

Administration of the Marine Mammal Protection Act of 1972

JANUARY 1, 1987 TO DECEMBER 31, 1987



U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
WASHINGTON, DC 20240



Administration of the
MARINE MAMMAL PROTECTION ACT OF 1972
Annual Report
January 1, 1987 - December 31, 1987

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DEPARTMENT OF THE INTERIOR
U.S. Fish and Wildlife Service
MARINE MAMMAL PROTECTION ACT

Report of the Department of the Interior

The Marine Mammal Protection Act of 1972, as amended (16 U.S.C. 1361-1407, 86 Stat. 1027 (1972), 95 Stat. 979 (1981), 98 Stat. 440 (1984), and 100 Stat. 3741 (1986)) 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 this 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(11)(B) 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 (manatee and dugong). Accordingly, published herewith is the report of the Department of the Interior for the period of January 1, 1987, to December 31, 1987, on the administration of the Marine Mammal Protection Act with regard to those mammals.

Issued at Washington, D.C., dated JUN 21 1988


Director

ADMINISTRATION OF THE MARINE MAMMAL PROTECTION ACT OF 1972

January 1, 1987 - December 31, 1987

Report of the Department of the Interior

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INTRODUCTION

AUTHORITY

The passage of the Marine Mammal Protection Act of 1972, hereafter referred to as the Act, gave the Department of the Interior responsibility for manatees, polar bears, walruses, sea and marine otters, and dugongs. Within the Department of the Interior, the Fish and Wildlife Service (Service) is responsible for managing these marine mammals and for enforcing the moratorium on taking and importing marine mammals and marine mammal parts.

The Service administers requests for waiving the moratorium and for the transfer of management authority to States, issues permits, conducts research programs, enforces provisions of the Act, publishes rules and regulations to manage marine mammals, 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-related responsibilities and maintains a close working relationship with the Marine Mammal Commission and its Committee of Scientific Advisors.

General information on distribution and migration, abundance and trends, general biology, ecological problems, allocation problems, regulations and research can be found in the 1979 annual report. Thus, it is not repeated here. There were no significant changes during this report period in the status of any of the species of marine mammals whose management is the Service's responsibility.

SPECIES LIST

Species List with the Status of Marine Mammals with Service Jurisdiction
Under the Marine Mammal Protection Act and the Endangered Species Act

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

APPROPRIATIONS

The most recent funding authorization by Congress for the Service was under Section 114 of the amended Marine Mammal Protection Act (16 U.S.C. 1361-1407, 86 Stat. 1027 (1972); 95 Stat. 979 (1981) for Fiscal Year (FY) 1984; and 98 Stat. 440 (1984) for Fiscal Years 1985 through 1988). The Calendar Year (January 1, 1987 - December 31, 1987) covered by this report, however, overlaps FY 1987 and FY 1988, and funds authorized and appropriated for both fiscal years are shown below.

Reporting Year (January 1 to December 31, 1987) Funding (in \$000):

	<u>Marine Mammal Protection Act Section 114</u>	
	<u>Authorized</u>	<u>Appropriated</u>
Fiscal Year 1987	\$3,000	\$2,355
Fiscal Year 1988	\$3,000	\$2,819



A West Indian manatee cow and her calf. U.S. Fish and Wildlife Service photo.

Distribution of appropriations (in \$000):

	Actual FY 87	Appropriated FY 88
<u>Marine Mammal Protection Act</u>		
Research and Development		
Alaskan sea otter	\$ 190	\$ 311
Southern sea otter	250	300
Walrus	200	298
Polar Bear	<u>770</u>	<u>867</u>
Total Research	<u>\$1,410</u>	<u>\$1,776</u>
Management		
Permit activities	\$ 25	\$ 25
Law enforcement activities	544	492
Other management activities	<u>376</u>	<u>526</u>
Total Management	<u>\$ 945</u>	<u>\$1,043</u>
Grand Total		
	<u>\$2,355</u>	<u>\$2,819</u>
<u>Endangered Species Act</u>		
Section 6 (Grants-to-States)		
California - Sea otter	\$ 102	\$ 101
Florida - Manatee	<u>115</u>	<u>75</u>
Total Section 6	<u>\$ 217</u>	<u>\$ 176</u>
Section 15		
Research and Development		
Endangered/threatened otters	\$ 362	\$ 397
Manatee	310	310
Monk seal	<u>2</u>	<u>2</u>
Total Section 15 Research	<u>\$ 674</u>	<u>\$ 709</u>
Management		
Endangered/threatened otters	\$ 449	\$ 600
Manatee	31	75
Monk seal <u>1/</u>	<u>25</u>	<u>0</u> <u>2/</u>
Total Section 15 Management	<u>\$ 505</u>	<u>\$ 675</u>
Grand Total		
	<u>\$1,396</u>	<u>\$1,560</u>

1/ Although the National Marine Fisheries Service has primary responsibility for monk seals, the species utilizes the Hawaiian Islands National Wildlife Refuge and Johnston Atoll National Wildlife Refuge, thereby becoming a management responsibility of the Service pursuant to the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee).

2/ \$25,000 appropriated for monk seal activities on the Hawaiian Islands National Wildlife Refuge under authority of the National Wildlife Refuge System Administration Act. This funding is part of the \$200,000 add-on in FY 1988 for Tern Island.

SUMMARY OF 1987 PROGRAM

OUTER CONTINENTAL SHELF OPERATIONS AND ENVIRONMENTAL STUDIES

The Service participates in the Department of the Interior's Outer Continental Shelf Development Program primarily by providing advice, review, and input at various stages in the leasing, exploration, and development process. The Service provides technical expertise on the management of fish and wildlife resources and related habitat.

During the report period, the Service participated in several lease sale processes and reviewed measures for the protection of marine mammals and other species. The Department of the Interior held two oil and gas lease sales, both in the Gulf of Mexico: Central Gulf of Mexico (Sale 110, April 1987), and the Western Gulf of Mexico (Sale 112, August 1987). Neither sale will impact marine mammals.

In addition, the Service reviewed the combined Environmental Impact Statements for proposed Sales 113, 115, and 116 in the Gulf of Mexico and Sale 109 in the Chukchi Sea, Alaska. The West Indian manatee may be involved in Sale 116, while the walrus and polar bear may be involved in Sale 109. The Sale 109 area lies adjacent to several units of the Alaska Maritime National Wildlife Refuge, which contains major sea bird colonies that could be affected by the lease sale and related activities. The potential impacts of oil spills, noise, and other disturbances to polar bear and walrus are discussed in the Sale 109 Environmental Impact Statement. The combined effects on these species from activities associated with the proposal are expected to be minor. Also, formal consultation under Section 7 of the Endangered Species Act was initiated in December 1987 on the potential impacts of Sale 91 on the southern sea otter. The consultation continued into 1988.

RESEARCH AND DEVELOPMENT

The National Ecology Research Center (Fort Collins, Colorado), Cooperative Fish and Wildlife Research Units Center, and Alaska Fish and Wildlife Research Center (Anchorage, Alaska) conducted research in FY 1987 under the Act. Emphasis was given to determining the ecological effects of human activities related to development and exploitation of the marine environment on marine wildlife and ecosystems. Research conducted or managed by the Service during FY 1987 is summarized below.

Service-Conducted Research

1. Polar bear

- a. Determine the distribution, timing, and importance of polar bear denning in northern Alaska.

Eleven dens were located in Alaska by radio telemetry during the 1987 fiscal year. An additional nine dens were located during the autumn of 1987. A paper, "Marine Denning of Polar Bears in Alaska," was presented at the 7th Biennial Conference on the Biology of Marine Mammals in Miami in December 1987. A manuscript, "Alaskan Polar Bear Denning," is currently in preparation. In FY 1988, a manuscript describing polar bear maternity denning will be prepared for submission to the journal Arctic.

- b. Determine interrelationships between sea ice habitats and polar bear distributions in the Bering and Chukchi Seas in western Alaska.

Locational data for polar bears were integrated into a Geographical Information System in FY 1987. Sources of remote-sensed ice data and other digitized ice data will be located in FY 1988 to use the Geographical Information System for assessing habitat/polar bear interrelationships.



A polar bear on the Arctic National Wildlife Refuge, Alaska. U.S. Fish and Wildlife Service photo by Dave Olson.

- c. Determine population definition and estimation of survival, recruitment, and numbers of polar bears in northwestern Alaska.

Collection of mark/recapture population data continued in the northern Bering Sea and the eastern Chukchi Sea during March-April 1987. Satellite telemetry collars were deployed on 13 female polar bears. Telemetry data to date indicate that Alaskan Bering/Chukchi Sea polar bears move north and northwest with the retreating ice pack in spring, summer, and fall. These polar bears occupy international and Soviet territorial waters during this time period. Western Alaska polar bears are apparently seasonally shared with the Soviet Union. Mark and recapture, and satellite telemetry data collection will continue during FY 1988. Differences in carbon/nitrogen ratios of material taken from polar bear claws show promise for use in population definition; refinement of the techniques will continue in FY 1988. Analysis of mitochondrial DNA for use in population definition will also continue in FY 1988.

Line transects, belt transects, and a stratification scheme for censusing polar bears in the Chukchi and Beaufort Seas were tested in FY 1987. Preliminary results indicate density of transects influences survey results. Analysis of survey data will be completed and a report of the results will be prepared in FY 1988. Initial contacts were made with Soviet scientists in FY 1987 and proposals for joint U.S./Soviet research on polar bears in the Bering and Chukchi Seas will be prepared in FY 1988.

- d. Determine relationships between polar bears, sea ice movement and condition, and pagophilic seals.

New information regarding polar bear/sea ice-prey relations was gathered in spring 1987. Using trained dogs to locate seal structures in the ice, the Service obtained a first assessment of prey selection by polar bears in the pack ice environment. A paper summarizing that effort, "Predation on Ringed Seals in the Western Beaufort Sea," was presented at the 7th Biennial Conference for the Biology of Marine Mammals in December 1987.

- e. Determine population definition and estimation of survival, recruitment, and numbers of polar bears in the Beaufort Sea.

Unusual ice conditions in 1987 resulted in polar bear movement patterns not previously observed. The ramifications of these patterns for population identification will be further assessed in 1988.

