatees that had been rescued, rehabilitated, and released, typically after brief periods at captive facilities. The results of this work were encouraging, as survival of released manatees was generally good. However, reintroduction of naïve, long-term captive manatees was recognized as a much more challenging task. The growing numbers of rescued orphaned manatees, as well as a number of captive-born manatees, stimulated interest in finding ways to successfully return these human-acustomed animals to the wild. The primary objective of the captive manatee release program is to develop protocols and guidelines for releasing long-term captive manatees into their natural environment, 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.

### *1998 Activities/Accomplishments:*

The agencies, oceanaria, and individuals involved in the captive release program held a workshop on May 26-27, 1998, at the Florida Marine Research Institute in St. Petersburg, Florida. The objectives of the workshop were to review the progress of the program, establish appropriate protocols and guidelines for reintroduction procedures, determine ways in which the program could be improved, and to develop strategies to improve communication and coordination among the many partners involved in the program. Two keynote addresses, by Drs. Randy Wells, MML, and Bill Karesh, Wildlife Conservation Society, 13 talks, and nine posters were presented on the first day of the workshop. Four concurrent panel discussions were held on the second day, covering: (1) management objects and budget considerations; (2) captive-rearing, pre-release conditioning, and release criteria; (3) post-release monitoring; and (4) biomedical assessment. Abstracts of the papers and results of the panel discussions will be published in a report in 1999.

Five captive-reared and released manatees were monitored in 1998, one in cooperation with the FDEP and the Everglades National Park, and one with Blue Spring State Park personnel. TMI-06 ("Brian") was released in Biscayne Bay in September 1997. He was rescued from the Port Everglades power plant intake canal in February 1998. Following successful rehabilitation, Brian will be re-released in March 1999. A milestone was reached when TBS-02 ("Georgia"), released at Blue Spring in April 1997 after almost 6 years in captivity, gave birth to a calf in May 1998. This was the first documented case of a captive-reared manatee giving birth in the wild. Georgia and her calf returned to Blue Spring this winter. TMI-04 ("Dakota") was another success story. After tracking him in the Biscayne Bay region since August 1996, we removed his radio tag assembly following a health reassessment in November 1998. Far less successful was the release of TRC-02 ("Mo"), a 4-yr-old male released at Crystal River in April 1998. Mo remained in the area of his release site for two weeks. For the following three weeks, no satellite-relayed locations were received. When Mo was finally relocated, he had traveled almost 500 km from his release site. He was rescued on 4 June 1998 off the Dry Tortugas, in waters over 50 m deep. He had clearly become disoriented and wandered far offshore. He was

dehydrated and malnourished, but recovered well and is now a companion to "Snooty" at the South Florida Museum-Parker Manatee Aquarium. One of the captive-born manatees that was staged at the Merritt Island enclosure in 1995, TSW-13 ("Foster"), was released in Everglades National Park in May 1998 and tracked by FDEP and Park personnel. Traveling up the Florida Keys, he moved to the Little River on the southeast coast in December 1998, where he lost his tag in early January. It is likely that he will be resighted during photo-identification field work.

## **6. 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 implementing recovery measures 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 understand the low growth rate in the California population. In addition, there are several associated studies of the effects of contaminants on sea otters.

### *1998 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, spring population counts made from 1995 to 1998 suggest that the California sea otter population is experiencing a decline. The average rate of decrease in this population since 1995 is about three percent per year. The altered growth trajectory of the sea otter population in California 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. Eleven sea otters were captured in Washington in 1998; nine were surgically implanted with radio transmitters. Monitoring of all instrumented otters continued. Data collection on foraging behavior, reproduction, time/activity budgets, and movements continued. A third subtidal survey was conducted in 1998 to document changes in nearshore communities as sea otters reoccupy historic habitat. Efforts to obtain foraging data have continued to document sea otter prey preferences in recently reoccupied habitat. The Olympic Coast National Marine Sanctuary again supported the subtidal surveys and increased foraging work.

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 ABSC. The Adak project was completed and a final report has been submitted to the 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 in which USGS/BRD is endeavoring to determine the source of these compounds and their possible effects on sea otter populations. Results indicate that polychlorinated biphenyls (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. A report on this work was published in 1998. This may represent redirected foraging behavior by the whales following the virtual local extinction of sea lions and harbor seals

from the central and western Aleutian archipelago.

Range expansion of the Washington population to east of Cape Flattery, an area devoid of sea otters since the fur trade period, continues. The July 1998 population survey resulted in a count of 433 which is 14 percent below the 1997 count of 502. The annual rate of population growth since 1989 is about 10 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. During 1998, a large group of males began foraging and resting 16 kilometers east of where they were in 1997. Additionally a group of about 30 females and pups is using the area between Tatoosh Island and Neah Bay. Subtidal habitat surveys have shown that sea urchin numbers are declining near Tatoosh Island and there is some evidence that the kelp community is responding favorably to the release from grazing pressure as urchin density drops. We hope to continue to monitor these changes during subsequent habitat surveys.

Information on sea otter birth rates and mortality are now available for comparison among Amchitka Island, Kodiak, Washington, and central California. These data demonstrate that age-specific birth rates are similar, but patterns of mortality vary substantially. Pre-weaning mortality rates have not been calculated yet for Washington, but both Amchitka and California have pre-weaning mortality rates of 40-50 percent, whereas the Kodiak rate is closer to 15 percent. Information obtained from Adak Island show a similar birth rate but a highly elevated probability of mortality most likely explains the recent population decline in that area.

Sea otters were successful in obtaining food items on 94 percent of their foraging dives (N = 722) east of Cape Flattery in Washington. By the end of 1998 we had accumulated over 10,000 foraging records from south of Cape Flattery, and over 2,600, and increasing, records from east of the "Cape". Preliminary analysis indicates foraging otters south of the Cape Flattery have a diverse diet with no one prey species dominating. However east of Cape Flattery about 70 percent of the diet, through 1997, were red sea urchins (*Strongylocentrotus franciscanus*). The 1998 data show this percentage is decreasing with about 43

percent of the diet comprised of red sea urchins. This supports the results observed in our subtidal surveys (see below). Sea urchins account for less than one percent of the 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 appears to be changing and this change seems to be reflected in observed changes in the kelp community around Tatoosh Island.

Four trips to San Nicolas Island (SNI) were made in 1998 to monitor the translocated sea otter colony. The highest count, 14 independent sea otters and 3 pups, was obtained in September, while the highest count of independent sea otters (15) was made in December. Three births were documented in 1998, bringing the minimum number of pups born at SNI to 50. 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).

### *1998 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 Hemisphere than in 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, urchin grazing has deforested areas lacking sea otters and those with well established, well-developed kelp forests characterize areas with well established sea otter populations. 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.

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 report on this study is nearly ready for submission.

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. A report on this work is currently *in review*.

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. We have 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 also 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.

Our 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 lumpsuckers. These episodic food subsidies appear to release the otter populations from food limitation, thus altering both their foraging behavior and demography. A report on this work is currently in review.

Diving surveys completed in summer of 1997 have shown that kelp forest ecosystems have collapsed in areas of western Alaska where sea otter populations have declined. A preliminary report on these findings was published in 1998.

# 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 an NMFS/Service Memorandum of Understanding, the Service retains authority over those investigations that involve endangered or threatened species under the jurisdiction of the Department. Violations are referred to the Department'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 49 incidents involving the illegal importation of marine mammals in 1998. Seizures involved products manufactured from sea lion and seal parts, dolphin, whale bone, sperm whale teeth, dugong, and other marine mammal parts. Seizures involving marine mammals not under the jurisdiction of the Service were referred to the NMFS. Additionally, southern California wildlife inspectors and special agents remained active participants in a multi-agency task force formed to address the violations associated with the importation, manufacture, and use of traditional Asian medicinals.

In southern California, Service special agents continued to work closely with the California Department of Fish and Game (CDFG) in conducting off-shore patrols to monitor the rapidly expanding "live trap" commercial fishery. Several State violations were detected during these patrols. These types of traps are believed to be a hazard to various species of marine mammals including the southern sea otter. The growth of this fishery has resulted in new State regulations designed to reduce potential impacts on marine mammals. A limited number of enforcement officers as well as suitable vessels allowed monitoring of only a small percentage of this commercial fishery. The Service, the NMFS, and the CDFG plan more extensive patrols in 1999.

Service special agents again participated in a multi-agency law enforcement task force along the central coast of California to address problems associated with the increasing population of elephant seals. One area of primary concern to the Service includes a light house and the adjacent property which are soon to become a part of the Service refuge system. This part of the coastline is a major haul out area for the seals and has a high level of human activity. Harassment of the seals and other types of violations including trespass and vehicle use infractions resulted in numerous citations.

The 1998 fall California sea otter count was 1,937, a decline of 12.2 percent from the 1997 fall count of 2,205. Additionally, in August and September of 1998, an unprecedented 100 sea otters migrated south of Point Conception, California, and remained in near shore habitats north of Santa Barbara. The presence of this large number of otters in waters heavily used by the shell fishing industry has increased concerns over the potential conflicts which may arise. Service special agents have developed contingency plans with other State and local enforcement agencies as well as the U.S. Coast Guard, for both incident response and routine "protective" patrols. It is uncertain if the presence of sea otters south of Point

Conception represents natural range expansion.

A total of 194 sea otters were found dead in California during 1998. The cause of death varied, but otter experts speculate that the trap fishery, along with gill net use, are contributing factors. Two sea otters were thought to have been shot during this reporting period. Both of these sea otters were found in the Monterey, California, area. An examination of the carcasses however, revealed the cause of death was not from the gun shots, but from other causes. Three other sea otters (two in the Monterey area and one in the Morro Bay area) were found to have died as a result of collisions with boats. One sea otter died from oil exposure in the southern end of the range. This death was not related to a specific oil spill and the origin of the oil could not be determined.

In northern California, a Sacramento area man was investigated for his attempt to sell two raw walrus tusks. A local jeweler was contacted by the man with an offer to sell the tusks for \$2,000. The jeweler notified the Sacramento office, and an agent was present at the jewelry store when the man and a companion came with the tusks. Investigation revealed that the tusks were pre-Act, and the man had inherited the tusks from an old sea captain who acquired the tusks before the turn of the century. The man was advised of the requirements of the Act and his responsibility to establish that the tusks were pre-Act.

In Oregon, an investigation of the unlawful transportation of two walrus tusks from Alaska and their subsequent sale in Oregon resulted in three subjects being charged with misdemeanor violations of the Act. Pleading guilty, the subjects were assessed \$1,575 in criminal penalties, collectively.

In Washington, one investigation resulted in the re-export of 109 cases of seal oil valued at over \$14,000. In another case, Washington special agents investigated

the unlawful importation of whale bone and have submitted the case for a civil penalty.

Investigations by Service special agents in the Service's Southeast Region resulted in 319 violations of the Act in Brevard and Volusia counties, Florida. All of the reported violations involved manatees.

