MARINE MAMMAL COMMISSION

Annual Report to Congress

1995

Marine Mammal Commission
1825 Connecticut Avenue, N.W.
Washington, D.C. 20009

29 February 1996

MARINE MAMMAL COMMISSION

Annual Report to Congress

1995

Marine Mammal Commission
1825 Connecticut Avenue, N.W.
Washington, D.C. 20009

29 February 1996

Table of Contents

List of Tables iii
List of Figures iii
Executive Summary v

I. Introduction 1
Personnel 1
Funding 1

II. Amendments to the Marine Mammal Protection Act and Related Legislation 3
Marine Mammal Protection Act 3
Endangered Species Act 5
Magnuson Fishery Conservation and Management Act 7

III. Species of Special Concern 9
Florida Manatee 9
Hawaiian Monk Seal 19
Steller Sea Lion 29
Harbor Seals in Alaska 35
Northern Fur Seal 38
Pacific Walrus 43
Sea Otter 49
Northern Right Whale 56
Humpback Whale 62
Bowhead Whale 67
Gray Whale 70
Vaquita 73
Gulf of Maine/Bay of Fundy Harbor Porpoise 76
Beluga Whale 83
Polar Bear 86

IV. Marine Mammal-Fisheries Interactions 89
Implementation of the New Incidental-Take Regime for Commercial Fisheries 89
The Tuna-Dolphin Issue 99
Pinniped-Fishery Interactions 109
The Gulf of Maine Ecosystem 113

V. International Aspects of Marine Mammal Protection and Conservation 115
The Compendium of Treaties and International Agreements 115
Improving Management of Marine Living Resources 116
International Whaling Commission 120
Conservation and Protection of Marine Mammals in the Southern Ocean 126
Convention on International Trade in Endangered Species of Wild Fauna and Flora 137

VI. Activities Related to Marine Mammals in the Arctic 139
Arctic Environmental Protection Strategy 139
Agreements Related to Polar Bears 142
Polar Bear Trophy Imports 147
Agreements Related to Walruses 152
The Bering Sea Ecosystem 153

VII. Marine Mammal Strandings and Die-Offs 157
Unusual Mortality Events in 1995 157
The Regional Marine Mammal Stranding Networks 158
Response to Unusual Mortality Events 159
The Possible Role of Marine Pollution 160

VIII. Impacts of Marine Debris 161
Biological Impacts of Marine Debris 161
Derelict Fishing Gear 162
The Marine Entanglement Research Program 166
Annex V of the International Convention for the Prevention of Pollution from Ships 167

IX. Outer Continental Shelf Oil and Gas Exploration and Development 173
Proposed Offshore Lease Sales 173

X. Research and Studies Program 179
Survey of Federally-Funded Marine Mammal Research 179
Marine Mammal Workshops and Planning Meetings 179
Commission-Sponsored Research and Study Projects 180

XI. Permits and Authorizations to Take Marine Mammals 189
Implementation of Permit-Related Amendments 189
Permit Application Review 191
Permit-Related Litigation 192
Acoustic Thermometry of Ocean Climate Program 194
Small-Take Authorizations 198

XII. Marine Mammals in Captivity 205
Care and Maintenance Standards 206
Foreign Facilities 207
Swim-with-the-Dolphin Programs 208

Appendix A: Marine Mammal Commission Recommendations in 1995 209

Appendix B: Reports of Commission-Sponsored Activities Available from the National Technical Information Service 219

Appendix C: Selected Literature Published Elsewhere Resulting from Commission-Sponsored Activities 227

List of Tables

Table 1. Marine mammal species and populations listed as endangered or threatened under the Endangered Species Act and depleted under the Marine Mammal Protection Act, as of 31 December 1995 10

Table 2. Known manatee mortality in the southeastern United States (excluding Puerto Rico) reported through the manatee salvage and necropsy program, 1978-1995 11

Table 3. Steller sea lion population estimates, 1960s to 1994 30

Table 4. Estimated take of Steller sea lions, 1992-1994 34

Table 5. Subsistence harvest levels for northern fur seals in the Pribilof Islands, 1985-1995 . . 40

Table 6. Estimated catch of Pacific walruses in Alaska and total reported catch of walruses in Russia, 1980-1995 46