Preliminary studies of commensal algae in the hair of polar bears and the stable carbon/nitrogen isotope ratios in claw tissue show promise of helping to distinguish polar bear stocks. Development of mitochondrial DNA techniques was advanced in 1987. All of these projects will be continued in 1988.

2. Southern sea otter

a. Ecological studies of sea otters and other marine mammals.

Range-wide counts were completed during November 1986 and May 26 - June 5, 1987, when 1281 and 1650 sea otters were counted, respectively. Weekly searches of the northern San Luis Obispo County, California, area were made to re-identify individual sea otters. Observations on the duration of foraging and diet were completed on sea otters in the Point Piedras Blancas area, and are continuing near Point Buchon. Monthly beach walks along a 10-mile section of coast in northern San Luis Obispo County were completed to document marine mammal and bird mortality.

b. Interactions between sea otters and nearshore communities.

Field research continued in FY 1987 in the following areas: (1) baseline sampling at San Nicolas Island; (2) special focus ecological studies at San Nicolas Island; (3) large-scale nearshore community descriptions in central and western Channel Islands; (4) kelp forest ecology in central California; and (5) establishment of baseline stations in the State of Washington and the Province of British Columbia. Data have been entered on microcomputers and are being analyzed for publication.

A final report on subtidal surveys of kelp forests was prepared for the Marine Mammal Commission. A final report on demography of intertidal mussel populations in Prince William Sound, Alaska, was prepared for the National Geographic Society. Thirteen papers were published in journals and symposia; 11 manuscripts were submitted for publication and one paper was presented at a regional meeting.

c. Pre-and post-ecological studies and translocation of sea otters to San Nicolas Island.

Pre-translocation capture and radio-implantation were successfully completed and baseline studies started on the movements, time budgets, and foraging characteristics of sea otters along the central California coast. The actual translocation of sea otters from the central coast to San Nicolas Island was initiated.

Between January and June 1987, thirty sea otters were captured and implanted with radio transmitters along the central California coast. Locations for the radio-tagged sea otters were determined from 2 to 3 times per week and 72-hour continuous time budget data were collected on 16 individuals. During 1987, 108 otters were captured along the mainland coast for possible translocation. A total of 64 sea otters were kept and transported to the Monterey Bay Aquarium, where three died and one was returned to its capture site. Fifty-one sea otters were flown to San Nicolas Island from the Aquarium in four groups between August 24 and September 30. Three sea otters died during this period at the Island. Nine more otters were flown to San Nicolas Island by the end of 1987.

3. Alaska sea otter

- a. Determine annual and seasonal distribution, abundance, and composition of populations of sea otters and other mammals in Prince William Sound, Alaska.

This work unit was completed. A report titled "Sea Otters of Prince William Sound, Alaska," was completed as part of a contract with the Alaska Fish and Wildlife Research Center. A manuscript titled, "Reproductive Characteristics of Female Sea Otters," is in draft form and will soon be in the review process.

- b. Provide the biological information necessary to establish zonal management for sea otters in Alaska.

This study is designed to examine movements, mortality, and reproduction of sea otters at Kodiak Island. Forty-five sea otters (30 female, 15 male) were implanted with radio transmitters and their locations documented using boats and fixed-wing aircraft. Overall, females have been more sedentary than males although almost all the marked sea otters have remained within the core study area. Only two males have had extreme distance movements longer than 35 km. There was a pronounced shift of males into protected bays during the fall of 1986 and an exodus from the wintering grounds in March 1987. Male sea otters typically form large, persistent groups at Kodiak Island but the locations of these groups may vary from year-to-year as they did in the summers of 1986 and 1987. Capture and tagging of sea otters at Kodiak Island and sighting of relatively few white-headed animals reinforce suspicions that the population of sea otters at northern Kodiak Island is a young one.

An unusual peak in mortality of sea otters was documented at Kodiak during summer, 1987. Fifty-nine carcasses of sea otters were found by, or reported to, Alaska Fish and Wildlife Research Center biologists between early June and late August. The majority of recovered carcasses were of males, spanning several age classes. The cause of death is unknown at present, but paralytic shellfish poison has been hypothesized as an agent.

Funds were provided to personnel of the University of Minnesota to support an intensive study of movement and reproduction of sea otters in eastern Prince William Sound. A new, small radio transmitter that can be attached to flipper tags was tested on sea otters at Kodiak Island and Prince William Sound.

- c. Determine interactions between sea otters and fisheries in Alaska.

Research was continued at Kodiak Island along two fronts: (1) a description of sea otter diets with an emphasis on the importance of commercial species of shellfish, and (2) an investigation of the impacts of foraging by sea otters on subtidal benthic communities. Foraging data were collected on otters of various sex and age classes in the northern Kodiak Island and northern Afognak Island areas. More than

2,000 feeding dives were observed. Sea otter diets were diverse although various clams, principally Saxidomus giganteus, Mya spp., and Macoma spp. formed the overwhelming majority of the diet. A marked contrast was observed in the size of clams taken by sea otters at northern Kodiak versus northern Afognak Island. Long-standing and heavy predation by sea otters on clams in the northern Afognak Island area is suspected to have reduced the size of clams in that area. A similar contrast in density was documented by SCUBA divers between the two areas. Divers established permanent sampling stations in several areas presently unoccupied or recently occupied by sea otters. Potential prey items were quantified and measured in each area to provide baseline data for further analyses.

Surveys of a known population of simulated sea otters (i.e., inflated brown plastic garbage bags) were undertaken using line and strip census techniques to assess the suitability of various survey techniques and platforms. An additional repetition of the study will occur in winter



A white, three tusked walrus (lower center). U.S. Fish and Wildlife Service photo.

1988 before analysis and reporting. Sea otter and sea otter-free habitat on the south side of Kodiak Island were surveyed in October 1987. Much of the sea otter-free habitat is still devoid of sea otters.

Currently, both commercial fisheries and tourism data bases are being compiled and analyzed to evaluate which regions in coastal Alaska are important to these industries. These data will eventually be used in the consideration of proposals for the establishment of management zones. Completion of this project is expected in 1988.

- d. Provide basis for estimating sustained yield and devise means to regulate population size and dispersal relative to management of sea otters in North America.

Surveys of populations of sea otters in southeastern Alaska were completed during summer 1987. All existing populations are growing rapidly at an overall finite rate of about 1.18 per year since 1975. More than 3,500 sea otters were counted in southeastern Alaska in five populations in 1987 from an original 402 animals released between 1965 and 1968. Plans are underway for an experimental manipulation of one or more sea otter populations in southeastern Alaska to test hypotheses related to range expansion and, hence, zonal management. Such a manipulation may occur in concert with a proposed transplant of sea otters to British Columbia.

4. Walrus

- a. Develop techniques to monitor movements for population assessment, haulout patterns, determine age/sex composition and behavior, and refine population estimates.

Satellite transmitters will yield data concerning spatial and temporal distribution and haulout behavior of Pacific walrus that are necessary to quantify biases in the joint U.S.-USSR walrus survey results. To develop a functional satellite telemetry system for walrus, transmitter pressure housings were designed and evaluated, the new immobilizing drug Telezol was evaluated, three methods of drug delivery were tested, and a quick and reliable attachment technique was developed during the first field season at Round Island, Alaska. Three VHF radio transmitters were deployed as well as a prototype satellite transmitter incorporating a saltwater switch to sense the amount of time hauled out and to control signal transmission. Two more prototypes that include a pressure sensor in addition to the saltwater switch are currently being tested. Locations from the deployed prototype transmitter are being plotted and haulout data will be analyzed in conjunction with the Geographical Information System for factors affecting haulout patterns. In FY 1988, Telezol will be evaluated further, and the feasibility of attaching a satellite transmitter to the tusk of a female walrus hauled out on pack ice will be investigated.

A project was begun to evaluate the age composition, reproductive status and food habits of walrus taken in the spring village subsistence harvest of 1985, and the ages of animals harvested in 1986 and 1987.

Under the Marine Mammal Project of the U.S./USSR Environmental Protection Agreement, and in cooperation with the University of Alaska and the National Marine Fisheries Service, walrus project personnel participated in a walrus harvesting and research cruise to the Chukchi Sea aboard a Soviet ship. Data were collected on age and sex composition of groups hauled out on the ice, body size and condition, reproduction, food habits, and samples were collected for aging, mitochondrial DNA and virological analysis.

5. Manatee and Dugong

a. Ecological studies of manatees and dugongs.

Longitudinal life history studies successfully continued, with winter field work carried out at Blue Spring and Crystal River. Scar cataloging efforts intensified on Florida's east coast. Radiotelemetry field work was completed in Fort Myers and initiated on the east coast. The experiment with satellite-monitored transmitters in Fort Myers was completed with as much as 20 months remote data collection from one individual. Argos-generated locations were plotted and analyzed with preliminary results presented at the Argos users' conference. Manatee VHF telemetry locations in southwestern Florida were digitized and integrated with digitized maps provided by the National Wetlands Research Center. A total of 18 manatees was radio-tagged on Florida's east coast, and seasonal habitat use is being determined. The Hobe Sound grassbed study was implemented by the National Marine Fisheries Service and Florida Department of Natural Resource cooperators, and Sirenia Project Staff. Stomach content analysis continues for dead manatees salvaged on Florida's east coast.

Warm season movements and habitat use of manatees wintering at the Fort Myers power plant were determined. Satellite-monitored telemetry has been proven operational and more successful on manatees than on any other marine mammal species. Radiotelemetry studies of manatees in eastern Florida and of dugongs in Queensland, Australia, were successfully initiated. Seagrass and food habits studies were successfully initiated in eastern Florida. Seven papers were presented at professional meetings and nine manuscripts were submitted for publication in FY 1987.

b. Development of decision support capability - microcomputer workstation for field office support (manatees).

A prototype "Decision Support System" to assist in biological consultations on the Florida manatee was initiated in FY 1987. Data elements include both biological and human use information. An initial

demonstration will occur in FY 1988. A geographic data entry component that will have wide applicability was transferred to personal computers in FY 1987.