Service special agents in Anchorage, Alaska, served a search warrant at a tannery, seizing more than 100 sea otter pelts and one polar bear hide. The owner previously had a permit to tan sea otter pelts for Alaska Natives. During the search, agents found many of the hides without required tags. More than 100 loose tags were found; it is suspected that they had been illegally cut off pelts to which they had been affixed. The tannery had virtually no records indicating where hides came from or to whom they belonged. A civil penalty action is pending against the tannery owner. All of the hides have been forfeited and agents are trying to find their lawful owners.

A case involving six Alaska Native walrus hunters from the village of Diomedede, who were investigated for allegedly wasting up to 33 walrus in violation of the Act, was settled in 1998 with each of the hunters agreeing to participate in a public service video. All of the walrus ivory seized in the investigation will be forfeited.

A Barrow, Alaska, man who had been a fugitive after failing to appear in Federal court to answer to a count stemming from his sale of a polar bear hide to an undercover Service officer, was arrested in 1998. The man pled guilty and was sentenced to two months in jail, a \$500 fine, and one year of probation. Agents had been searching for the man unsuccessfully when they overheard state troopers advising their dispatcher over the radio that the man had been stopped for a traffic violation. A Service special agent immediately notified the troopers of the outstanding warrant and the man was taken into custody.

An Alaska Native hunter from Wainwright tried to circumvent the Act's implementing regulations that prohibit sale or transfer of raw marine mammal parts to non-Natives by "leasing" a polar bear hide to a non-Native for \$1 per year for 99 years. He paid a \$500 fine and forfeited the hide.

Service special agents in Alaska, in cooperation with the Eskimo Walrus Commission (EWC) and the Service's Marine Mammals Management Office, continued to attend subsistence hunter meetings in northwest Alaskan Native villages in 1998. The meetings serve as a cooperative forum for exchanging information between the interested parties.

At the request of the Alaska Wilderness Recreation and Tourism Association, a Service special agent gave a presentation about the Act and other wildlife laws at the Association's annual conference. Of particular interest was the effect of tour boats on marine mammals.

# 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 and 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.

The Act provides an exemption to the take prohibitions for Alaska Natives for subsistence purposes and to create and sell authentic Native articles of handicrafts and clothing. In order to enable marine mammal hides to be tanned and to facilitate trade of products among Alaska Natives, registered agent/tannery permits may be issued to non-Alaska Natives (i.e., persons other than Alaska Indians, Eskimos, or Aleuts). Registered agents may purchase and sell raw parts and tanned skins from and to Alaska Natives or other registered agents, provided that only authentic Alaska 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 Alaska 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 trophy imports, and 50 CFR 18.31 for scientific research or public display permits. During 1998, the Service

proposed regulations to approve additional polar bear populations 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 1998, seven new permits were issued, and four permits were amended or renewed for scientific research. Six permits were issued for public display. One permit was issued, and one permit was amended and renewed for enhancement. One permit was issued for photography. Eight parties either registered or renewed their registration as agents and/or tanneries. Sixty permits were issued for import of sport-hunted polar bears from Canada.

The following is a brief description of permit actions taken in 1998.

## Scientific Research Permits

1. Permit 672624, renewed October 19, 1998, through June 16, 2003, to the USGS/BRD for scientific research of California sea otters as previously described in our 1994 Annual Report.

2. Permit 766146, amended September 30, 1998, through January 25, 2003, to Texas A&M University for scientific research of West Indian manatees. The permit was amended to include authorization for new investigators to conduct research as described in our 1994 Annual Report.

3. Permit 773494, amended August 11, 1998, through July 22, 2003, to the FDEP for scientific research of West Indian manatees. The permit was amended to change the principal officer, increase the allowable number of recaptures of released manatees, increase the allowable number of implants of passive integrated

transponder tags in captive and free-ranging manatees, and allow import of biological samples from captive or wild West Indian manatees, Amazonian manatees, West African manatees, and dugongs.

4. Permit 801652, amended July 14, 1998, through December 31, 2000, to the USGS/BRD for scientific research of Pacific walrus. The permit was amended to change the principal officer and to allow for the attachment of video cameras to walrus.

5. Permit 837797, issued March 4, 1998, through March 4, 2003, to Steven Benner, University of Florida, for import of polar bear ear punch samples previously collected in the course of on-going research in Canada for the purpose of scientific research related to the genetic evolution of polar bear.

6. Permit 837923, issued June 11, 1998, through June 10, 1999, to Gordon Bauer, New College, University of South Florida, for scientific research of the cognitive abilities of West Indian manatees.

7. Permit 838930, issued June 11, 1998, through June 10, 2003, to MML, to take (harass) free-ranging West Indian manatees by making in-water observations to collect data for gender and life history studies.

8. Permit 839099, issued April 7, 1998, through April 7, 2003, to Jennifer Burns, University of California, to receive biological samples collected from Pacific walrus under Permit 801652 for the purpose of scientific research related to walrus health, physiology, and growth rates.

9. Permit 843203, issued July 28, 1998, through July 26, 2000, to James Estes, USGS/BRD, to take captive California sea otters undergoing rehabilitation by allowing them access to commercial fishing traps to determine if and how they become entrapped.

10. Permit 843809, issued September 11, 1998, through July 28, 2001, to MML, to take West Indian manatees for the purpose of scientific research relating to manatee response to approaching water vessels.

11. Permit 001145, issued September 11, 1998, through September 9, 2000, to MML, to take two captive-held West Indian manatees undergoing rehabilitation for the purpose of scientific research relating to physiological changes in manatees upon release into the wild.

### Public Display Permits

1. Permit 826442, issued June 24, 1998, through June 24, 1999, to Grayson County Bank Museum, Sherman, Texas, to import a polar bear from the Northwest Territories, Canada, donated to the Museum for the purpose of public display.

2. Permit 826912, issued August 7, 1998, through August 6, 1999, to Arrowhead Bluffs Museum/Exhibits, Wabasha, Minnesota, to import a polar bear from the Northwest Territories, Canada, donated to the Museum for the purpose of public display.

3. Permit 829754, issued October 20, 1998, through October 20, 1999, to Northeastern Nevada Historical Society and Museum, Elko, Nevada, to import a polar bear from the Northwest Territories, Canada, donated to the Museum for the purpose of public display.

4. Permit 831734, issued jointly with NMFS March 2, 1998, through March 2, 2003, to the American Museum of Natural History to import, re-import, export, and re-export salvaged material from dead Cetacea, Pinnipedia, Sirenia, sea otter and marine otter for the purposes of public display and scientific research.

5. Permit 833153, issued March 16, 1998, through March 15, 1999, to Wyobraska Natural History Museum, Gering, Nebraska, to import a Pacific walrus from the Northwest Territories, Canada, donated to the Museum for the purpose of public display.

6. Permit 001991, issued October 20, 1998, through October 20, 2003, to Oregon Coast Aquarium, to take one male northern sea otter (that was recovered as an orphaned/abandoned pup in Alaska) for the purpose of public display.

### Enhancement Permits

1. Permit 770191, amended May 13, 1998, through May 12, 2003, to the Service to take West Indian manatees for the purpose of enhancing the recovery or survival of the species. The permit was amended to allow manatees undergoing rehabilitation to be placed temporarily at facilities outside the State of Florida.

2. Permit 837131, issued February 12, 1998, through February 11, 2003, to the Monterey Bay Aquarium to take California sea otters for the purpose of rehabilitation and release to the wild.

### Photography Permits

1. Permit 841982, issued July 16, 1998, through July 15, 2003, to Adam Ravetch to take (by Level B harassment) Pacific walrus for the purpose of educational/commercial photography.

### Registered Agent/Tannery Permits

1. Permit 623423, renewed the tannery registration of New Method Fur Dressing Company, San Francisco, California, on July 8, 1998.

2. Permit 723077, renewed the registration of Alaska Fur Exchange, Anchorage, Alaska, as an agent on April 6, 1998.

3. Permit 748545, renewed the registration of Alaskan Treasures, Anchorage, Alaska, as an agent on December 8, 1998.

4. Permit 799359, renewed the registration of Carolina Fur Dressing Company, Raleigh, North Carolina, as a tannery on September 16, 1998.

5. Permit 802573, renewed the registration of Top Gun Taxidermy, Wasilla, Alaska, as a tannery on July 10, 1998.

6. Permit 812648, renewed the registration of Elizabeth West, Sitka Fur and Leather, Sitka, Alaska, as an agent on April 16, 1998.

7. Permit 839290, Duane Edward Hill, Alaska Auction Company, Anchorage, Alaska, was registered as an agent on April 27, 1998.

8. Permit 840155, Mia Sotelo, Moyle Mink and Tannery, Heyburn, Idaho, was registered as a tannery on August 12, 1998.

### Polar Bear Trophy Import Permits

<i>Approved Populations</i>	<i>Number of Permits Issued</i>
Southern Beaufort Sea	13
Northern Beaufort Sea	3
Viscount Melville	4
McClintock Channel	13
Western Hudson Bay	2

<i>Deferred Populations (Pre-Amendment only)</i>	<i>Number of Permits Issued</i>
Queen Elizabeth Islands	0
Norwegian Bay	0
Kane Basin	0
Baffin Bay	2
Lancaster Sound	16
Gulf of Boothia	2
Foxe Basin	2
Davis Strait	3
Southern Hudson Bay	0

# International Activities

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

The Service, in partnership with the USGS/BRD, the NMFS, the State of Alaska, and colleagues from universities and non-governmental organizations, collaborated with 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 1998. Under the auspices of the bilateral marine mammal project, one U.S. specialist traveled to Russia, while 15 Russians traveled to the U.S. for jointly sponsored activities.

Eight Russian representatives attended a meeting with U.S. colleagues in Washington State for one week in February to negotiate the text of the proposed *U.S.-Russia Bilateral Agreement on the Conservation and Management of the Alaska-Chukotka Polar Bear Population*.

In February-March, the Monterey Bay Aquarium hosted two Russian sea otter specialists from Kamchatka for a month of field capture and tagging exercises as agreed upon in the Protocol of the Sixth Joint U.S.-Russia Sea Otter Workshop. The Russian side also acquired tagging tools and tags for use on sea otters in Russia.

In April, the Russian side transferred two sea otter carcasses and additional sea otter organs to the U.S. for necropsy by the USGS/BRD as agreed upon in the Protocol of the Sixth Joint U.S.-Russia Sea Otter Workshop.

In August, the NMFS hosted a specialist from the Kamchatka Fisheries Agency, Russia, for one month of studies of ice-associated harbor seals (*Phoca vitulina*) near Seward, Alaska. Radio transmitters were deployed.

In August, one NMFS specialist visited the Commander Islands, Russia for collaboration on fur seal (*Callorhinus ursinus*) studies with Russian colleagues.

The Service hosted two Russians at a Pacific walrus harvest monitoring workshop in Nome, Alaska, for one week in September. Recent harvest data were exchanged and recommendations made for improving and coordinating walrus harvest monitoring efforts in Chukotka and Alaska.

The U.S. and Russian sides created a subgroup of the Marine Mammal Working Group "Conservation and Management of Cetacean Populations Utilized in Aboriginal Whaling" whose purpose is to review research and management of gray (*Eschrichtius robustus*) and bowhead (*Balaena mysticetus*) whales. In November, two Russians were hosted by the NMFS in California for cooperation under this subgroup.