Table 7. California sea otter population counts by the Fish and Wildlife Service and the California Department of Fish and Game, 1982-1995 50

Table 8. Quotas and number of bowhead whales taken by Alaska Eskimos, 1973-1995 69

Table 9. Estimated incidental kill of dolphins in the tuna purse seine fishery in the eastern tropical Pacific Ocean, 1972-1995 100

Table 10. Estimated U.S. and foreign dolphin mortality, kills per set, sets on dolphins, and percent observer coverage 1988-1995 102

Table 11. The number and percentage of marine species worldwide with documented marine debris entanglement and ingestion records by species group 163

Table 12. Summary of garbage discharge limitations under the International Convention for the Prevention of Pollution from Ships (1973/1978) and the U.S. Act to Prevent Pollution from Ships, as Amended 168

List of Figures

Figure 1. The Hawaiian Archipelago 20

Figure 2. Range and breeding islands of the northern fur seal 38

Figure 3. Range of the Pacific walrus 44

Figure 4. Process by which permit applications to take marine mammals are reviewed. 192

EXECUTIVE SUMMARY

This is the 23rd Annual Report of the Marine Mammal Commission and its Committee of Scientific Advisors on Marine Mammals. The Commission was established under Title II of the Marine Mammal Protection Act of 1972 to provide an independent source of policy and program guidance to Congress, the Executive Branch, and Federal agencies on domestic and international activities affecting marine mammal conservation.

The purpose of this report is to provide timely information on marine mammal-related issues and events to Congress, Federal and state agencies, public interest groups, the academic community, private citizens, and the international community. When combined with previous annual reports, it provides a historical record of the nation's progress in developing policies and programs to conserve marine mammals and their habitat. To ensure factual accuracy, the draft report was provided to relevant federal and state agency representatives and other involved persons for comment. The contents of the report are briefly described below.

Introduction (Chapter I)

Members of the Commission, its Committee of Scientific Advisors on Marine Mammals, and staff are listed in this chapter along with a brief summary of the Commission's recent funding history. The Commission's fiscal year 1995 appropriation was $1,384,000.

Reauthorization of the Marine Mammal Protection Act and Related Legislation (Chapter II)

Federal actions to conserve marine mammals are guided by several key laws, the most important of which is the Marine Mammal Protection Act of 1972. In 1994 Congress amended that Act, reauthorizing its funding provisions through 1999 and making certain other changes. Perhaps the most significant amendments are those to establish a new regime for managing interactions between individual marine mammal stocks and commercial fisheries. In part, they call for assessments of the status of each marine mammal stock in U.S. waters and for measures to reduce the bycatch that may be impacting marine mammal stocks determined to be strategic by virtue of their reduced or declining status. Other significant amendments change Federal responsibility for regulating the care and maintenance of captive marine mammals, streamline permitting processes for scientific research and for the take of small numbers of marine mammals by harassment incidental to various other human activities, provide for importing polar bear hunting trophies from Canada, and require analyses of the health and stability of marine ecosystems in the Gulf of Maine and the Bering Sea. Chapter II provides an overview of these changes and identifies sections of the report that discuss actions by the Commission and others to implement the amendments.

Two other laws of particular importance to marine mammal conservation are the Endangered Species Act and the Magnuson Fishery Conservation and Management Act. Funding provisions in these Acts expired in 1992 and 1993, respectively. In 1995 Congress considered bills to amend and reauthorize these Acts, but no legislation was enacted. Amendments considered during 1995 that would affect marine mammals are discussed briefly.

Species of Special Concern (Chapter III)

The Marine Mammal Commission pays particular attention to marine mammal species and populations that have special conservation needs. Chapter III discusses activities by the Commission and others in 1995 to address these needs for several marine mammal species, including Florida manatees, Hawaiian monk seals, Steller sea lions, northern right whales, and Gulf of Maine harbor porpoises.

Florida Manatees — Florida manatees are threatened by high levels of mortality, a third of which are human-related, and habitat destruction. In 1995, 203 dead manatees, the second highest annual total ever recorded, were found in the southeastern United States. Collisions with boats and entrapment in water control structures (*i.e.*, flood gates and navigation locks) are the leading human causes of manatee mortality and accounted for 43 and 8 deaths, respectively, in 1995. The Commission helped establish a cooperative Federal-state partnership that now forms the basis of efforts to address these and other manatee recovery issues. The manatee recovery program has become a model for other species recovery programs.