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 National Marine Fisheries Service 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 National Marine Fisheries Service for its consideration and appropriate action. However, under a National Marine Fisheries Service/Service Memorandum of Understanding, the Service retains authority over those investigations that involve endangered or threatened species under the jurisdiction of the Department of the Interior. Violations are referred to the Department of the Interior's Office of the Solicitor for civil action or to the Department of Justice for criminal action.

One-hundred and ninety-five marine mammal investigations were pending as of December 31, 1986, and Service agents initiated 88 new investigations during 1987. Eighty-five marine mammal investigations were closed during the year, leaving 198 investigations pending as of December 31, 1987. Thus far, of those cases that have been adjudicated and entered into the Service's computerized information system, \$40,135 in fines have been imposed.

Agents worked closely with representatives of the Northwest Arctic Native Association concerning the use of aircraft in taking marine mammals. Although it is not expressly forbidden by the Act, the use of aircraft to hunt polar bear is a concern of both the Service and resource users.

Alaska Law Enforcement Actions

During this reporting period, the Service in Alaska opened 15 new cases, closed 27 cases, and left 62 cases pending. Most effort was concentrated in closing old cases.

Operation Taxidermy, one of the largest concerted efforts combating illegal commercialization of wildlife in Alaskan history, was terminated January 29, 1987. A specific target of this investigation was the unlawful sale, possession, and transportation of polar bear hides. The investigation also discovered a flourishing trade in walrus ivory and related products with an aggregate weight of approximately 800 pounds of items being seized on January 29, 1987. Agents spent a considerable effort during 1987 in prosecutions resulting from the operation. Fourteen defendants were tried or pleaded guilty from Operation Taxidermy which has resulted, so far, in \$61,600 in assessed fines, approximately \$17,000 in restitution to the Government, 7 years in jail time, and 25.5 years of probation time.

A case is presently being prosecuted involving "wasteful taking" which is significant because it is the first such case to be prosecuted in Alaska. The case involves the killing of six walrus near Cape Peirce by two Alaska Natives. The Natives took only a small amount of meat leaving the remainder of the carcasses on the beach.

PERMITS AND REGISTRATIONS

The Act prohibits the take or import of marine mammals and marine mammal products although exceptions may be made under permit for scientific research or public display. These permits may be issued only if it is determined by the Service that there would be no adverse effects on the health and well-being of the marine mammal species, populations, and their marine ecosystems. Registered agent permits may also be issued to authorize the buying and selling of raw marine mammal parts or products by non-Alaskan Natives (i.e., persons other than Alaskan Indians, Eskimos, or Aleuts) in narrowly defined circumstances. Registered tannery permits may be issued to enable marine mammal hides to be tanned to facilitate trade of these products among Alaskan Natives.

Section 104 of the Act authorizes the Director of the Service, acting on behalf of the Secretary of the Interior, to issue permits for scientific research and public display. Permitting provisions are set out in Title 50 of the Code of Federal Regulations -- 50 CFR 18.23(d) for registered agent/tannery permits and 50 CFR 18.31 for scientific research or public display permits.

During 1987, ten new permits for scientific research were issued, and two were amended and/or renewed. Five permits were issued for public display. Ten permits were issued for registered agent/tannery.

The following is a brief description of permit actions taken in 1987.

Scientific Research Permits

New Permits:

1. PRT-716284 was issued 6/11/87 to the Cousteau Society, Los Angeles, California, for filming and observation of polar bears, walrus, and sea otters in Alaska.
2. PRT-719453 was issued 8/12/87 to the California Department of Fish and Game to capture, tag, and translocate up to 20 sea otters to determine the influence of the release area and the release technique on their homing tendency (Phase I), and to test the feasibility of maintaining an experimental boundary to prevent dispersal of sea otters by using non-lethal containment methods and to capture, tag, and translocate sea otters that cross the designated experimental boundary (Phase II).

3. PRT-717318 was issued 8/12/87 to the Service's Portland, Oregon, office authorizing the capture, tagging, blood sampling, and tooth removal (one) of not more than 250 southern sea otters in California and their subsequent release or translocation.
4. PRT-708155 was issued 6/24/87 to the Service's Alaska Fish and Wildlife Research Center, Anchorage, Alaska, to capture up to 176 sea otters in the vicinity of Kodiak, Afognak, and Shuyak Islands, Alaska, for tagging, blood sampling, premolar extraction, lip tattoos, radio transmitter implants, and release.
5. PRT-684532 was issued 11/18/87 to the Service's San Simeon, California, Research Office to capture and release West Indian manatees in the U.S. and Puerto Rico for radio tagging, peduncle tagging, free-floating tether tags, tail-notching, freeze-branding, nonharmful rehabilitation studies, to collect dead or injured animals, and to export parts of salvaged dead manatees.
6. PRT-716436 was issued to Charles Monnett of the University of Minnesota on 6/15/87 authorizing the capture of up to 320 Alaskan sea otters in certain parts of Alaska for flipper tagging, lip tattooing, blood sampling, tooth (one) extraction, radio transmitter implants and external radio transmitters/temple tags, and subsequent release/recapture.
7. PRT-685009 was issued to Mote Marine Laboratory of Sarasota, Florida, on 6/30/87 and authorized the use of variable tilt and range sonar on up to 200 bottle-nosed dolphins and 20 West Indian manatees around Tampa, Florida, to evaluate the use/effects on these animals.
8. PRT-684424 was issued to the National Marine Fisheries Service, Washington, DC, on 12/28/87 and authorized the export and import from anyplace in the world of scientific specimens of all species of marine mammals of the Orders Cetacea, Pinnipedia, Sirenia, and Carnivora.
9. PRT-717015 was issued to the Natural History Museum of Los Angeles County, California, on 9/24/87 and authorized the import and export of scientific specimens of all species of marine mammals of the Orders Cetacea, Pinnipedia, Sirenia, and of marine otters.
10. PRT-716387 was issued to Hubbs Marine Research center of San Diego, California, on 5/28/87 and authorized research work on up to 100 California sea otters including acoustic stimuli of killer whales or otter pups as repellants or attractants, respectively, for controlling otter movements.

Scientific Permit Renewals/Amendments:

1. PRT-710118, previously issued to the Service's San Simeon, California, Research Office, was amended to allow the capture of up to 35 southern sea otters from Ano Nuevo Island to the Santa Maria River in order to study

their time budgets, movement patterns, and social behavior. The original 1986 permit stipulated that the authorized activities could be conducted only in the area south of San Simeon, California.

2. PRT-716436, previously issued to Charles Monnett of the University of Minnesota, was amended to authorize Pat Gullett, DVM, to also surgically implant radio transmitters into Alaskan sea otters.

Registered Agent Permits

1. PRT-717725, Alaska Native Cultural Arts Exchange, Anchorage, Alaska, issued for the period 6/18/87 through 6/30/89.
2. PRT-719633, Con-Tan Inc., Conroe, Texas, issued for the period 9/23/87 through 9/30/89.
3. PRT-718877, Joseph N. Kolodji, Wasilla, Alaska, issued for the period 9/1/87 through 9/1/89.
4. PRT-681597, George L. Kritchen, Cordova, Alaska, issued for the period 10/16/87 through 10/15/89.
5. PRT-688253, Lourdes M. Link, Soldotna, Alaska, issued for the period 12/14/87 through 12/31/89.
6. PRT-718866, Midnight Sun Fur Dressers and Leatherworks, Seward, Alaska, issued for the period 7/15/87 through 7/31/89.
7. PRT-719749, Mark J. Steele, Chugiak, Alaska, issued for the period 12/9/87 through 11/30/89.
8. PRT-683423, New Method Fur Dressing Co., San Francisco, California, issued for the period 7/15/87 through 7/15/89.
9. PRT-692473, North Star Products, Juneau, Alaska, issued for the period 7/15/87 through 7/31/89.
10. PRT-722615, Johnny L. Palmer, Ketchikan, Alaska, issued for the period 12/17/87 through 12/31/89.

Public Display Permits

1. PRT-715556, was issued 4/19/87 to the Columbus Zoological Garden, Powell, Ohio, for the import of one 16-year old female polar bear, which had been designated a public nuisance, from Churchill, Manitoba, Canada.
2. PRT-715460, was issued to Adventure World, Japan, on 4/22/87 and authorized the capture, transportation, and maintenance of one male and four female northern sea otters.

3. PRT-718972, was issued to Hiroo Aquarium, Japan, on 8/12/87 and authorized the capture, transport, and maintenance of one male and four female northern sea otters.
4. PRT-715242, was issued to Kobe Municipal Aquarium, Kobe, Japan, on 4/22/87 and authorized the capture, transport, and maintenance of four female northern sea otters.
5. PRT-718896, was issued to Marine Palace Limited of Japan, on 8/13/87 and authorized the capture, transport, and maintenance of one male and four female northern sea otters.

INTERNATIONAL ACTIVITIES

Excess Foreign Currency Program

During this report period, the Service received no new congressional authorization for the use of excess foreign currencies, but continued to work in Egypt, Pakistan, and India using carryover funds authorized in previous years. Those authorizations were requested under Section 8 of the Endangered Species Act, that allows such funds to be expended on projects deemed by the Secretary of the Interior to be necessary or useful for the conservation of endangered or threatened species.

The Service continued its support for the development of Ras Mohamed Natural Protectorate, Egypt's first marine park. This support included assistance to the Protectorate Manager who received a 10-month Hubert Humphrey Scholarship to study environmental conservation at Cornell University, Ithaca, New York.

US-USSR Environmental Agreement: Marine Mammal Project

In partnership with the National Marine Fisheries Service, the Service collaborated with the USSR Ministry of Fisheries and the USSR Academy of Sciences in a broad program of laboratory, field, and museum research focusing on marine mammals of mutual interest and importance. During 1987 American and Soviet specialists took part in three exchanges totaling 4 man-months, all under the auspices of the bilateral US-USSR Environmental Agreement.

In September-October, three American specialists took part in a joint walrus and bearded seal research expedition aboard the Soviet vessel "Zakharovo." Data were collected on sex and age distribution, feeding habits, and reproduction, with post-cruise laboratory analyses of walrus tissues and mitochondrial DNA.