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

The Pacific walrus population ranges across the international boundaries of the U.S. and Russia. The need to address international conservation issues such as monitoring the status and trend of the 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 1994, representatives of the U.S. and Russia signed a protocol of intent to further the conservation and management of shared stocks of walrus by developing bilateral agreements addressing conservation, research, habitat protection and Native subsistence use. The protocol calls for the development of government-to-government and Native-to-Native agreements between respective counterparts in the U.S. and Russia.

In 1998, discussions on the development of a government-to-government walrus agreement were suspended pending the completion of negotiations on a similar conservation agreement for the shared Chukchi/Bering Seas polar bear stock. The Service intends to work with the Alaska Native community to develop a

U.S. negotiating position on provisions for a U.S.- Russia walrus agreement when bilateral discussions resume.

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

Over the past 25 years, the U.S. and Russia have carried out many cooperative studies on walrus under the auspices of the U.S./Russia Area V Environmental Protection Agreement. In September 1998, the Service and the Eskimo Walrus Commission hosted a bilateral workshop in Nome, Alaska, concerning walrus harvest monitoring in the U.S. and Russia. Workshop presentations included reports on: U.S. and Russian harvest monitoring methods; the exchange of recent walrus harvest data; U.S. and Russian harvest regulation and enforcement programs; overviews of management organizations and subsistence user groups in the U.S. and Russia; and discussions on the importance of walrus hunting to subsistence hunters in Alaska and Chukotka. During the workshop, participants identified information and management needs for harvest monitoring in Alaska and Chukotka, and developed recommendations for improving harvest monitoring programs in both nations. A report summarizing the proceedings of the harvest workshop is available upon request (write to: U.S. Fish and Wildlife Service, Marine Mammals Management, 1011 East Tudor Road, Anchorage, AK 99503).

The Russian delegation to the workshop reported that the economic crisis in Russia has led to the deterioration of harvest monitoring programs in Chukotka to the point where harvest estimates can no longer be considered reliable. The Service is trying to help Russian biologists and hunters find the resources necessary to re-establish harvest monitoring programs in Chukotka. In the spring of 1999, the Service plans to invite Russian harvest monitors to observe and participate in walrus harvest monitoring activities and training in Alaska.



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

The Service continues to participate in the development of a conservation agreement between the U.S. and Russian governments. The purpose of the agreement would be the effective conservation and management of the polar bear population in the Chukchi/Bering Seas through regulation of take and protection of habitat. The treaty between the U.S. and Russia would provide the basis for developing a unified and comprehensive management program which includes provisions for: regulation of take (i.e., quotas); enhanced bio-monitoring and research opportunities; increased habitat protection; and non-consumptive as well as consumptive uses. The treaty between governments would be implemented through the companion Alaska-Chukotka "Native-to-Native" agreement and be consistent with the 1973 International Agreement on the Conservation of Polar Bears. Oversight of the implementation would be through a joint commission of government and Native representatives from each country.

In February 1998, U.S. and Russian representatives negotiated the text for the *U.S.-Russia Bilateral Agreement on the Conservation and Management of the Alaska-Chukotka Polar Bear Population*. Formal review and approval of the draft is pending in both countries. Upon approval by both governments, the U.S. Department of State will consult with the other three countries party to the 1973 International Agreement on the

Conservation of Polar Bears (1973 Agreement). If there are no objections, the Bilateral Agreement would be cleared for signature and presentation to the U.S. Senate for its advice and consent. Implementation of the Bilateral Agreement would provide for active involvement of Alaska and Chukotka Natives.

### **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 Agreement, 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 final draft report to Congress has been completed; as of the end of 1998, final review of the document was pending.

Regarding the international review of the effectiveness of the 1973 Agreement and methods for conducting future reviews, the Service has consulted with the other contracting parties (i.e. Canada, Russia, Norway, and Denmark) and received formal responses from all but Russia. These parties believe the 1973 Agreement has functioned effectively and has largely been responsible for recovery of polar bear populations which were imperiled in the 1960s. These contracting parties

recognize that a number of actions would improve effectiveness of implementing the 1973 Agreement, and each country should continue to strive toward this goal. They suggested that periodic review of the effectiveness of the 1973 Agreement is currently served through the advisory nature of the Polar Bear Specialist Group and this role should continue in the future.

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 comply with 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 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.

At present, the Service is awaiting a formal response from Russia, which has provided a provisional draft response recommending that a consultative meeting of the contracting parties be conducted with the intention of improving certain aspects of the 1973 Agreement. On receipt of the formal Russian response, the Service will be able to complete this international review.



# Status Reports

## Stock Assessments

New Section 117 in the 1994 Amendments to the Act required the Service and the NMFS, as appropriate, to prepare and periodically update reports which assess the current status of all stocks of marine mammals occurring in U.S. waters. These stock assessment reports (SARs) are intended to provide information for making management decisions to address the incidental take of marine mammals in commercial fisheries. SARs use the best available information on population size and productivity to calculate the potential biological removal (PBR) level that the population could sustain, and compare the PBR with estimates of annual human-caused mortality to assess the status of the stock. Stocks are designated as strategic or non-strategic. As defined in Section 3(19) of the Act, a strategic stock is one that is listed as threatened or endangered, or likely to be so designated within the foreseeable future, under the ESA; depleted under the Act; or one with a level of direct human-caused mortality that exceeds its PBR.

On October 4, 1995, the Service completed SARs for all marine mammal species under our jurisdiction occurring in waters of the United States (i.e., Pacific walrus, polar bears, and northern sea otter in Alaska; northern sea otter in Washington State and southern sea otter in California; and West Indian manatees in the southeastern United States). Notice of their completion and public availability was announced in the FEDERAL REGISTER (60 FR 52008) on that date. These reports contained information regarding the distribution and abundance of these 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 stocks, and every

three years for stocks determined to be non-strategic. During 1996, the Service reviewed all eight of its 1995 SARs and determined that it would be appropriate to revise those 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 SARs, the status of the four stocks had not changed; both West Indian manatee stocks and the southern sea otter stock in California were still classified as strategic, while the northern sea otter stock in Washington State was still classified as non-strategic. On April 25, 1997, the Service published a FEDERAL REGISTER notice (62 FR 20201) to announce the availability for public review of draft revised SARs for these four stocks; the 90 day comment period expired on July 24, 1997. The revised documents were submitted for final approval by the end of 1997 with that approval expected early in 1998. By the end of 1998, however, final approval had not been received and the documents are now obsolete. (Note: The Service has begun efforts in 1999 to develop new, revised SARs for these four stocks.)

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 their SARs. However, in 1997, the Service again reviewed these SARs and determined that revisions would be appropriate. Revisions were begun and on March, 5, 1998, we published a FEDERAL REGISTER public Notice of Availability of Draft Revised Marine Mammal Stock Assessment Reports for Alaska Sea Otter, Walrus, and Polar Bear (63 FR 10936). Following a 90-day comment period, we subsequently published in the FEDERAL REGISTER on September 14, 1998 (63 FR 49132), a Notice of Availability of Revised Marine Mammal Stock Assessment Reports for Pacific Walrus and Polar Bear in Alaska.

The non-strategic status of these stocks has not changed.

The 1998 revised Pacific walrus SAR was updated to include new information on fisheries and harvest related mortality. In the absence of new population data, no changes were proposed to the estimated PBR level. The inclusion of the latest fisheries and harvest information resulted in a slightly lower estimate of average annual human caused mortality, and its non-strategic designation remained. However, during the review process, conservation organizations and members of the scientific community raised questions about the Service's use of outdated population information. The Service is working with the USGS/BRD to develop a study plan for a statistically valid walrus population survey. The next revision of the Pacific walrus stock assessment report is scheduled for 2001.

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 (ASOC) for a proceeding on the record (pursuant to Section 117(b)(2) of the Act. 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." As 1998 ended, the Service was working with the ASOC to clarify concerns and resolve the issue.

## Pacific Walrus

The Service is responsible for managing walrus in U.S. waters. In 1994, the Service developed a conservation plan for Pacific walrus. This plan identifies critical management and research needs and objectives for improving the conservation of walrus stocks in Alaska. This plan has been used to develop and implement walrus program activities as reported below.

### *Co-Management With Alaska Natives*

The Act authorizes the Service to enter into cooperative agreements with Alaska Native organizations to conserve marine mammals and to support management of subsistence use by Alaska Natives. Agreements may include grants to Alaska Native organizations to carry out such activities. In 1998, the Service provided the Eskimo Walrus Commission (EWC) with \$80,000 for management activities which included a bilateral walrus harvest monitoring workshop; meetings with Russia's Chukotka Natives for the development of a Native-to-Native agreement on walrus conservation; development of Native self-regulation policies concerning walrus utilization; and a transfer of funds to the Bristol Bay Native Association (BBNA) for management activities.

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

In 1995, the Service entered into a cooperative management agreement with the Qayassik Walrus Commission, the EWC, and the Alaska Department of Fish and Game (ADFG) to monitor a limited subsistence hunt on Round Island, Walrus Islands State Game Sanctuary, Bristol Bay, Alaska.

In 1998, the harvest limit was 20 walrus (including struck and lost animals) and the hunting season was September 20 through October 20. Hunt activities were cooperatively monitored by the Service and the BBNA. Hunt monitors were stationed on Round Island through the hunt season to monitor walrus' responses to hunting activities and to collect biological information from harvested animals. During the hunt season, Bristol Bay hunters harvested a total of 13 of the 20 allotted walrus. There were no struck and lost animals. Samples collected included: teeth for age determination and contaminant samples for the Alaska Marine Mammal Tissue Archival Project (AMMTAP). The AMMTAP is an interagency project dedicated to the collection and long-term storage of marine mammal tissues suitable for determining levels of organic and inorganic toxic substances. Next year the Service plans to offer technical and logistical support to the BBNA, which will be taking over the task of monitoring the Round Island hunt.

### *Research and Monitoring Activities-Bristol Bay Walrus Haulouts*

Each summer, Bristol Bay, Alaska, provides feeding and resting habitat for thousands of male Pacific walrus. From

May through October, walrus congregate in the bay and rest at traditional haulouts at Round Island, Cape Peirce, Cape Newenham, and Cape Seniavin. In 1998, the Service continued to participate in a cooperative program with the ADFG to monitor the numbers of walrus using haulouts in Bristol Bay and to assess human impacts which might affect the use of these haulout sites.

Last year's effort marked the first year of haulout monitoring at Cape Seniavin located along the south shore of Bristol Bay on the Alaska Peninsula. This site has been surveyed infrequently, and information on the number of walrus using the site has been limited. The haulout was monitored in June and July by a Service biologist and a student intern sponsored by the BBNA. As many as 1,800 animals hauled out at the Cape during the monitoring period. The Cape Seniavin haulout does not have the protection that the haulouts at Round Island and on the Togiak National Wildlife Refuge (i.e., Cape Peirce and Cape Newenham) do, and the monitors observed several instances of human-caused disturbances which flushed animals from the haulout. A report summarizing the results of haulout monitoring at Cape Seniavin is available upon request (write to: U.S. Fish and Wildlife Service, Marine Mammals Management, 1011 East Tudor Road, Anchorage, AK 99503).