In October, two Soviet biologists traveled to the United States to collaborate with American colleagues at Hubbs Marine Research Institute, California, in evaluating non-metrical statistics (e.g., statistics based on such things as color patterns, not measurements) displayed in photographs of harbor seals. The visiting specialists also worked in the pinniped osteological collection of the National Museum of Natural History, Washington, D.C.

In November, a team of Soviet scientists conducted a cetacean survey on the vessel "Dobriy" in the Bering Sea from the Commander Islands to the Aleutian Ridge. The results of the cruise were shared with the United States. Additional information on all the activities described above is available from the Service's Office of International Affairs, Room 2058, Department of the Interior, Washington, D.C. 20240.

STATUS REPORTS

Marking, Tagging, and Reporting Regulations

Although authorized by Congress in 1981, the Service deferred action on establishing regulations for marking, tagging, and reporting (previously referred to as reporting and sealing) Native take of polar bear, walrus, and sea otter on the assumption that return of marine mammal management authority to the State of Alaska was imminent. Later, the Service developed a proposed rule for marking, tagging, and reporting Native take of polar bear, walrus, and



Walrus in Alaska. U.S. Fish and Wildlife Service photo.

sea otter and published it in the Federal Register in December 1985. Public meetings were held in 32 coastal Alaska villages, and a public teleconference with five villages was also conducted in 1986.

The Service began the process of completing final regulations in 1987; they are expected to be published in the Federal Register and implemented in 1988.

Walrus

A Memorandum of Agreement (Agreement) between the Service, Alaska Department of Fish and Game (Department), and the Eskimo Walrus Commission (Commission) was signed on May 21, 1987. This Agreement is an important step towards improving the cooperative management of the Pacific walrus. The primary objective of the Agreement is to promote communication and exchange information on the Pacific walrus. The Agreement emphasizes that a sound management policy is best implemented through mutual cooperation and assistance.

The Service continued to participate with the Department and the Commission through the ad hoc Pacific Walrus Technical Committee (Committee), a group that provides scientific and management advice to the Commission. The Commission met twice and the Committee met once during 1987. Principal discussion items included possible amendments to the Act in 1988, walrus research, harvest monitoring, and marking, tagging, and reporting regulations.

The 1987 take of walrus from six villages that are monitored during the spring harvest was 2,077 animals. This harvest was 26 percent below the 8-year average and 22 percent below the 1986 level. Harvest of females was 18 percent below the 8-year average and 11 percent below the 1986 take (Table 1).

Table 1. Observed Spring Walrus Harvest in Six Villages, 1980 through 1987.

Year	Male	Female	Calves	Unknown	Totals
1980	849	830	78	532	2,289
1981	1,578	1,336	369	31	3,314
1982	1,062	927	362	142	2,493
1983	865	629	307	337	2,138
1984	1,318	1,562	661	442	3,983
1985	943	2,046	434	106	3,529
1986	1,028	1,082	292	248	2,650
1987	624	966	471	16	2,077
Totals	8,267	9,378	2,974	1,854	22,473

The Service has monitored the number and activity patterns of walrus using the Cape Peirce summer haulout area on the Togiak National Wildlife Refuge for the past 3 years. Disturbances to walrus have also been monitored. Walrus have been using the Cape Peirce haulout regularly since 1983 and it is now the most

heavily used mainland haulout area in Bristol Bay. The number of walrus using the Cape Peirce haulout area has been approximately 5,000 (1983), 8,600 (1984), 12,000 (1985), 11,500 (1986), and 6,300 (1987).

Round Island is one of seven islands managed by the Department as the Walrus Islands State Game Sanctuary. The Sanctuary was created with the primary goal of protecting walrus using the summer haulout area. At the time of its creation in 1960, the Walrus Islands were the only known summer haulout areas for the Pacific walrus in the United States. The Department has monitored the number and activity patterns of walrus at Round Island regularly since the early 1980's. The largest number of walrus using Round Island in 1987 was 5,300, although there were about 12,400 observed in 1986. The decline in numbers in 1987 may reflect changes in the use patterns among other Bristol Bay haulout areas as a result of weather or sea ice conditions. Preferred use areas on the island in 1987 also shifted significantly from past years; haulout patterns in 1987 deviated somewhat from the usual 9 to 10 day cycle.

As part of the Service's continuing effort to monitor the health of the walrus population, a contract was negotiated with the Institute of Marine Science in Fairbanks to age walrus teeth collected at Little Diomedea, Savoonga, and Gambell during the spring hunting seasons of 1985, 1986, and 1987. The contract also included the analysis of reproductive organs and stomach contents collected from walrus during the 1985 spring harvest. A final report is due in September 1988.

Sea Otter-Alaska

Sea otter management in Alaska continues to be controversial. Public concerns continue to focus around the following: (1) the effects of sea otter populations on shellfish fisheries; (2) the effects of various fisheries on sea otter populations; (3) the potential harvest of sea otters as a resource; (4) the legal harvest by Natives; and (5) the potential effects of development (especially offshore oil development) on otter populations.

Observations of sea otters in Yakutat Bay and other reports in recent years indicated a need to determine the relative abundance of sea otters along the Gulf of Alaska coastline. A population survey along the north gulf coast of Alaska from Cape Spencer (Cross Sound) to Point Martin (east of Cordova) was completed in 1987. A systematic survey of this extensive stretch of Alaskan coastline has not been conducted since early translocation efforts in the 1960s. Otters were observed from Cape Spencer to Icy Point in southeast Alaska and from Cape Suckling to Point Martin in the northern Gulf of Alaska. During the survey, no otters were seen between Icy Point and Cape Suckling. However, otter observers reported seeing otters in this area in 1987.

Efforts begun in 1986 to monitor the expansion of sea otters from Prince William Sound into the Gulf of Alaska, through Orca Inlet, continued in 1987. Preliminary efforts to document sea otter-fishery interactions in the Copper River drift gillnet fishery were also initiated. Small numbers of sea otters have been expanding their range from Prince William Sound along the Copper River flats since the early 1980s. Large numbers of sea otters have recently moved into this area. In 1987, five aerial surveys (May to September) were

conducted monthly to monitor the movements of the population throughout the season and to determine the effect of an intensive fishing effort on otters in the area. Survey results showed several thousand sea otters throughout the season in the area of Orca Inlet-Hawkins Island cutoff (i.e., the western portion of the Copper River Delta). Generally, concentrations of sea otters and intensive commercial fishing occurred in separate areas of the Copper River Delta during 1987. As sea otter numbers continue to increase and the population expands, conflicts with commercial fisheries may intensify.

Service regulations allow Natives to send marine mammal skins for processing to registered tanneries holding valid permits. The Service requires registered agents and tanneries to submit semi-annual reports on all marine mammals they handle. In 1987, a draft report was completed on the known take of sea otters as calculated from registered agent/tannery reports and law enforcement records for illegally-taken animals. Sea otters, as a species, were first requested under registered agent/tannery registration in 1980. The first year that sea otter skins were shipped to a commercial tannery for processing was 1982. The number of registered agents/tanneries under permit to handle sea otters has steadily increased from one in 1981 to twenty-one in 1986. Table 2 summarizes the known take of sea otters by Alaska Natives through 1986. These figures represent only those skins processed by commercial tanneries.



A sea otter at Amchitka Island, Alaska. Photo by Luther C. Goldman.

Table 2. Known take of sea otters in Alaska, 1982 through 1986.

Residency of Hunters	Number of Animals Taken					Totals
	1982	1983	1984	1985	1986	
Atka				7	2	9
Unalaska					11	11
King Cove				3	17	20
Sand Point					2	2
Chignik				1	29	30
Naknek			5	5	9	19
Palmer				1	2	3
Anchorage				1	29	30
Kenai				2		2
Ninilchik					2	2
Port Graham					11	11
English Bay				15	35	50
Kodiak	4	31	62	88	109	294
Port Lions				22	10	32
Port Bailey				48		48
Larsen Bay				41	6	47
Old Harbor				2	7	9
Cordova			7	63	56	126
Tatitlek				8		8
Pelican					5	5
Sitka				46	64	110
Unknown				32	149	181
Totals	4	31	74	385	555	1,049

Source: Taken from semi-annual reports of registered agents and tanneries, and Service law enforcement records.

The Service also had a cooperative agreement with the National Oceanic and Atmospheric Administration and the University of Minnesota for a research project entitled "Sea Otter Tagging/Tracking Study Along the Alaska Peninsula (False Pass), during 1986 and 1987." The agreement has been extended through April 30, 1988.

The Service continued to provide information and technical assistance to user groups and the general public. In this regard, the Service established a working relationship with the Regional Resource Management Commission (representing the North Pacific Rim Chugach Natives) concerning sea otter management. The Service attended several meetings of the Commission advising them about marking, tagging, and reporting regulations, sea otter management, and possible amendments to the Act.

A slide program on the current status of sea otters and management in Alaska was completed and presented several times during 1987.

The Service completed a survey in July 1987 of a population of Alaska sea otters translocated to Washington State during 1969 and 1970. Originally, 59 animals were moved in the translocation effort, but, during an intensive survey conducted in 1977, only 19 otters (including 4 pups) were observed. However, surveys conducted during the 1980's indicate that the population is now slowly increasing. In 1981, 1983, and 1985, total counts of sea otters were 36, 52, and 65, respectively. The 1987 survey revealed the presence of 94 sea otters. Thus, while initially struggling to adjust, it appears that this Washington State population is established and should continue to grow.

Polar Bear

The Service continued to collect harvest data from Native hunters. Minimum harvest was 95 bears by hunters from 14 villages between July 1, 1986, and June 30, 1987 (Table 3). Of those bears harvested for which the sex was known, the male to female sex ratio was 65 to 35. The harvest was 22 percent below the average for the previous six years; however, if the 1983/84 harvest year was deleted, the 1986/87 harvest represents the average for the 5-year period. The 6-year average is 128 bears per year and the 5-year average is 101 bears per year. Thirty-three percent of the 1986/87 harvest occurred in the northern Alaska area associated with the Beaufort Sea. The 6-year average harvest of polar bears from the Beaufort Sea stock and Chukchi/Bering Sea stock is 27 percent and 73 percent, respectively.

Table 3. Alaskan Polar Bear Harvest: July 1, 1986, to June 30, 1987.

Village	Male	Female	Unknown Sex	Total
Kaktovik	1		1	2
Nuiqsut			1	1
Barrow	5	6	7	18
Wainwright	7	2	3	12
Pt. Lay			1	1
Pt. Hope	6	3	4	13
Kivalina	1			1
Kotzebue	3			3
Shishmaref	6			6
Wales	5	2		7
Little Diomede	4	2		6
Gambell	9	11		20
Savoonga	4	1		5
Total	51	27	17	95

The Service provided technical assistance to the North Slope Borough Fish and Game Committee and Inuvialuit Game Council in their development of a Polar Bear Management Agreement. This Agreement was signed in January 1988 and focuses on cooperation in managing and maintaining a viable polar bear population that is shared between the Inuvialuit (Northwest Territory, Canada) and Inupiat (northern Alaska) peoples. The major objectives of the Agreement are to: (1) protect female polar bears; (2) minimize effects of human activities; (3) manage bears on a sustained yield basis; (4) promote research; and (5) encourage the wise use of bear products and by-products.



A polar bear climbs onto the ice. U.S. Fish and Wildlife Service photo by F. Sorensen.

Alaskan Issues Meetings

The Service participated in two international meetings: Canadian Polar Bear Technical Committee meeting in Quebec and a Polar Bear Deterrent training session in Winnipeg. The Service also attended the Rural Alaska Resources Association and the Alaska Federation of Natives workshops concerning possible amendments to the Act.

Sea Otter-Southern

The southern sea otter in California is a remnant of the sea otter species that once ranged throughout the northern and eastern Pacific Coast. In the mid-1700's, the sea otter was recognized as a valuable fur-bearing animal, and commercial exploitation began. The historical population in California is estimated to have been 16,000-18,000 individuals. By 1910, the species had been virtually exterminated from its entire range except for remnant populations in Russia, Alaska, the Queen Charlotte Islands (British Columbia), central California, and the San Benito Islands (Baja California). Even though the International Fur Seal Treaty of 1911 promoted protection of sea otters on the high seas, by 1920 the British Columbia and Baja populations were also extinct.

In 1913, the California State Legislature protected the sea otter from exploitation, although there were apparently very few sea otters left in California. Those that survived were probably concentrated in the Point Sur area. In 1938, 50 otters were noted at Bixby Creek in Monterey County, just north of Point Sur.

Fully protected against take, the population subsequently grew in number and range. By 1970 the population had become reestablished in about 10 percent of its historic California range. However, since 1970, little or no growth in numbers has been observed, although the range has expanded somewhat. In 1977 the southern sea otter, already afforded the protection of the Act, was listed as a threatened species under the authority of the Endangered Species Act. The sea otter's physiological vulnerability to oil and greatly reduced population size and distribution, combined with threats of oil spills resulting from increasing tanker traffic near the central coast, were the primary reasons for its being listed.

The California Department of Fish and Game (State) and the Service again conducted spring and fall surveys in 1987, as they have since 1982. The area surveyed included the entire 220-mile long established range of the southern sea otter population, from Point Ano Nuevo in Santa Cruz County to the Santa Maria River in San Luis Obispo County, plus additional peripheral habitat. The total numbers of otters counted during both the spring and the fall (1987) surveys were higher than any since these counts were first begun (Table 4). As a rule, fall counts are consistently lower than spring counts. This may in part be due to the fact otters are more difficult to observe in the fall owing to their dispersment throughout the range, and therefore are less concentrated, and in part due to the greater abundance of bull kelp during the fall, which obscures some otters. In the spring, the giant kelp is more clumped and there is little bull kelp to contend with; therefore, the otters are easier to count. Most otters are still found between Monterey and Morro Bay.

Table 4. Comparison of Southern Sea Otter Counts Conducted Since the Spring of 1982.

<u>Season</u>	<u>Number of Independent Otters</u>	<u>Number of Pups</u>	<u>Total</u>
1982 Spring	1124	222	1346
Fall	1194	144	1338
1983 Spring	1131	120	1251
Fall	1062	164	1226
1984 Spring	1181	123	1304
Spring*	1151	52	1203
Fall	No survey		
1985 Spring	1124	236	1360
Fall	1066	155	1221
1986 Winter	1231	181	1412
Spring	1345	225	1570
Fall	1088	113	1201
1987 Spring	1430	220	1650
Fall	1263	104	1367

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

Translocation of Southern Sea Otters:

Translocation of southern sea otters to establish a second breeding colony was initiated in 1987. The purposes for establishing a second colony are two-fold: (1) to eliminate the possibility that more than a small proportion of the population would be decimated by any single natural or human-caused catastrophe; and (2) to obtain data for assessing translocation and containment techniques, population status, and the influence of sea otters on the structure and dynamics of the nearshore community. The latter information is particularly important in attempting to understand the characteristics and impacts of a sea otter population at its optimum sustainable level.

A Final Environmental Impact Statement (Statement) and rulemaking were distributed by the Service in May 1987. The Final Statement considered all available data and information and evaluated potential effects of the translocation on the marine environment, the southern sea otter, and the socioeconomics of the region. The Final Statement and rule reflect the Department of the Interior's consideration of all comments received from the public and Federal, State, and local officials.

The Service was provided a clear authority under Public Law 99-625 (November 7, 1986) to translocate southern sea otters and to implement long-term management of the proposed experimental population. The Service has adopted the guidelines, terms, and authorities of this law in the preparation of the Final Statement and incorporated these into a final rule (i.e., final regulations).

Public Law 99-625 is a free-standing provision based on concepts similar to the Endangered Species Act and contains five key elements:

1. The authorization and procedure for the relocation, protection, and management of a second colony of southern sea otters;
2. Requires designation of two concentric zones: an inner "Translocation Zone" that must provide the habitat necessary for furthering the conservation of the sea otter and a buffer zone to protect the population from activities occurring elsewhere, and an outer "Management Zone," or otter-free zone, to minimize potential conflicts between fisheries and other resource users and the translocated population;



Sea otter. U.S. Fish and Wildlife Service photo by Mike Boylan.

3. Establishes the status of otters from the experimental population under the Endangered Species Act. The applicability of Section 7 and Section 9 requirements of the Endangered Species Act as well as the prohibitions on taking under the Act differ with respect to the two zones;
4. Allows those interests affected by the proposed sea otter translocation to obtain early consultation on the consequences of their activities; and
5. Requires a description of the relationship of the translocation to the overall status and recovery of the southern sea otter and to future Section 7 determinations under the Endangered Species Act.

This law provides the authority and establishes the guidelines for carrying out the proposed translocation.

The final rule establishes the boundaries of a Translocation Zone to which otters would be translocated and given protection similar to that of the parent population, and a Management Zone to be maintained otter-free by non-lethal means. The Translocation Zone consists of San Nicolas Island and surrounding waters in the Southern California Bight, ranging from 10-19 nautical miles from the 15-fathom contour surrounding San Nicolas Island. The Management Zone includes the remainder of the Southern California Bight south of Point Conception, including the other offshore islands and mainland coast. As such, it implements a significant form of zonal management, as recommended by the Marine Mammal Commission in 1980.

Capture and Monitoring Operations:

Capture operations were initiated on August 24, 1987, and implemented in accordance with the Translocation Plan contained in the Final Statement for the translocation of sea otters. Teams of biologists from the Service and the State effectively coordinated the capture, transport, and release of sea otters in the main range and on San Nicolas Island. Capture teams carried out their activities over the southern third of the sea otter range, from approximately Point Buchon north to Lopez Point. Following capture, otters were taken to the Monterey Bay Aquarium where they were held for observation and examined by an experienced sea otter veterinarian. All otters were held a minimum of two days to monitor their behavior and minimize stress. From the aquarium the otters were flown by charter plane directly to San Nicolas Island and released. Initially the otters were held in floating pens just offshore in the belief that this would help minimize stress and facilitate acclimation of the animals. Based on observations of penned otters during the initial releases, the Service began to release otters immediately upon arrival, a less stressful practice.

Status of Colony:

One hundred and eight sea otters (48 males, 60 females) were captured during the period August 24 to October 30, 1987: 68 by dip net, 34 by Wilson trap, and 6 by tangle net. Forty-four of the captured animals were released as unsuitable for translocation (based on selection by sex, age, body weight, and

general health condition). Sixty-four sea otters were taken to Monterey Bay Aquarium. Three died while at the Aquarium and one was returned to its capture site. Sixty sea otters were actually shipped to San Nicolas Island (13 males and 47 females) in 8 groups as follows:

1. August 29 ---- 24 animals
2. September 6 -- 21 animals
3. September 18 - 5 animals
4. September 30 - 1 animal
5. October 3 ---- 2 animals
6. October 24 --- 2 animals
7. November 2 --- 3 animals
8. November 4 --- 2 animals

Three sea otters died soon after arrival at San Nicolas Island. Two more were found dead on the mainland (October 11 and 22) and three additional animals were sighted alive on the mainland (December 9). In addition, there have been reports that two otters died in set lobster pots near an adjacent island and another otter was taken in a gill net. Thus, as of December 31, 1987, a theoretical population of 49 otters remained on San Nicolas Island. Between November 15 and December 6, 1987, 31 otters were individually identified at San Nicolas Island. There are no data on the other 18 animals. Eight of these 18 were never seen after their release at San Nicolas Island.

Discussion of Mortality:

Necropsies were performed on otters that died during the translocation phase: three otters at the Monterey Bay Aquarium and three at San Nicolas Island. In all but one case, mortality was attributed to stress-related factors. One of the otters, a young female, was also diagnosed as having a severe case of pneumonia. This animal was ill when captured. Following the death of these six otters, precautionary modifications were made in the project to minimize the likelihood of additional mortality.

Five additional cases of mortality which occurred at some unknown time after the otters were released at San Nicolas Island have been reported. Carcasses were obtained in only two cases. Two otter carcasses were found on Ventura County mainland beaches in southern California, one at Point Mugu and one off Rincon Beach. These otters were sent to the Madison National Wildlife Health Research Center for necropsy and forensic analysis. Both cases are still under investigation by the Service's Law Enforcement Division. Fishermen reported that two other otters drowned in lobster traps. In one report, the description of the otter's colored tags with inscribed numbers matched those of a sea otter released at San Nicolas Island. This identified otter has not been resighted and is presumed dead. A third otter with a San Nicolas tag was reported as incidentally taken in a gill net in the Management Zone. This otter has not been identified because the description of its tag fits the tags of two of the otters missing from San Nicolas Island.