### *Research and Monitoring Activities-Walrus Harvest Monitoring Project*

In 1998, the Service continued its Walrus Harvest Monitoring Project (WHMP) which monitors the size and structure of the subsistence walrus harvest in the primary walrus hunting villages in Alaska. As reported in previous reports, Service and village technicians work together to collect information on the size and demographics of the spring harvest by conducting hunter interviews and obtaining biological samples. This information is 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 include teeth for age determination, adult female reproductive tracts to determine reproductive status, and occasional anomalous tissues which are used to identify specific pathologies.

In 1998, a total of 794 harvested Pacific walrus were recorded through the WHMP at the Native villages of Little Diomedea, Gambell, Savoonga, and Wales. The recorded harvest consisted of: 77

calves, 8 yearlings, 27 subadult animals, 677 adults, and 5 animals of unknown age class. The sex ratio of the harvest was approximately equal. Frequency distributions of age estimates indicated sex-linked differences in age structure of the harvest; 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.

### *Research and Monitoring Activities-Population Status and Trend*

The current size and trend of the Pacific walrus population is unknown. Between 1975 and 1990, walrus population surveys were carried out cooperatively by the governments of the U.S. and Soviet Union (now Russia). These cooperative surveys were suspended after the 1990 survey due to budgetary constraints in both countries. Since 1990, no information has been collected with which to assess population size or trend.

In the past few years, we have obtained encouraging results from remotely sensed data that may be capable of detecting walrus on land and on ice. Potentially, these techniques may be more accurate and cost effective than traditional aerial surveys. The Service plans to continue investigating the application of remote sensing to walrus studies.

### *Research and Monitoring Activities-Walrus Productivity and Survivorship*

In September 1998, a Service biologist and researchers from the University of Alaska participated in a scientific cruise through the pack-ice of the Chukchi Sea on board the GreenPeace vessel *Arctic Sunrise*. The objective of the study was to visually sample the age-sex composition of free ranging walrus herds to investigate productivity and juvenile survival rates. Preliminary results indicated a lower than expected number of calves of the year. Only 5 percent of the adult females encountered were accompanied by calves of-the-year. The number of yearling (6 percent) and two year old (5.5 percent) animals encountered was also lower than expected, which suggests low productivity and/or low juvenile survivorship over the past several years. This is consistent with anecdotal reports from walrus hunters who have observed fewer calves over the past few years. These results warrant further investigation. GreenPeace has tentatively agreed to support another ice edge survey in the summer of 1999. The

Service has also contacted the U.S. Coast Guard Arctic Icebreaker Coordinating Committee to express interest in doing walrus surveys from the *USCGC Healy* in the year 2001.

### **Northern Sea Otter**

During 1998, the Service's Alaska Sea Otter Program accomplished the activities described below. Several were carried out in close cooperation with the ASOC, as described below under the paragraph entitled *Cooperative Management With Alaska Natives*.

#### *Biological Monitoring Program*

The Service and the ASOC continued training Alaska Native hunters to necropsy sea otters. By the end of 1998, a total of 56 individuals had been trained in communities throughout Alaska. This has resulted in the collection of sea otter biological samples for contaminants analyses and life history studies. For example, 96 sea otters were necropsied and sampled in 1998 as part of this program. In addition, the Service collaborated with the ASOC to produce a "refresher" training video designed to maintain an adequate level of training.

#### *Local Population Trend Surveys*

The Service worked with the ASOC to develop methods for small-scale sea otter trend surveys, which can be conducted by Native communities as part of their local area management plans. On-site training sessions were held in Sitka, Cordova, Yakutat, and Port Graham, Alaska. Members of these communities now have the ability to use this method to develop localized trend surveys and also to train representatives of other interested Native communities.

#### *Mortality Surveys*

Sea otter mortality surveys are being continued in Cordova, Alaska. These were done in previous years in conjunction with the development of local area management plans. In 1998, another localized mortality survey was initiated by Alaska Native villagers in Sitka, Alaska.

#### *Contaminants Monitoring*

A three year program was initiated in 1997 to monitor contaminants in approximately 50 sea otters. Funding for 1997 (21 otters) and 1998 (19 otters) was received from the Service's Division of Environmental Contaminants. Funding is anticipated to complete the analytical work in 1999 (17 otters). Samples were submitted for organochlorine and heavy metal analyses from southeast Alaska (16

otters), Prince William Sound (11 otters), Kodiak Archipelago (5 otters), Cook Inlet (2 otters), the Alaska Peninsula/Aleutian Islands (4 otters), and the Russian Kamchatka Peninsula (2 otters).

Preliminary results of the 1997 organochlorine data indicate low concentrations of certain compounds in a small number of sea otters. Of the 21 sea otters 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.

#### *Work With the Alaska Science Center*

The Service provided continuing support to the ABSC and the Exxon Valdez Trustee Council on restoration projects following the 1989 *Exxon Valdez* oil spill. These projects consider the mechanisms and extent of recovery of sea otter populations injured as a result of the spill. The Service and the ABSC also worked together to collect additional data on sea otter abundance, limited distribution, and foraging behavior on Amchitka Island to complement work recently completed by the University of California at Santa Cruz. Additionally, Service biologists participated in the multi-agency dungeness crab study looking at sea otter expansion and dungeness crab abundance in Glacier Bay National Park.

#### *Placement of Stranded Sea Otter*

One abandoned sea otter pup was picked up from Klawock, Alaska, by a private citizen in July 1998. The pup was treated and cared for by the Alaska SeaLife Center in close consultation with Service staff, until it was successfully placed at the Oregon Coast Aquarium.

#### *Cooperative Management With Alaska Natives*

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 Marking, Tagging, and Reporting Program (MTRP) and

ASOC input in ongoing Service activities. Mortality surveys continued in Cordova, and were initiated in Sitka, Alaska. In addition, representatives of several communities have been trained to conduct localized population trend surveys.

### **Polar Bear**

#### *Harvest Summary*

Our MTRP continued to collect information from polar bears taken by Native hunters for subsistence purposes. The 1997/98 Alaska harvest of 57 bears consisted of 27 males, 21 females, and 9 with sex unknown (Table 1). This harvest was similar to the low harvest (45) recorded during the 1995/96 season. The relatively low harvest numbers may be due in part to the late arrival of the pack ice and relatively warm temperatures during November 1997 which may have reduced the number of bears available to be harvested.

Natives harvested polar bears in every month except July and October (Table 2). Forty-seven percent of the bears were killed during the winter months of December, January, and February. Only 8 percent were killed during the fall compared to 30 percent killed during the same period in 1996/97. The sex ratio of polar bears of known-sex during the 1997/98 harvest season was 56 percent males and 44 percent females. This is the second year in a row where the percentage of females in the harvest has exceeded the long-term sex ratio average of 34 percent for females.

The mean age for females (7.9 years, n=14) and males (5.1 years, n=14) in the harvest for the 1996/97 season (Table 3) was close to the long-term average of 7.2 and 6.4 years, respectively. The long-term average age class distribution for the polar bear harvest in Alaska is 50 percent adults, 32 percent subadults, and 18 percent cubs. Although the percentage of adults as determined from tooth annuli for known age bears in the 1996/97 harvest (46 percent) approximates the long-term average, the percentage of subadults (18 percent) and cubs (36 percent) is reversed from what is usually observed in the harvest (Table 4). These percentages may change when ages are determined from the teeth of 12 remaining bears (not included in Table 4) that were harvested during 1996/97. Teeth were obtained from 54 percent of the bears harvested during the 1997/98 season. Age determinations from tooth annuli are based on completed years of life. Using this system, cubs are 0-2.3

**Table 1. Village Polar Bear Harvest, Alaska, 1997/1998.**

<i>Village</i>	<i>Male</i>	<i>Female</i>	<i>Unknown</i>	<i>Total</i>
Kaktovik*	1	–	1	2
Nuiqsut*	2	–	–	2
Barrow*	8	4	2	14
Atqasuk*	–	–	–	0
Wainwright*	2	2	2	6
Point Lay	2	2	–	4
Point Hope	3	7	1	11
Kivalina	–	–	–	0
Kotzebue	–	–	–	0
Shishmaref	2	1	–	3
Wales	1	–	–	1
Ageklekak	–	–	–	0
Little Diomede	2	2	3	7
Savoonga	3	2	–	5
Gambell	1	1	–	2
<b>Total</b>	<b>27</b>	<b>21</b>	<b>9</b>	<b>57</b>
<b>Percent</b>	(47.4)	(36.8)	(15.8)	(100)

\* Denotes villages party to the IGC/NSB Management Agreement. Harvest season extends from July 1, 1997, to June 30, 1998.

**Table 2. Monthly Polar Bear Harvest, Alaska, 1997/1998.**

<i>Village</i>	<i>Month</i>												<i>Total</i>
	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	
Kaktovik*	–	1	–	–	–	1	–	–	–	–	–	–	2
Nuiqsut*	–	–	2	–	–	–	–	–	–	–	–	–	2
Barrow*	–	2	–	–	2	4	1	–	1	–	4	–	14
Atqasuk*	–	–	–	–	–	–	–	–	–	–	–	–	0
Wainwright*	–	–	2	–	–	3	–	–	–	1	–	–	6
Point Lay	–	–	–	–	–	1	–	1	2	–	–	–	4
Point Hope	–	–	–	–	–	–	3	5	3	–	–	–	11
Kivalina	–	–	–	–	–	–	–	–	–	–	–	–	0
Kotzebue	–	–	–	–	–	–	–	–	–	–	–	–	0
Shishmaref	–	–	–	–	–	–	–	–	–	2	–	1	3
Ageklekak	–	–	–	–	–	–	–	–	–	–	–	–	0
Wales	–	–	–	–	–	–	–	–	1	–	–	–	1
Diomede	–	–	–	–	2	–	2	1	–	1	1	–	7
Savoonga	–	–	–	–	–	1	–	3	1	–	–	–	5
Gambell	–	–	–	–	–	–	1	–	–	–	1	–	2
<b>Total</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>0</b>	<b>4</b>	<b>10</b>	<b>7</b>	<b>10</b>	<b>8</b>	<b>4</b>	<b>6</b>	<b>1</b>	<b>57</b>
<b>Percent</b>	<b>0</b>	<b>5.2</b>	<b>7.0</b>	<b>0</b>	<b>7.0</b>	<b>17.5</b>	<b>12.3</b>	<b>17.5</b>	<b>14.0</b>	<b>7.0</b>	<b>10.5</b>	<b>1.8</b>	<b>100</b>

\* Villages party to the IGC/NSB Management Agreement. Harvest season extends from July 1, 1997, to June 30, 1998.