To date there is one known sea otter birth at San Nicolas Island. The mother and pup were observed for several days, after which the mother was seen alone.

The pup is assumed to be dead. This observation was no cause for serious concern because female otters typically lose their first pup, and there is a high level of mortality in many sea otter populations.

The Service is still assessing the status of the translocation effort, and new pertinent information is being collected and analyzed. While some translocated otters are unaccounted for, it is premature to assume mortality for these "missing" animals (e.g., three otters missing for over a month were subsequently found in the Management Zone). The Service did anticipate that a small number of otters would leave San Nicolas Island (the Translocation Plan and the Federal Permit acknowledges the need to have supplemental releases at the Island in order to provide a nucleus of about 70) and that there would be some mortality including an unpredictable level of illegal and incidental take.

Law Enforcement:

Once the otters were transferred to San Nicolas Island, the law enforcement effort there included a heavy concentration of Special Agents and State Wardens. From late August through late September, four to five Special Agents and four to five Wardens were assigned to San Nicolas Island. During this initial coverage, the officers conducted 24-hour surveillance of boats in the area. State assistance was beneficial due to the use of its vessels for boarding and patrol purposes.

During the first 30 days after the otters were transferred to San Nicolas Island, an average of 5-10 fishing boats per day were contacted by Agents and Wardens. The majority of these boats were manned by urchin divers. These contacts were made to inform the divers and boat operators of the laws concerning sea otters.

Beginning in October and through December 31, 1987, two Special Agents were assigned to the Island on a weekly basis. These officers contacted approximately 5-10 boats per day in October during the onset of the lobster season and increased lobster diver activity in the area. In November, boat contacts by officers dropped to 3-5 per week due to winter sea conditions and less boat activity in the area.

The Service has trained two Wildlife Officers who are assigned to the Service's Ventura Endangered Species Recovery Office (Ventura Office) specifically for sea otter law enforcement and containment. These officers finished training at the Federal Law Enforcement Training Center, Glynco, Georgia, on November 5 and immediately began patrol work at San Nicolas Island, working along with Service Special Agents in continuing casual contacts with fishing vessels. By mid-December, the two Wildlife Officers were so well indoctrinated into island operation that regular island assignment of Special Agents was no longer necessary.

Investigations that have been conducted as a result of the sea otter translocation include take of sea otters, sea lions, and migratory birds as follows:

1. Sea otters: The death of a San Nicolas sea otter found by the U.S. Navy on shore at Point Mugu is being investigated by the Service.

Laboratory analysis indicates that the cause of death was a gun shot. This investigation is ongoing at the time of this report.

Information was received that two dead San Nicolas otters were observed in lobster pots at Prisoners Cove, Santa Cruz Island. This information is being investigated.

2. Sea lions: Service Special Agents and a National Marine Fisheries Service Agent conducted an investigation of the shooting of a sea lion at San Nicolas Island. These officers conducted surveillance prior to the shooting and subsequently conducted interviews to determine responsibility for the violation. By year's end, the continuing investigation was being conducted solely by the National Marine Fisheries Service.
3. Migratory birds: Information was received by Service agents, while on San Nicolas Island, that two individuals in wet suits were observed shooting at sea gulls from a party fishing boat. Further, the boat was within the 300-yard limit established by the U.S. Navy as off-limits. A Service agent and a Navy security officer warned the vessel that it was in a closed zone.

Containment:

As of October 1, 1987, the Service's Ventura Office has been responsible for implementation of a containment program. A containment contingency plan has been prepared which serves as the working guidelines for the verification, monitoring, and capturing of otters found in the Management Zone. Presently, the Ventura Office is still in the process of purchasing essential capture equipment (boat, SCUBA gear, Wilson traps, etc.) and training field biologists in capture techniques. Until all equipment is purchased and biologists trained, the Ventura Office is limited to implementing the immediate verification response and follow-up monitoring. The capture of otters is presently being handled cooperatively by both State sea otter biologists and Service research biologists.

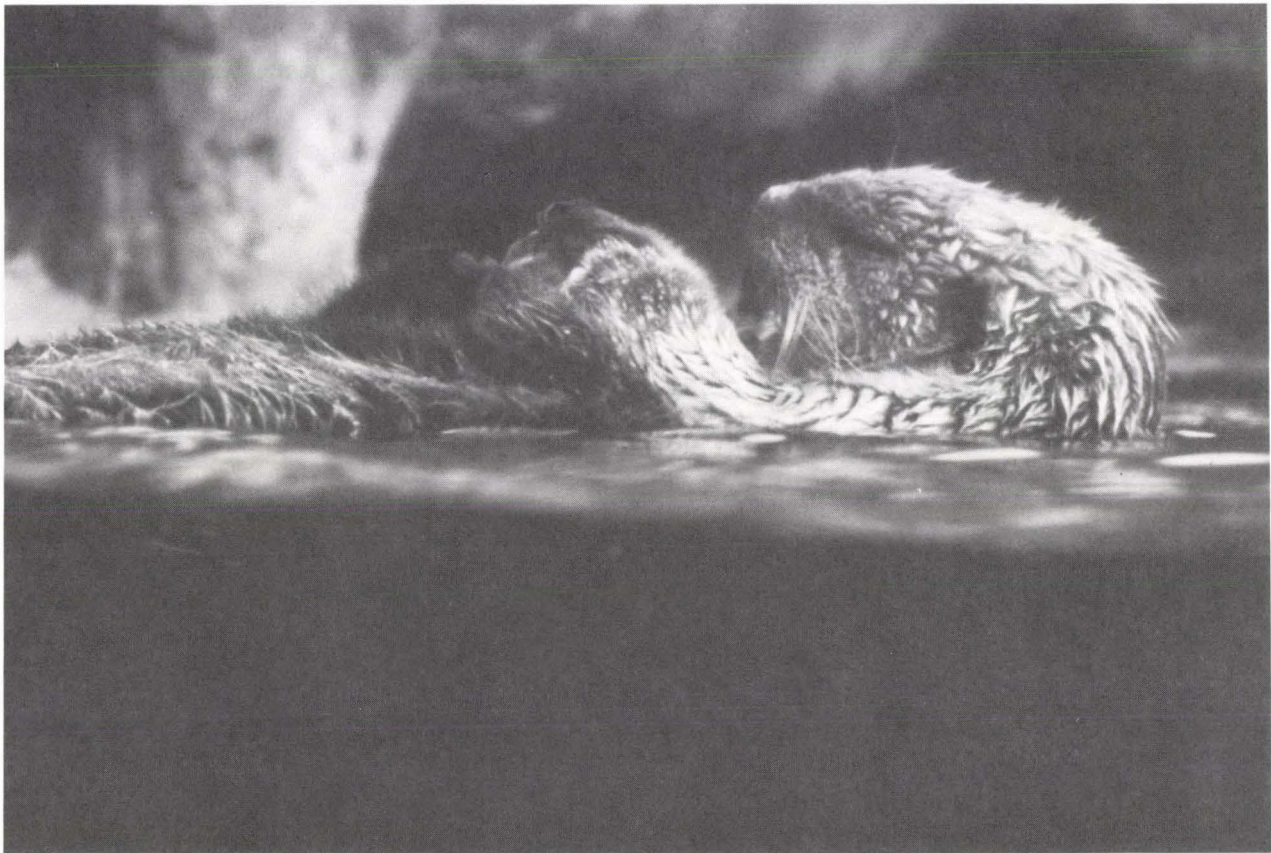
Between September 1 to December 18, 1987, there were 16 reports of sea otters observed in the Management Zone: 6 in September, 4 in October, 2 in November, and 4 in December. Sixty percent were observations of a single otter, 33 percent were of 2 otters, and 7 percent (1 report) were of 3 otters together. Fifty percent of the reports (8 of 16) provided adequate information for verification of the sighting. One case could not be verified. In the remaining seven cases, verification responses were initiated by means of airplane, boat, or land observations.

To date there have been three verified sightings of sea otters in the Management Zone. One otter was observed for only a single day. This otter was likely from the present mainland range based on the color tag observed on the otter. After the initial observation this otter could not be located again.

The second verified report came from State biologists. During the biennial sea otter survey, two otters were observed within the Management Zone just off

Point Conception. Follow-up monitoring resulted in the observation of one otter within the zone and one north of the Management Zone. A capture effort was initiated but had to be postponed due to foul weather. Subsequent monitoring failed to locate an otter in that portion of the Management Zone. State and Service biologists believe that a small group of otters probably move in and out of the Management Zone around Point Conception and have been doing so for years. Monitoring of the area continues.

The third verification occurred December 8, 1987. On that date a fisherman reported two otters in a kelp bed just near the Los Angeles/Ventura County line. Biologists from the Ventura Office verified three adult otters and one pup. All adult otters had been translocated to San Nicolas Island and had obviously swam to the mainland. Service researchers coordinated capture operations with State biologists, resulting in the capture of the female and her pup and their return to the location within the parent population where she was originally captured. A severe winter storm rapidly moved in and precluded follow-up efforts to capture the remaining two females. Searches for these otters have continued.



Sea otter with pup. U.S. Fish and Wildlife Service photo by Lynn B. Starnes.

Summary:

Although it is still too early in the program to draw any final conclusions or make any predictions about the future outcome of the translocated otters around San Nicolas Island, the translocation project is functioning well. There has been successful reintroduction of sea otters to San Nicolas Island and as of December 31, 1987, a nuclear population of at least 31 otters remained in the Translocation Zone. Procurement of necessary equipment and training will better facilitate collection and analysis of additional data on otter behavior, capture methods, and handling. Efforts are proceeding to carry out an efficient and effective program which ultimately leads to the recovery of the southern sea otter.

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, and continues to be, a significant source of mortality. From June 1982 to December 31, 1987, a total of 48 otters were observed drowned or otherwise known to have drowned in commercial fishing nets: 6 in 1982, 6 in 1983, 16 in 1984, 12 in 1985, 3 in 1986, and 5 in 1987. However, only a small proportion of the total entangling set-net effort within the sea otter's range was sampled for sea otter mortality. Therefore, the actual frequency of net-entanglement mortality for the California population is presumed to be substantially higher than indicated by the confirmed observations of 48 sea otters entangled in set-nets (through December 31, 1987). The calculated average number of sea otters drowned in these types of nets during the 1982-84 period was 80 per year or about 6 percent of the population annually. This source of mortality is considered by Service and State biologists to be the primary reason that the population has not grown during the last 10-15 years.

On May 24, 1985, the Governor of California signed into law restrictions on gill and trammel net fishing (with net mesh equal to or greater than 3.5 inches) within the 15-fathom (one fathom equals 6 feet) isobath from Monterey to the Santa Maria River mouth. On September 20, 1986, to further protect sea otters and other marine mammals and birds from entanglement, legislation was enacted prohibiting gill and trammel nets inside the 20-fathom isobath along parts of the central portion of the sea otter's range, specifically between Point Sur and Pfeiffer Point in Monterey County and between Cape San Martin in Monterey County and Pico Creek in San Luis Obispo County. However, the Director of the California Department of Fish and Game has the authority to extend the 20-fathom closure throughout the length of the State's Sea Otter Refuge that comprises about 100 miles of coastline between the Carmel River (just south of Monterey Bay) and Santa Rosa Creek (just south of San Simeon) should subsequent observations of drowned otters warrant it. This legislation also provided funds for a low-interest loan program for fishermen affected by the closures. Loans obtained under this program are to be applied to the development and purchase of alternative fishing gear.

The Governor of California approved regulations on September 16, 1987, affecting incidental take within the translocation zone. Gill and trammel nets cannot be used offshore of San Nicolas Island in water 20-fathoms or less.

Furthermore, no person, except State, local, or Federal employees in the performance of their official duties, can discharge any firearms within the sea otter translocation zone. Incidental take of sea otters in the management zone is not a violation of the California Endangered Species Act.

The emergency closures and protective legislation appear to have reduced the number of otters entangled in legally set nets, but no conclusion can yet be drawn on whether or how much the population growth rate will change. Based on beached-carcass counts, the total observed sea otter mortality (from all causes) for calendar year 1987 consisted of 92 otters, 4 more than 1986 but 39 less than 1984 (pre-closure year). The figures for beach-cast otters found in 1987 are virtually equal to the long-term (15-year) average.

Section 7 Consultations:

Pursuant to Section 7 of the Endangered Species Act, the Service reviews proposed federally funded, conducted, or permitted activities that may affect the southern sea otter and issues Biological Opinions and recommendations to minimize impacts. In 1987, the Service was engaged in four formal Section 7 consultations on the sea otter in California. One "jeopardy" Biological Opinion was issued (Case No. 1-6-7-F-20). That Biological Opinion was issued to the U.S. Army Corps of Engineers after analysis of Texaco's proposed interim marine terminal at Gaviota, Santa Barbara County. The reasonable and prudent alternatives to the project as proposed were: (1) all oil ships using the terminal, when in route north of the terminal, must remain a minimum distance from shore such that the 30-day conditional spill risk probability affecting the existing sea otter range from any given point in route is 5 percent or less; (2) no more than 10 tankers per year can move oil northward during the life of the facility (i.e., 30 years); and (3) up to 80 tankers per year can move oil northward during a 4-year life of the terminal; after 4 years the terminal will be removed or Section 7 consultation is to be reinitiated. The Corps issued a conditioned permit to Texaco that included the third alternative.

Various endangered species permit applications were reviewed in 1987 for compliance with Section 7. Those permits involved capture and tagging (including transponders) and the subsequent relocation of otters within the present range, harassment of sea otters, and experimental containment studies (PRT-707688, PRT-716387, and PRT-719453).

Section 6:

The Service provides funding for sea otter conservation to the California Department of Fish and Game through Section 6, Grant-in-Aid to the States, of the Endangered Species Act. The State uses these funds to obtain an index of sea otter mortality and to determine the causes of death. The State program involves sea otter carcass salvage and necropsy, and documentation of incidental take of sea otters in commercial fishing nets.

The carcass salvage program involves computer cataloging of all verified observations of dead sea otters. Necropsies are performed on fresh carcasses and those animals suspected of being shot are x-rayed. During the reporting

period, 92 sea otter mortalities were reported by salvage personnel. Of the 92 carcasses that were found in 1987, 22 were known to have died directly or indirectly from human causes (8 from gunshot wounds, 5 by gill net operations, 7 as a result of research activities, and 2 by other human causes).

The State cooperated with the Service in the capture operations for translocation and in conducting spring and fall population counts discussed earlier. In addition, State fish and game biologists conducted bimonthly aerial censuses of the range peripheries to determine changes in distribution and seasonal abundance.

State biologists are involved in developing or improving new capture techniques for sea otters. Current techniques to capture otters are either passive capture using floating entangling nets or more labor-intensive methods involving SCUBA and Wilson traps (hand held capture device) or dip-netting from



Boaters and snorkelers lined up on the outside edge of a NO ENTRY manatee sanctuary at Crystal River, Florida, waiting for manatees to exit. Approximately 45,000 boaters and snorkelers visit Crystal River annually to dive and interact with manatees. U.S. Fish and Wildlife Service photo.

a boat. Both labor-intensive methods usually capture only one otter at a time. Improving the efficiency of removing otters from an area could reduce the impacts of oil spills on the sea otter population as well as facilitate capture for translocation and containment of any new colony of sea otters.

The State enhanced the efficacy of their Wilson traps through modifications of equipment and testing of new techniques. Fifteen State divers have received training in the use of the underwater capture device and tagging otters. Modifications of gear such as adding rebreathers to eliminate bubbles and changing the propulsion apparatus has made the device less cumbersome for the diver and less apparent to the otters. Initial efforts indicate that capture rates will improve.

West Indian Manatee

The Florida Department of Natural Resources continued the Manatee Salvage/Necropsy Program. A total of 116 dead manatees were collected in the southeastern United States. Florida accounted for 113 cases, and 3 occurred in Georgia. Causes of death were categorized as collisions with boats or barges (39), crushing or drowning in lock or canal gates (5), other human-related (4), perinatal (30), other natural (16), and examined but undetermined (22). In addition, one dead manatee report was verified in Puerto Rico, but the carcass was not recovered. Although total mortality was eight less than in 1986, boat/barge-related mortality was higher than any year since the salvage/necropsy program was first started by the Service in 1974. Thirty-three percent of all manatee deaths in 1987 were attributable to boat/barge collisions, and 41 percent of the manatee deaths were human-related.

It is becoming increasingly obvious that a more constant and growing threat to the survival of manatees in Florida is linked to the rapid growth of its human population, 90 percent of which live within 10 miles of the coast. With a population increasing at a rate of 800 residents a day, Florida recently became the fourth most populous State in the Nation. By the year 2000, it is expected to rank third. Also, accompanying the population boom has been the corresponding increase in the number of registered boats in the State. While there were only 100,000 registered boats in Florida in the early 1960's, there are now more than 650,000, and an additional 300,000 transient boats enter each year from out of the State. By the year 2000, these numbers are expected to double.

The seriousness of these impacts is clearly illustrated not only by the increasing number of manatee deaths associated with human-related causes, but also by the dramatic increase in the number of Endangered Species Act Section 7 consultations with the Corps of Engineers on boat docks, marinas, and dredging projects affecting manatees and their habitats. For example, in 1987, the Service issued 15 jeopardy biological opinions, while in 1984 only 4 jeopardy biological opinions were issued.

To address this situation, the Service and the Florida Department of Natural Resources initiated actions to address cumulative impacts and strengthen the permit review process by developing area or site-specific "Manatee Protection Plans." These plans are being developed with the assistance and cooperation of

the Corps of Engineers, State planning councils, counties, and public, and will establish development guidelines that can be used by developers and regulatory agencies to protect manatees and their habitats. By mid 1990, it is hoped that all of these plans will have been completed.

A second approach to strengthening the review of permit applications that was initiated in 1987 was the development of a computer-based geographic information system. Such a system is expected to greatly facilitate review by integrating, mapping, and making readily available information on a local geographic area. Included in the data base would be manatee distribution and habitat use patterns, locations, and numbers of boat-related manatee mortalities, vessel densities and use patterns, locations of boat speed regulatory zones, locations of existing boating facilities and trends in their development, zoning requirements, and a history of permit reviews and Section 7 consultations in the same geographic area.

In addition to these planning activities, the Service recognized the urgency for updating the West Indian Manatee Recovery Plan and its implementing document, the Comprehensive Work Plan. Neither the Recovery Plan nor the Comprehensive Work Plan had been updated since adoption in 1980 and 1982, respectively. As a result, program budget needs beyond 1984 were never fully elaborated, and changes to reflect progress on research and management tasks had not been incorporated since 1982. Therefore, the Service implemented plans to update, revise, and consolidate these two documents into a comprehensive Recovery Plan, and in December 1987 appointed a new multi-agency recovery team to complete these tasks.

Radiotelemetry field work on manatees was completed in southwestern Florida, and initiated on Florida's eastern coast. The southwestern Florida study is now in the phase of data analysis. In eastern Florida, 18 manatees were radiotagged at three locations during 1987. The objectives of this multiyear project are to determine movement patterns and to identify key use areas for future protection. Habitat loss due to development and direct mortality of manatees due to boat strikes are major problems on the east coast. Unlike populations studied in the past at other sites on the St. Johns River, northwestern and southwestern Florida, the ongoing studies in eastern Florida are beginning to reveal extensive and complex patterns of movement and habitat use. Seasonal migrations were noted between south Florida and Georgia, and movements up to 850 kilometers were observed. Satellite-monitored platform terminal transmitters were proven to be a highly effective means to track manatees over these wide ranges in 1987. These transmitters also proved to be much safer and significantly more cost efficient than the conventional VHF transmitters and aerial tracking methods. However, all of these systems continue to be employed in order to maintain a large sample of manatees and because only five platform terminal transmitters are currently available for use.