**Table 3. Mean Age\* of Polar Bears Harvested in Alaska, 1992-1997.**

Sex	1992/1993 <sup>a</sup>			1993/1994 <sup>a</sup>			1994/1995 <sup>a</sup>			1995/1996 <sup>a</sup>			1996/1997 <sup>a</sup>		
	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD
Male	24	9.6	6.7	52	7.1	7.4	49	7.6	7.5	9	5.6	4.0	14	5.1	4.9
Female	12	11.5	7.2	39	7.0	5.5	24	6.1	6.4	3	6.3	4.0	14	7.9	8.3
Unknown	1	3.0	–	2	8.0	2.8	1	3.0	–	8	5.5	5.9	0		

\*Ages are based on cementum annuli of the first premolar. Ages not yet available for bears taken in harvest year 1997/98.

N = Number of Bears Analyzed. M = Mean Age. SD = Standard Deviation.

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

**Table 4. Age Class\* of Polar Bears Harvested in Alaska, 1992-1997.**

Age Class (years)	1992/1993 <sup>a</sup>	1993/1994 <sup>a</sup>	1994/1995 <sup>a</sup>	1995/1996 <sup>a</sup>	1996/1997 <sup>ab</sup>	Total
Adults (>5)	24(65)	44(47)	31(42)	9(45)	13(46)	121(48)
Subadults (>2.3-5)	10(27)	33(36)	32(43)	7(35)	5(18)	87(35)
Cubs (0-2.3)	3(8)	16(17)	11(15)	4(20)	10(36)	44(17)
Unknown Age	39	32	21	25	60	177
<b>Total</b>	<b>76</b>	<b>125</b>	<b>95</b>	<b>45</b>	<b>88</b>	<b>429</b>

\*Ages based on cementum annuli of the first premolar. Ages not yet available for bears taken in harvest year 1997/98.

Two-year old bears are considered subadults after April 30. ( ) = Percentage of known age bears by harvest year.

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

<sup>b</sup> An additional 12 teeth have been sent to the lab to be aged.

years old, subadults are >2.3-5 years old, and adults are >5 years old. Complete sex and age information of harvested bears was obtained from the hunter for 82 percent of the kill during the 1997/98 season.

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

The 1997/98 harvest by Alaska's North Slope villages included in the Inuvialuit Game Council/North Slope Borough Management Agreement for Polar Bears in the Southern Beaufort Sea was 24 polar bears: 13 males, 6 females, and 5 of unknown sex (Table 1). The harvest from the Alaska region of the southern Beaufort Sea represented 42 percent (24/57) 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. As shown in Table 2, approximately 17 percent (4 of 24) and 33 percent (8 of 24) of the polar bears harvested from the Southern Beaufort Sea were taken in September and December 1997, respectively. Three bears from this population were taken outside

the prescribed season which extends from September 1 to May 31.

The sex composition of the harvest of known-sex animals was 68 percent male and 32 percent female. The mean age for females (n=6) and males (n=6) harvested during the 1996/97 season was 9.3 years and 5.67 years, respectively. Changes in the age composition of the harvest may be indicative of changes in the population dynamics. The ages of female and male polar bears have remained fairly stable since 1980. The age class composition based on tooth annuli from the 1996/97 harvest (42 percent adults, 52 percent subadults, and 5 percent cubs) approximates the long-term average. Age determinations from tooth annuli are based on completed years of life. Complete sex and age information was obtained from the hunters for 75 percent of the kill during the 1997/98 season.

#### *Population Modeling*

We modeled the female portion of the Southern Beaufort Sea polar bear stock with a Leslie transformation matrix using the best available life history and harvest data. Age-specific rates of reproduction and mean litter sizes were based on

capture data. Age-specific survival rates were based on radio-telemetry. Harvest records from the Service and the Canadian Wildlife Service provided estimates of the size and composition of the harvest. We used a stable age population structure to start the model. We incorporated the annual variation and the measurement error inherent in the life history and harvest parameters by using bootstrapping and Monte Carlo methods to generate a set of parameters for each model year. We ran 500 iterations of the model for 30 model years each. The modeled population showed an annual growth rate of 0.52 percent (95 percent C.I. 1.2 percent to -0.23 percent), which is one quarter of the previously estimated growth rate based on the increase between two population estimates. We modeled perturbations to the population by removing bears from the population in model year zero. We also modeled latent effects by depressing cub production and survival over a number of years following the initial perturbation. Recovery time was defined as the model year when the model population regained the initial population size. The model has a 95 percent probability of recovery from an initial removal of 30 bears that ranges from 7 years (no latent effects), to 18 years (5 percent depression of cub production and survival over 5 years). Recovery times were strongly dependent upon the number of bears removed and the magnitude and the persistence of the latent effects. The model is strongly sensitive to the initial population estimate, the proportion of females in the population, and the allocation of the Alaskan harvest.

#### *Polar Bear Bio-Monitoring Program*

The third year of the polar bear bio-monitoring program, to document contaminant levels in polar bears in Alaska, began in fall/winter 1997/1998. The Service, working cooperatively with the North Slope Borough, the Alaska

Nanuq Commission (ANC), and Alaska Native hunters, is collecting liver, kidney, muscle, and fat tissues from 50 adult male bears to determine metal and organochlorine contamination.

Contaminant specimens were collected from six adult males, one sub-adult male, and two adult females during the 1997/98 season. To date, we have the results on the organochlorine analysis from 16 adult males, eight each from the Beaufort Sea population and the Chukchi/Bering Seas population, respectively. The movement of the sea ice influences the distribution and availability of polar bears for Native subsistence hunters. During fall 1997, the pack ice in the Beaufort Sea remained far offshore until early November and polar bears did not arrive in the vicinity of Barrow until early December. Normally a significant part of the polar bear harvest in the Southern Beaufort Sea occurs in the fall. This is the third winter out of the last four years in which the fall movement of the pack ice to the Alaskan coast has been delayed due to warmer than normal ocean temperatures. The 45 or so polar bears that were present during fall 1997 spent much of their time on the Barrier Islands and shoreline between Barter Island (Kaktovik) and the Canadian border.

Although the number of adult males harvested during the 1997/98 harvest season was low, the percentage from which samples were collected increased from the 1996/1997 harvest season. All specimens received have been submitted to labs for analysis. Levels of Total PCBs (S-PCB ppm, wet weight) averaged 2.45 ppm (range 0.90-7.55 ppm), but were not high relative to levels found in Hudson Bay, Canada, and Svalbard, Norway, two areas that have some of the highest documented levels in polar bears. The highest levels of S-PCB were found in one subadult from Point Lay (7.55 ppm) and two adults from Barrow (5.05 ppm and 5.01 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 16 bears recently analyzed was 0.79 which is similar to the high levels reported for the Chukchi and Bering Seas. 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 have some of the highest reported levels within the Arctic region.

Suspected sources are from Asia, carried north via the Japanese current, and from Russian rivers to the north. One common source of HCH is lindane which is used as an insecticide to treat seeds and lumber. HCH is highly soluble in water, and has been linked to reproductive, liver, and immune system dysfunctions.

To date we have not received results on the trace elements from tissues collected during the 1997/98 harvest season. Analysis of methyl mercury will be done in January 1999 for specimens collected during 1996/97 and 1997/98 harvest seasons. We examined 19 trace elements in the muscle, livers, and kidneys of 16 adult male polar bears taken in northern and western Alaska. Several elements (i.e., aluminum, Al; arsenic, As; boron, B; barium, Ba; beryllium, Be; molybdenum, Mo; and lead, Pb) were near the detection limit in all tissues. The preliminary results (n=11) indicate that mercury (Hg) levels in Alaska polar bear livers (both population stocks combined) are lower than those reported for western Canada in 1986 and levels of cadmium (Cd) and copper (Cu) are somewhat higher.

#### *Cooperative Management With Alaska Natives*

The ANC was established on June 16, 1994, to represent Alaska Native hunters concerning issues related to the conservation and subsistence uses of polar bears. The ANC consists of representatives from 12 villages from northern and western coastal Alaska.

The goals of the ANC are to: (1) encourage and implement self-regulation of polar bear hunting by Alaska Natives; (2) provide education and information to the public, and appropriate State and Federal agencies; (3) represent polar bear hunting communities in developing, reviewing, and commenting on regulations affecting polar bear management; (4) encourage international cooperation in management, research, and enforcement through the involvement of Native hunters and leaders to ensure the health of polar bears and their habitat; (5) promote conservation, health, and sustainable utilization of polar bears by Alaska Natives; (6) actively participate in the formation and implementation of harvest monitoring efforts; and (7) enter into, or participate in, the negotiation of local, State, Federal, and international agreements for the protection, enforcement, enhancement, utilization, and research of marine mammal populations including polar bears.

In 1998, the Service provided the ANC with \$90,000 as authorized under Section 119 of the Act. The ANC used these funds for activities associated with the development of the Native-to-Native Agreement for the Conservation of Polar Bears in the Chukchi/Bering Seas, participation in international, Federal, and local meetings to discuss, comment on, and review issues and policies during the development of the draft U.S./Russian Bilateral Agreement, and to assist in providing information concerning the health, management, subsistence use, and conservation of polar bears back to the villages. In 1998, the ANC hosted a meeting in Nome, Alaska, to coordinate the development of the companion Native-to-Native Polar Bear Agreement with the Chukotka Union of Marine Mammal Hunters (UMMH) and to develop protocols for collecting traditional knowledge of polar bear habitat in Chukotka. Implementation of this agreement will provide for active involvement of Alaska and Chukotka Natives.

#### **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 the Service finds that the total of such taking will have a negligible impact on a 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 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. LOAs 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 (i.e., exploration, development, and production) year-round in the Beaufort Sea and adjacent northern coast of

Alaska. On August 14, 1995, the Service modified and extended the regulations (60 FR 42805) through December 15, 1998.

On August 28, 1997, BP Exploration (Alaska), Inc. (BPXA), submitted a petition for rulemaking to the Service seeking an extension of these regulations for an additional five-year term from December 16, 1998, through December 15, 2003. The request was submitted by BPXA for itself and on behalf of ARCO Alaska, Inc., Exxon Corporation, and Western Geophysical Company. The activities and geographical extent of the request were essentially identical to the then in-place regulations, except that the petition also requested incidental take authority for the construction and operation of offshore sub-sea pipelines, new activities for which incidental take authority was not included in regulations expiring on December 15, 1998. On November 17, 1998, we published a proposed rule in the FEDERAL REGISTER (63 FR 63812); sub-sea pipelines were not included. At that time, information related to sub-sea pipelines was in two Draft Environmental Impact Statements being developed, one by the U.S. Army Corps of Engineers (Corps) for the Northstar Project, and one by the Minerals Management Service for the Liberty Project. On December 15, 1998, the Beaufort Sea incidental take regulations expired. (Note: We issued new regulations on January 28, 1999, (64 FR 4328) that did not include sub-sea pipelines. These new regulations are

valid for a period of one year through January 30, 2000. During this one year period, we will consider new information associated with sub-sea pipelines to evaluate the scope of activities that will be covered in a future rule.

During calendar year 1998, 15 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 5).

#### **Marking, Tagging, and Reporting Program**

The Act set 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 for the purpose of continuing traditional lifestyles through subsistence and handicraft purposes. Our MTRP was implemented in October 1988 to monitor the subsistence harvest of polar bear, sea otter, and Pacific 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 1998, the MTRP staff traveled to 47 coastal villages to hold village meetings, hire and replace taggers, provide training, and work with hunters to gain better compliance with MTRP requirements. To help inform village residents of the MTRP rule, eight school presentations were made during the

village visits. In the Anchorage area, MTRP staff conducted 30 additional information and education programs. MTRP staff hired or replaced 18 taggers, and added two new villages to the Program.

The MTRP currently has 144 taggers and 30 alternates located in 105 villages throughout coastal Alaska (Table 6). Usually, local Native residents are hired and trained in the villages where they live to tag polar bear and sea otter hides and skulls, and walrus tusks. The MTRP employs 62 sea otter, 30 polar bear, and 95 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 in a few villages, 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. Tag numbers, location, and date of tagging, place of kill or find, sex, age, and measurements of specified parts are recorded by the tagger. Harvest data were reported from 68 villages during 1998.

Twenty-seven sea otter taggers reported 810 otters being tagged in 1998 (Tables 7 and 8). 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 MTRP requirements by sea otter hunters appears to be high.

Forty-six polar bears were tagged in 12 villages during the 1997-98 hunting season (Tables 9 and 10). Compliance by the polar bear hunters to MTRP requirements appears to be good.

Fifty-two walrus taggers reported tagging 1,560 walrus in 1998. 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 is given a weight factor of 0.5, because the possibility exists that the second tusk may be tagged at a later

**Table 5. Letters of Authorization Issued in 1998 for the Beaufort Sea and Adjacent Northern Coast of Alaska.**

<i>Date</i>	<i>Company</i>	<i>Activity</i>
January 1, 1998	ARCO Alaska, Inc.	Production
January 1, 1998	BP Exploration (Alaska), Inc.	Production
January 27, 1998	ARCO Alaska, Inc.	Development
March 16, 1998	BP Exploration (Alaska), Inc.	Exploration
March 16, 1998	BP Exploration (Alaska), Inc.	Exploration
March 24, 1998	Exxon Company USA	Exploration
May 12, 1998	BP Exploration (Alaska), Inc.	Development
May 19, 1998	Western Geophysical Company	Exploration
October 9, 1998	ARCO Alaska, Inc.	Exploration
October 16, 1998	ARCO Alaska, Inc.	Exploration
October 16, 1998	ARCO Alaska, Inc.	Exploration
October 19, 1998	BP Exploration (Alaska), Inc.	Exploration
October 19, 1998	ARCO Alaska, Inc.	Exploration
October 19, 1998	BP Exploration (Alaska), Inc.	Exploration
October 19, 1998	BP Exploration (Alaska), Inc.	Exploration



**Table 6. Villages With MTRP Taggers and Species Tagged, 1998.**

<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	Stebbins	W
Clarks Point	W	Koyuk	W	St. Michael	W
Cold Bay	SO/W	Kwigillingok	W	St. Paul	SO/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	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:* 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; Marking, Tagging, and Reporting Program; 1011 East Tudor Road; Anchorage, Alaska 99503. Telephone: (800) 362-5148.*

**Table 7. Sea Otters Tagged, by Tagging Location and Year.**

<i>Location</i>	<i>Pre-Rule</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>5-year Total</i>
Akhiok	1	0	0	0	0	0	0
Anchorage	117	56	37	50	22	2	167
Angoon	0	39	56	0	0	0	95
Atka	0	2	0	0	0	0	2
Bethel	4	0	0	0	0	0	0
Chenega Bay	0	0	14	6	0	0	20
Chignik	1	6	0	0	0	0	6
Chignik Lake	0	2	0	0	0	0	2
Cordova	31	120	171	173	34	292	790
Craig	0	0	0	0	0	36	36
Egegik	0	0	0	1	0	0	1
English Bay	0	6	0	12	0	0	18
False Pass	0	0	10	3	3	2	18
Homer	18	14	0	24	8	2	48
Hoonah	0	7	4	0	3	25	39
Hydaburg	0	0	0	7	38	0	45
Juneau	11	93	21	3	33	16	166
Kake	0	2	3	5	0	0	10
Kenai	0	19	0	0	0	2	21
Ketchikan	2	6	11	3	32	45	97
King Cove	8	5	1	0	13	1	20
Klawock	57	19	52	25	98	20	214
Kodiak	157	6	30	41	25	20	122
Larsen Bay	31	16	7	77	22	13	135
Mekoryuk	5	0	0	0	0	0	0
Nelson Lagoon	0	0	0	0	1	1	2
Nikolski	0	0	0	0	1	0	1
Old Harbor	0	0	0	0	53	0	53
Pelican	0	0	0	8	6	52	66
Petersburg	0	0	0	0	10	0	10
Pilot Point	1	0	1	0	0	0	1
Port Graham	0	101	32	13	20	10	176
Port Heiden	1	1	2	7	0	0	10
Port Lions	11	23	3	18	9	0	53
Sand Point	0	3	0	0	4	2	9
Seldovia	0	8	0	1	27	11	47
Shishmaref	0	0	0	0	0	14	14
Sitka	44	131	38	67	97	102	435
Valdez	0	135	121	56	166	111	589
Wrangell	0	2	0	3	0	0	5
Yakutat	0	13	15	4	13	31	76
<b>Totals</b>	<b>500</b>	<b>835</b>	<b>629</b>	<b>607</b>	<b>738</b>	<b>810</b>	<b>3,619</b>

**Table 8. Sea Otters Tagged by Age Class, Sex, and Year.**

	<i>Pre-Rule</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>5-year Total</i>
<b>Adults</b>							
Female	88	167	99	82	90	98	536
Male	231	468	442	421	469	579	2,379
Unknown	121	80	25	38	62	33	238
<b>Subadults</b>							
Female	8	25	18	20	42	43	148
Male	8	66	26	31	47	39	209
Unknown	14	21	2	3	10	4	39
<b>Pups</b>							
Female	0	1	2	5	4	7	19
Male	1	5	5	5	11	6	32
Unknown	6	1	8	2	3	1	15
<b>Unknown</b>							
Unknown	23	1	2	0	0	0	3
<b>All Ages</b>							
Female	96	193	119	107	136	148	703
Male	240	539	473	457	527	624	2,620
Unknown	164	103	37	43	75	38	296
<b>Totals</b>	<b>500</b>	<b>835</b>	<b>629</b>	<b>607</b>	<b>738</b>	<b>810</b>	<b>3,619</b>

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 11 and 12).

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

Compliance with the MTRP requirements by walrus hunters needs improvement. Despite an aggressive campaign by MTRP staff and Law Enforcement special agents to improve compliance, some walrus hunters still do not comply with the MTRP rule. Village meetings, radio and newspaper announcements, letters, and posters were utilized in 1998 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 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. The MTRP staff will continue to provide information that is obtainable only by being acquainted with the residents of the remote villages and/or familiarity with the traditional village life.

During 1998, 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.

**Table 9. Polar Bears Tagged, by Tagging Location and Harvest Year<sup>a</sup>.**

<i>Location</i>	<i>1993/94</i>	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>	<i>1997/98</i>	<i>5-year Total</i>
Barrow	29	11	15	28	11	94
Gambell	28	9	0	7	1	45
Kaktovik	5	1	1	2	1	10
Kivalina	1	2	0	0	0	3
Kotzebue	1	0	1	1	0	3
Little Diomede	8	10	2	6	3	29
Nome	0	2	0	0	1	3
Nuiqsut	3	1	1	0	2	7
Point Hope	6	19	2	12	11	50
Point Lay	1	1	0	5	3	10
Savoonga	23	10	0	1	5	39
Shishmaref	5	17	2	0	3	27
Wainwright	10	7	14	4	4	39
Wales	1	2	0	1	1	5
<b>Totals</b>	<b>121</b>	<b>92</b>	<b>38</b>	<b>67</b>	<b>46</b>	<b>364</b>

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

**Table 10. Polar Bears Tagged by Age Class, Sex, and Harvest Year.<sup>a</sup>**

<i>Location</i>	<i>1993/94</i>	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>	<i>1997/98</i>	<i>5-year Total</i>
<b>Adults</b>						
Female	15	11	2	10	11	49
Male	29	40	12	21	12	114
Unknown	5	2	7	1	0	15
<b>Subadults</b>						
Female	10	10	4	15	8	47
Male	26	18	10	14	12	80
Unknown	2	0	1	1	0	4
<b>Cubs</b>						
Female	6	4	0	1	1	12
Male	7	2	0	3	1	13
Unknown	1	1	2	2	1	7
<b>Unknown</b>						
Female	14	0	0	0	0	14
Male	4	4	0	0	0	8
Unknown	2	0	0	0	0	2
<b>All Age Classes</b>						
Female	45	25	6	26	20	122
Male	65	60	22	38	25	210
Unknown	10	3	10	3	1	27
<b>Totals</b>	<b>121</b>	<b>92</b>	<b>38</b>	<b>67</b>	<b>46</b>	<b>364</b>

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

**Table 11. Walrus Harvest Estimate, From MTRP Data, by Tagging Location and Year.**

<i>Location</i>	<i>Pre-Rule</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>5-year Total</i>
Adak	0	0	0	0	0	1	1
Anchorage	295	14	15	8	5	3	45
Barrow	1	16	10	12	45	16	99
Bethel	13	7	1	2	12	11	33
Brevig Mission	3	3	2	1	47	83	136
Chevak	11	3	2	0	0	0	5
Chignik	1	0	0	1	3	0	4
Chignik Lake	2	0	0	0	1	0	1
Clarks Point	8	0	3	0	0	0	3
Cold Bay	0	1	0	0	0	3	4
Deering	0	0	0	0	6	0	5
Dillingham	25	48	38	63	62	40	251
Egegik	0	2	0	3	0	0	5
Elim	0	0	1	1	1	0	3
Fairbanks	9	1	0	0	3	4	8
False Pass	0	0	0	0	2	0	2
Gambell	12	522	287	676	353	659	2,497
Golovin	1	1	1	1	2	4	9
Goodnews Bay	4	2	2	1	0	3	8
Hooper Bay	3	3	2	1	8	6	20
King Cove	0	0	0	0	3	0	3
King Island	2	12	0	120	8	11	151
King Salmon	3	0	2	0	1	3	6
Kipnuk	3	5	1	23	1	2	32
Kivalina	0	0	1	12	15	30	58
Kongiganak	1	6	3	5	1	2	17
Kotzebue	30	0	0	22	15	1	38
Koyuk	0	0	1	0	0	0	1
Kwigillingok	3	1	1	1	4	0	7
Little Diomedea	3	377	197	89	152	163	978
Manokotak	3	2	0	0	0	4	6
Mekoryuk	23	7	10	8	13	4	42
Naknek	3	0	0	1	0	0	1
Nelson Lagoon	0	0	0	0	3	1	4
Newtok	0	0	1	0	0	0	1
Nome	50	19	4	47	3	13	86
Petersburg	0	0	0	0	2	0	2
Pilot Point	0	0	0	0	3	0	3
Platinum	20	0	3	0	14	0	17
Point Hope	3	6	0	0	3	0	9
Point Lay	0	1	4	4	7	6	22
Port Heiden	5	1	3	12	0	0	16
Sand Point	1	0	0	0	0	0	0
Savoonga	426	158	394	329	265	255	1,401
Shaktoolik	0	0	0	2	0	9	11
Shishmaref	494	7	12	65	24	101	209
Sitka	15	0	0	0	0	0	0
St. George	1	0	0	0	0	0	0
St. Paul	0	0	1	1	0	0	2
Teller	0	1	4	0	0	9	14
Togiak	13	32	17	43	37	27	146
Toksook Bay	4	2	0	5	3	3	13
Tuntutuliak	0	5	4	0	0	6	15
Tununak	1	1	0	2	0	0	3
Unalakleet	6	2	2	0	0	0	4
Wainwright	4	68	83	24	48	55	278
Wales	10	0	8	1	2	21	32
<b>Totals</b>	<b>1,533</b>	<b>1,336</b>	<b>1,120</b>	<b>1,586</b>	<b>1,177</b>	<b>1,560</b>	<b>6,779</b>