A study to characterize the seagrasses of Hobe Sound, Florida, and to determine the effects of boat-induced turbidity on this seagrass community, which is utilized as a winter food base for manatees, was initiated. This research is a cooperative effort by the Service, the National Marine Fisheries Service, and the Florida Department of Natural Resources. Light sampling designs and

seagrass productivity, distribution, biomass, and species composition investigations were implemented. Data currently being gathered will serve as a control for an experimental "no-wake" regulatory period to be established during later phases of the study.

Life history studies of manatees continued to be carried out based on longitudinal records of individuals recognizable from distinctive scar patterns. The photographic catalog of individuals maintained for these studies (with assistance from Florida Power and Light) continued to expand in 1987. Stomach content analyses for manatee food habit studies also continued, and provided the Service and cooperators with valuable information on food types and preferences.

Aerial surveys of selected areas in Palm Beach and Volusia Counties were concluded, and preliminary results showed increasing pressures on manatee habitats by boats and resultant shifts in manatee distribution. Field tests of aerial survey methods to determine a state-wide manatee population estimate were completed in 1987, and researchers agreed that the methods that were tested were not producing statistically comparable data. Increased efforts will be made in 1988 to reevaluate survey methods and to eliminate the many variables that have historically adversely influenced surveys.

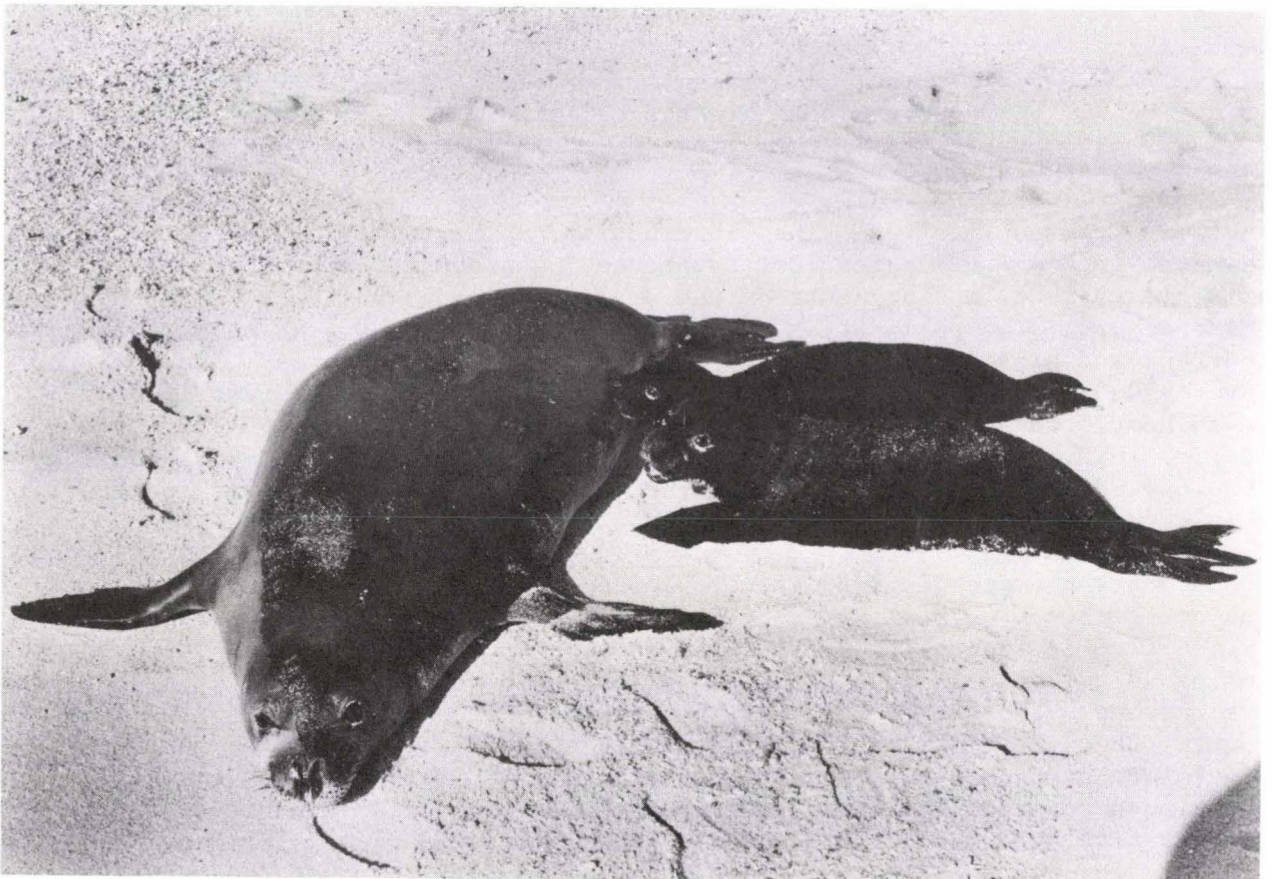
Training and technical assistance were provided to international researchers and managers concerned with manatees in Australia, Ivory Coast, Mexico, Panama, and Saudi Arabia.

A two-volume publication, "The Distribution and Mortality of the West Indian Manatee in the Southeastern United States," was completed by the Service's Sirenia Project, and segments of the draft were made available to planners and researchers. The publication updates a 1974 report by D.S. Hartman, summarizes current and historical information on over 1,000 dead manatees, and analyzes over 4,000 hours of aerial manatee surveys. Several other manuscripts were also completed and submitted for publication in the scientific literature during 1987. Topics included manatee and dugong study techniques, behavior, ecology, distribution, genetics, parasitology, population status, and general biology.

Condemnation proceedings to acquire approximately 13 acres of water bottoms adjacent to the Crystal River National Wildlife Refuge for a manatee sanctuary were filed in Federal Court in 1986, but court delays prohibited the case from being adjudicated in November 1987 as scheduled, and it was still unresolved by year's end. Therefore, the water bottoms were once again leased from the owner during the winter months to provide critical warm water refugia and an inviolate sanctuary in Kings Bay, Crystal River, Florida. The Service continued to support the Manatee Rescue Contingency Plan conducted through a cooperative agreement with Sea World and Miami Seaquarium. The Florida Marine Patrol, through the "Resources Alert Watch Line," determines the validity of reports of injured manatees and reports them to Sea World and Miami Seaquarium for rescue. The Service also established an agreement with Walt Disney's Living Seas to house captive born and rehabilitating manatees.

The Service and the State of Florida intensified habitat protection efforts in 1987, and committed to vigorously pursuing habitat acquisition projects in the Crystal River area. The State initiated plans under its Conservation and Recreational Lands Program to complete acquisition projects involving 150 acres of land surrounding the warm-water spring at the head of the Homosassa River and approximately 12,000 acres of wetlands between the Crystal and Homosassa Rivers. The Service completed its planning efforts to acquire approximately 3,000 acres at the mouth of the Homosassa River adjacent to the Chassahowitzka National Wildlife Refuge, and with the \$650,000 add-on appropriated by Congress for FY 1988, immediately began efforts to acquire a site on Kings Bay for the subsequent development of a manatee interpretive/education center.

Finally, the Florida Department of Natural Resources continued to develop its manatee program. In 1987, emphasis was directed towards reviewing permits for boating facilities, upgrading and expanding the manatee regulatory boat speed zones, improving the salvage/necropsy program, cooperating with county governments to develop Manatee Protection Plans, and evaluating the



Female monk seal with rare twin pups, Laysan Island, Hawaiian Islands National Wildlife Refuge. U.S. Fish and Wildlife Service photo by Eugene Kridler.

effectiveness of state-wide aerial survey methods. Through the "Save the Manatee Club," the Florida Department of Natural Resources also expanded their interpretive and education programs. The Service and the Florida Department of Natural Resources enjoy a close and mutually supportive working relationship.

Hawaiian Monk Seal

As part of a production and population survey, Service biologists worked with National Marine Fisheries Service researchers on each island of the Hawaiian Islands National Wildlife Refuge (Refuge) tagging weaned pups and resighting tagged seals. They also conducted regular population censuses of monk seals at French Frigate Shoals and intermittent surveys at Midway Atoll and other islands of the Refuge. Service biologists cooperate regularly with National Marine Fisheries Service personnel on various research and recovery actions recommended in the Hawaiian Monk Seal Recovery Plan.

Entangled monk seals encountered during surveys throughout the Refuge were released from nets and other debris. Large nets washed up on Refuge beaches were burned to reduce the likelihood of entanglement with seals. Underdeveloped female pups from French Frigate Shoals were transported to Honolulu where they were rehabilitated for release at Kure Atoll in an effort to repopulate Kure.

Coordination of Service and National Marine Fisheries Service activities was emphasized during the year to ensure that their field work was carried out safely in these remote locations. Special Use Permits were issued, and Service employees assisted with logistic support where possible by providing aircraft space, boats, and radio contacts.

One Section 7, Endangered Species Act biological opinion addressing possible impacts to monk seals was completed during the reporting period. The Minerals Management Service initiated the consultation regarding the proposal to lease submerged lands and allow for prospecting for cobalt-rich crusts. The opinion concluded that the action would not be likely to jeopardize the continued existence of the Hawaiian monk seal or other listed species under Service jurisdiction.

Dugong

In October 1986, a Research Biologist with the Service's National Ecology Research Center travelled to Townsville, Australia, to collaborate with biologists from the James Cook University of North Queensland and the Queensland National Parks and Wildlife Service in capturing dugongs and tagging them with radio-transmitters. Two dugongs were captured and radio-tagged near Townsville. This collaboration continued through 1987 with one of the original dugongs being recaptured and re-tagged with a conventional radio transmitter that was still being monitored from land and boats by the end of the year.

In November 1987, four additional dugongs were captured in northeastern Queensland and fitted with radio-transmitters that were monitored by TIROS weather satellites. The satellite telemetry represents a major breakthrough in

monitoring dugong movements, as there is no need for expensive air and boat time to track the animals. The basic techniques and technology associated with tracking dugongs and manatees by satellite were developed by the Service's Sirenia Project in Gainesville, Florida. The Service will continue to collaborate with the Australians in using radio-tracking techniques to study dugong movements in Queensland.



A West Indian manatee eating water hyacinth, Volusia County, Florida. U.S. Fish and Wildlife Service photo.