**Table 12. Walrus Harvest Estimate, From MTRP Data, by Age Class, Sex, and Year.**

	<i>Pre-Rule</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>5-year Total</i>
<b>Adults</b>							
Female	236	720	481	623	442	623	2,889
Male	608	502	490	688	631	789	3,100
Unknown	585	52	24	53	44	59	232
<b>Subadults</b>							
Female	5	7	11	14	2	9	43
Male	27	28	20	38	19	61	166
Unknown	49	1	4	15	4	7	31
<b>Calves</b>							
Female	0	0	0	0	0	1	1
Male	0	1	0	0	0	0	1
Unknown	1	25	90	155	35	11	316
<b>Unknown</b>							
Unknown	22	0	0	0	0	0	0
<b>All Ages</b>							
Female	241	727	492	637	444	633	2,933
Male	635	531	510	726	650	850	3,267
Unknown	657	78	118	223	83	77	579
<b>Totals</b>	<b>1533</b>	<b>1336</b>	<b>1120</b>	<b>1586</b>	<b>1177</b>	<b>1560</b>	<b>6,779</b>

**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. The 1998 spring survey resulted in a count of 2,114 individuals (Table 13) with animals ranging from Pigeon Point, San Mateo County, to Purisima Point, Santa Barbara County. In addition, a group of approximately 150 sea otters moved into the Management Zone (please see the section below entitled, “Translocation of Southern Sea Otters” for details of this “Management Zone.”).

The Service listed the southern sea otter as threatened under the ESA in 1977 because of its small population size, limited distribution, and risk of exposure to oil spills throughout its range. The most serious threat to the southern sea otter still is a major oil spill from a tanker in the waters in the vicinity of its range. However, factors responsible for the recent decline in the population (1995-1998) are currently also of great concern.

Standardized population surveys that began in 1982 have continued. The USGS/BRD, the CDFG, and the Service again conducted the spring and fall population surveys in 1998. Spring counts are consistently higher than fall counts, and this is thought to be the result of more favorable sighting conditions in the spring than in the fall. The area surveyed included the entire 220-mile long established range of the southern sea



*An observant sea otter*

USFWS photo by Mike Boylian

otter, from Point Ano Nuevo in Santa Cruz County to the Santa Maria River in San Luis Obispo County, plus additional peripheral habitat. Based on the spring 1998 survey, the total sea otter count is 5.2 percent below the spring 1997 count and down about 10 percent from the peak count in 1995 (Table 13). Most otters were sighted between Ano Nuevo, San Mateo County, and Avila Beach, San Luis Obispo County. Concern over the apparent decline in the southern sea otter population is heightened by two consecutive years of record high mortality (as indicated by beached sea otter carcasses).

*Translocation of Southern Sea Otters*  
Between 1987 and 1990, 139 southern sea otters (31 males, 108 females) were translocated to San Nicolas Island, offshore southern California, in an effort to establish a second breeding colony. The purposes for establishing a second colony were two-fold: (1) reduce the possibility that any single natural or human-caused catastrophe would decimate the entire population; 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 provided authority and established the guidelines for carrying out the translocation program. The regulations designating the colony as an experimental population (50 CFR 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 otter surveys are conducted at San Nicolas Island every other month by the USGS/BRD. During 1998, counts of independent otters ranged from 12 to 17. From the beginning of the translocation program through the end of 1998, a total of 50 pups are known to have been born at the island. Because pups are not marked, an assessment of recruitment into the population is difficult to ascertain. Reproduction at the island is continuing as three different pups were observed there during 1998.

**Table 13. Comparison of Southern Sea Otter Counts Conducted Since the Spring of 1982.<sup>a</sup>**

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
1998	Spring	1,955	159	2,114
	Fall	1,726	211	1,937

<sup>a</sup> In 1992, all survey data since Fall 1982, were reviewed and counts corrected as appropriate.

<sup>b</sup> CDFG aerial survey with ground truth stations.

<sup>c</sup> Experimental.

#### *Containment*

The containment program was designed to prevent sea otters from colonizing the Management Zone through a cooperative effort between the Service and the Department. The containment operation, as outlined in the Translocation Plan and the Service's Containment Plan, consisted 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 San Nicolas Island, 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 San Nicolas Island. 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 off the mainland. Concern was raised regarding the requirement that sea otter containment activities were being conducted by non-lethal means. An evaluation of containment techniques proved to be inconclusive, and recommendations were made to continue sea otter containment activities with modifications, including the use of radio telemetry to monitor the otters better and increasing the post release monitoring effort. However, this increased effort required additional funding which was not available. Since 1993, sea otter containment activities have been limited due to the unavailability of funds within both the Service and the CDFG. In 1996, the CDFG notified the Service that because of changing program priorities they would not be able to assist the Service with containment efforts, should they become necessary. The Service and the CDFG continued working together taking occasional reports of sea otters in the Management Zone but efforts to capture and relocate these animals are not being made.

On March 13, 1998, 25-30 sea otters were reported in the Management Zone; the number increased to over 100 by May 8, 1998. By October, only four otters were observed in the Management Zone. In late December 1998, the Service received notice that 50 otters were again in the area.

While the Service is sensitive to the concerns of the fishing community and other potentially affected parties, the large influx of otters into the Management Zone was an unusual occurrence not previously seen in the Management Zone. The Service is being necessarily cautious in its approach to resolve the situation in light of the continuing decline of the parent population and the potential adverse effects of relocating such a large number of individuals out of the Management Zone back into the parent population. The Service notified Congressional representatives and stakeholders regarding this dilemma. In August 1998, two public meetings were held to discuss the situation and subsequent actions the Service might take. At these meetings, the Service identified two documents that needed to be prepared before a decision could be made regarding future actions: (1) a biological opinion considering the

question of whether containment of sea otters in the Management Zone is likely to jeopardize the continued existence of the species; and (2) an evaluation of the Southern Sea Otter Translocation Program.

#### *Law Enforcement*

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

Three sea otters were known to have died of gun shot wounds during 1998. These animals likely represent a fraction of southern sea otters killed annually by malicious activities. Two other dead otters were found with healed bullet wounds that were not the cause of death. As of the end of 1998, six incidences of shooting are currently under investigation by Service law enforcement agents. However, evidence required to bring such cases to court is often lacking.

#### *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 in past years. The State of California entered into a cooperative agreement with the NMFS to assist with the monitoring program required under the 1988 amendments to the Act. In Monterey Bay and Morro Bay, up to three NMFS observers had been stationed to document incidental take, but no observers were used in 1998. From June 1982 to December 31, 1998, a total of 75 otters have been observed or otherwise known to have drowned in legally set commercial fishing nets (Table 14).

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 only a small

**Table 14. Summary of the Minimum Number of Southern Sea Otters Known to Have Drowned in Legally Set Commercial Fishing Nets, 1982-1998.**

<i>Year</i>	<i>Minimum number of sea otters drowned in legally set commercial nets</i>
1982	6
1983	6
1984	16
1985	12
1986	3
1987	5
1988	5
1989	11
1990	9
1991	0
1992	0
1993	1
1994	1
1995	0
1996	0
1997	0
1998	0
<b>Total</b>	<b>75</b>

number of sea otters use waters deeper than 30 fathoms. Based in part on that information, the Service recommended to the NMFS that a 30 fathom closure be implemented to 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.

In 1998, there was no observer program. However, the NMFS completed a draft report evaluating the potential take of harbor porpoise and sea otters by the halibut fishery. In 1995, halibut fishing effort shifted from offshore Santa Cruz coast to southern Monterey Bay. Based on several assumptions, the draft report estimated that in 1998, about 40 sea otters may have died in halibut nets. However, actual mortality has not been documented.

The small group of sea otters (approximately 16), 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 there are no restrictions of gill or trammel net fishing for the protection of sea otters. Access to this area is difficult and therefore it is not



typically covered by the NMFS observer program. The CDFG has chosen not to close the area because, at present, 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 continues to be of 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 uses 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 (see below).

A live finfish (trap) fishery is increasing along the California coast. Traps for finfish are set within the kelp beds near shore. In areas where this fishery occurs, the number of sea otter beach cast carcasses has increased. The Service is concerned about the potential impact from this fishery on the southern sea otter population. Funding has been transferred to USGS/BRD to study the potential for sea otter entrapment and to implement an observer program to determine if sea otters are dying in trap gear.

#### *Sea Otter Mortality*

Over 100 sea otter carcasses wash ashore every year. In 1998, 213 southern sea otter carcasses were recovered from beaches. This represents a record high for number of recovered beach cast carcasses and is equivalent to 10.1 percent of the spring population count. The previous record of 179 carcasses was set in 1996 (7.9 percent of the spring count).

The 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. In 1998, the necropsy program at the NWHC continued at the same level of coverage as in 1997, that is, only 25 percent of recovered carcasses were necropsied due to other program and budget demands. Causes of mortality among necropsied animals have not significantly changed since 1994 when most sea otter deaths were attributed to infectious diseases (42 percent). These diseases include coccidioidomycosis (6.8 percent), acanthocephalan peritonitis (15.9

percent), protozoal encephalitis (11.4 percent), and other diseases (7.9 percent). Other sources of mortality include various types of trauma such as shark bite and lacerations (18.2 percent), emaciation (11.4 percent), tumors (3.4 percent), and various conditions of mechanical or functional impairment such as esophageal impaction, intestinal perforation, and intestinal volvulus (9.1 percent). The cause of death of 15.9 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.

Rehabilitated sea otters that lack the skills to survive in the wild are placed in permanent housing in a number of facilities. During 1998, those facilities included the Monterey Bay Aquarium, Sea World of San Diego, Oregon Coast Aquarium, the New York Aquarium, and the Long Beach Aquarium of the Pacific.

#### *ESA 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 two requests for formal consultation: (1) the Environmental Protection Agency initiated consultation on minimum concentration levels for numerous toxic chemicals on a suite of endangered and threatened species, and 2) the Service reinitiated consultation on continuing the containment program (established as part of the Southern Sea Otter Translocation Program).

#### *ESA Section 6 Funds*

Section 6 funds (\$60,000) were granted to the CDFG for the southern sea otter in 1998 to study infectious diseases that may be contributing to the sea otter population decline.

#### *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 CDFG.

Ramifications of both Federal and state legislation has yet to be realized or applied to the existing document. The Service, in coordination with the CDFG, plans to update and make final the contingency plan in 1999.

#### *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. A minimum estimate of 8-12 million gallons of diluent have been released into the soil, ground water, and local marine environment in the past 34 years. In the past year, characterization of non-petroleum contamination has begun at this site. In the first screening of contaminants, PCBs were found in some diluent plumes throughout the oil field. A site of particular concern is the PCB contaminated 5X diluent plume located on the beach. This plume has been documented to release diluent, and apparently PCBs, into the ocean on several occasions in the past. Full characterization of contamination throughout the oil field continues. 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.

#### *Avila Beach Oil Spill Settlement*

Unocal and the trust resource agencies, the Service and the Department, reached a settlement agreement for \$100,000 to be used for sea otter restoration activities resulting from natural resource damages sustained during the 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.

Three restoration projects have been selected and the projects will begin early in 1999. The projects are: (1) Establishing the Factors That Affect Survivability of Wild and Rehabilitated Sea Otters; (2) Baseline Health Studies:

Part I: Baseline Health Studies on Southern Sea Otters and Comparison to Otters Injured in the Avila Beach Unocal Spill; and (3) Part II: Analysis and Comparison of Existing Blood Samples for Polycyclic Aromatic Hydrocarbons (PAH) by Enzyme-Linked Immunosorbent Assay (ELISA) and Gas Chromatography Mass Spectroscopy (GCMS). A copy of the final restoration plan is available from the Land Conservancy of San Luis Obispo County's web page ([http://www.slonet.org/vv/land\\_con](http://www.slonet.org/vv/land_con)).

### **West Indian Manatee**

The West Indian manatee in Florida represents the northern most and largest remaining component of a manatee population once found throughout the Caribbean basin. Physically isolated from its counterparts, the manatee in Florida has historically been viewed as rare and declining in number. Because of this perception, 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 of 1973, and the Act.

Manatee research and management initiatives over the past thirty years 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 an increasing human population, development, and use of watercraft underscores the importance of addressing the needs of the manatee through the cooperation of its human neighbors.

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 efforts. 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 have played an integral role in the manatee recovery process.

### *Status*

While most authorities agree that the present size of the manatee population has increased over the past few decades, the extent to which this has occurred is unknown. It has been suggested that this growth may be 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 relatively recent existence of non-natural warm water refuges, the establishment and enforcement of manatee protection zones, and public education. Despite this apparent increase, a rising number of human-related manatee deaths and chronic loss of essential manatee habitat to coastal development will have a significant effect on the future of this species.

The 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. One statewide survey was flown in 1998. This survey, flown on January 29-30, 1998, yielded a count of 2,022 manatees. Surveys conducted between 1991 and 1998 produced high counts ranging from 1,465 to 2,639 animals. It is difficult to determine trends in population size based on these surveys because of highly variable survey conditions and other factors.

A total of 243 manatees are known to have died in 1998. Included in this year's mortality were sixty-seven manatees that died from watercraft collisions, nine crushed and killed in flood gates and water control structures, and seven that died from other human-related causes. 1998 was the worst year on record for total number of human-caused manatee deaths.

### *Management*

Manatee behavior and habitat condition have been closely monitored for more than twenty 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 GISs. These data are used to develop population models and to assist Federal, State, and local agencies to protect manatees from direct threats such as watercraft and water control structures and from indirect threats such as habitat loss.

Service efforts include a variety of initiatives that protect manatees and manatee habitat. These include Section 7 of the ESA, the Service's authority to designate sanctuaries, law enforcement, etc. The Section 7 process involves a Service review of Federal actions for impacts to listed species, including the manatee. When it is determined that an action is likely to jeopardize the continued existence of manatees, the Service suggests reasonable and prudent alternatives to the action agency to eliminate these effects.

Comprehensive manatee protection plans are being developed on a countywide 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 thirteen counties involved in this process have either permanent or interim countywide speed restrictions in effect and the remaining county is partially protected in certain critical areas. The counties are also addressing guidance on boat facility siting, recommendations for limiting boat densities in certain areas, sea grass protection, etc. 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.

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 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. By the end of 1998, four structures where significant numbers of manatees had been crushed were fitted with these devices. The Service has reviewed and commented on SFWMD and Corps proposals through Section 7 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.

A permanent sanctuary was designated in the Service's Crystal River National Wildlife Refuge at Three Sisters Springs. The spring run 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. Sheer numbers of visitors and the undisciplined actions of a few individuals cause these animals to leave



USGS/BRD

*A Florida manatee surfacing to breathe.*

the area at a time when they rely on the warm water. To minimize harassment, a sanctuary was created to give manatees a warm water area free from visitors. The FDEP also designated sanctuaries in 1998 at two power plant effluents in Titusville, Florida, to reduce harassment created by recreational fishermen fishing in these discharges.

In order to reduce the number of deaths and injuries associated with watercraft, the Service was involved in efforts to improve boater compliance with speed zone measures in sensitive manatee areas. These efforts included increasing Federal enforcement activities in zones throughout the State. The U.S. Coast Guard, in partnership with the Service,

took steps to better patrol these areas and law enforcement task forces were developed to patrol high mortality areas in Brevard and Volusia counties in Florida. Service officers stopped more than a thousand violators and issued more than 300 citations to boaters caught speeding in manatee protection areas. U.S. Coast Guard boarding officers issued 260 tickets throughout Florida to boaters violating manatee speed zones.

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 1998, thirty-three rescues were conducted. These rescues included

six manatees suffering from cold stress, 10 manatees that were entangled in fishing gear, three animals struck by boats, three orphaned calves and 11 animals rescued for other reasons. 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. A newly authorized out-of-state facility, Sea World of California, opened a new manatee rehabilitation facility in 1998 to take care of manatees requiring long term rehabilitative care. Fifty manatees were in rehabilitation facilities at the end of 1998.

The Service funded a study to better assess the extent to which manatees are entangled in fishing gear. Researchers reviewed manatee mortality, rescue, and photo-id records dating from 1974 and identified the number of manatees that either died, were rescued or bore scars from interactions with fishing gear. One hundred and thirty-three incidents were listed. These included 63 deaths and 70 rescues. Fifty of these incidents involved pots associated with the blue crab fishery. Monofilament ingestion and entanglement accounted for 21 events, while lines, nets, and hooks were responsible for 32 other events. Entanglement scars were observed on 20 individuals.

A contingency plan for catastrophic manatee rescue and mortality events was completed in 1998. 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 1998, progress was made toward this goal. Recovery team members furthered efforts to reduce watercraft 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 and Other Marine Mammal Activities on Pacific Islands

*Pacific/Remote Islands National Wildlife Refuge Complex Activities*  
Service staff of the Pacific/Remote Islands National Wildlife Refuge (NWR) Complex worked closely with NMFS personnel to aid in the recovery efforts of Hawaiian monk seals. The greatest efforts involved the sharing of Service facilities and equipment by NMFS personnel operating at Laysan Island and French Frigate Shoals. These research teams were provided transportation on refuge-funded charters, food, equipment, boat supplies, and volunteer assistance. Radio and telephone communications were also provided without fee. Service personnel assisted NMFS personnel in conducting population surveys, production estimates, tagging efforts, re-sighting of marked seals, reporting seals entangled in marine debris, deployment of satellite tags and critter-cams.

Service staff also assisted in the translocation of two male seals from French Frigate Shoals to Johnston Atoll NWR in an effort to mitigate male seal aggression. Staff on Johnston Atoll NWR provided continued observations and reporting to the NMFS.

The Service continued to work with Corps to finalize plans for sea wall restoration at Tern Island. The design for improving the sea wall while reducing seal entrapment has been finalized and progress is underway to begin this seal wall repair project in FY 1999.

Service Environmental Contaminants biologists have worked with U.S. Coast Guard and NMFS personnel to identify, isolate and clean-up contaminated areas at French Frigate Shoals. Progress on this problem continues into 1999, and could have serious implications on the long-term health and vigor of the seal populations of the French Frigate Shoals.

Observations were also made and recorded by Service personnel for other marine mammal species. Spinner dolphins, bottlenose dolphins, and humpback whale sightings were reported during expeditions to all outer islands as well as at camps on Laysan, Tern Island, and Palmyra.

Marine debris clean-up efforts were done at French Frigate Shoals in cooperation with 13 other agencies. Removal of more than 8 tons of netting, plastic, and other debris was accomplished in an effort to



USFWS photo by Jim Leapold

*Hawaiian monk seal*

reduce wildlife entanglement. Hawaiian monk seals, as well as green sea turtles and other wildlife species, should receive significant benefits from this effort.

### *Midway Atoll National Wildlife Refuge Activities*

#### *Hawaiian monk seal (Monachus schauinslandi)*

The following activities were conducted under NMFS Permit No. 1029 and Fish and Wildlife Special Use Permits MID-03-97 and MID-03-98.

In 1998, personnel from the Refuge, NMFS, Hawaii Wildlife Fund, and Oceanic Society assisted in the recovery of the Hawaiian monk seal population at Midway Atoll by: (1) monitoring population numbers; (2) identifying, by tagging and bleach-marking, individual seals to assess level of inter-atoll movement; (3) recording beach use patterns; (4) photo/video documenting seal behavior; (5) determining prey preference by collecting and analyzing scats and spewings; (6) obtaining biopsy samples for dietary analysis; (7) obtaining blood and fecal samples and bacterial swabs from seals for health assessment; (8) studying potential conflicts between monk seals and a shore-based sport fishery; and (9) inventory and removal of nets and marine debris capable of entangling wildlife from the atoll's reefs.

#### *Midway Atoll's Hawaiian Monk Seal Population Summary*

Midway Atoll has a resident population of between 50-60 seals; 11 pups born in 1998.

Overall, the population trend is increasing, recovering from almost complete extirpation from the atoll in the 1960s.

*Spinner Dolphin (Stenella longirostris)*  
The following activities were conducted under the NMFS's General Authorization No. 31 and Fish and Wildlife Special Use Permit MID-07-96.

In 1998, personnel from the Refuge, Oceanic Society and Texas A&M University conducted the second year of a research project designed to assess impacts of human activities on Midway's spinner dolphins. The objectives of the study are: (1) assess abundance and distribution of dolphins; (2) determine habitat use; (3) determine size, composition and social structure of dolphin groups; (4) develop photo-identification files for the population; (5) develop year-round activity patterns; and (6) evaluate dolphin behavior to detect any possible dolphin/human conflicts and make management recommendations to make sure that activities of humans and dolphins at Midway Atoll are compatible.

Midway Atoll's resident spinner dolphin population is estimated at 100-180 animals. The population seems to be stable.

#### *Midway Atoll NWR Funding*

The Service contributions to the above activities were funded through the normal refuge operations budget. No specific funding from other sources was received.

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