To reduce vessel-related manatee deaths, the State of Florida began work in 1989 to develop boat speed rules in 13 key Florida counties. Work to implement these rules continued in 1995. Although it is too soon to judge their effectiveness, vessel-related manatee deaths since 1989 have been relatively stable after a steady increase in the 1980s. The State of Florida, the Army Corps of Engineers, and the South Florida Water Management District also made encouraging progress in 1995 to develop pressure-sensitive gate-reversing mechanisms to prevent manatee entrapment in water control structures.

Progress was also made in 1995 to complete a revised Florida manatee recovery plan and to test a new approach for returning long-term captive manatees to the wild. A potential problem for the recovery program arose late in 1995 when the National Biological Service had to consider substantial cuts in its manatee research program to meet proposed agency budget reductions. The reductions could impede the flow of information on the status and ecology of Florida manatees needed to make informed management decisions.

Hawaiian Monk Seals — Hawaiian monk seals are one of the world's most endangered seals. Sensitive to human disturbance, they occur almost exclusively on and around small, remote islets in the Northwestern Hawaiian Islands. The number of Hawaiian monk seals has decreased significantly in recent years for reasons that are not certain. However, recovery prospects in some areas were improved by recent decisions to close a Coast Guard LORAN station on Kure Atoll and a Naval Air Station on the Midway Islands — two of the species' six

major pupping sites. To enhance recovery, the National Marine Fisheries Service increased its efforts in 1995, and the Commission held a monk seal recovery program planning meeting to develop recommendations to involved agencies.

A major focus of attention in 1995 was on restoring the monk seal breeding colony on the Midway Islands. The Navy took steps to clean up contaminants and wildlife hazards from its air station, to transfer ownership of the Islands to the Fish and Wildlife Service for use as a national wildlife refuge, and to develop a funding proposal under the Department of Defense Legacy Program to move rehabilitated monk seals to Midway. Navy efforts to clean up and transfer Midway proceeded well, but the proposal to move seals to Midway, while given high priority, was not funded because late in 1995 funding for the program was rescinded.

Another important issue in 1995 was assessing the effect of lobster fishing on seal prey at French Frigate Shoals. The largest component of the species' decline has been at this site and appears to be food-related. Other matters receiving attention were expanding and improving efforts to rehabilitate underweight monk seals taken from French Frigate Shoals and reducing attacks by adult male seals that have caused death and serious injuries to female and juvenile seals at Laysan Island.

Steller Sea Lions — Steller sea lions, currently listed as threatened under the Endangered Species Act, have experienced the most extensive decline of any marine mammal in U.S. waters over the past 30 years. Recent studies indicate there are two stocks of Steller sea lions. The eastern stock ranges from the central Gulf of Alaska to California and appears stable. The western stock, which once included 90 percent of all Steller sea lions, ranges from the central Gulf of Alaska to Japan and has declined 80 percent from 1960 levels. Reduced availability of prey, which includes fish species taken commercially, is hypothesized to be the leading cause of the decline.

In 1995 the National Marine Fisheries Service proposed to reclassify the western stock as endangered. The Commission supported the Service's reclassification proposal and recommended actions to better assess the causes of the decline and to develop possible management actions. The Service also completed assessments for both Steller sea lion stocks and initiated efforts to develop a co-management agreement with Alaska Natives who take Steller sea lions for subsistence purposes.

Northern Right Whales — The most endangered marine mammal in U.S. waters is the northern right whale. The largest surviving population, numbering little more than 300 animals, occurs seasonally in three locations off the U.S. Atlantic coast and two areas off Canada. One-third of this population's known mortality is attributed to two human causes — collisions with ships and entanglement in fishing gear. At the recommendation of the Commission, the National Marine Fisheries Service completed a recovery plan in 1994. To help implement its provisions, the Service established two regional interagency teams — a southeast team to protect whales in a winter calving area off Florida and Georgia and a northeast team to protect whales on two summer feeding areas. In 1995 the southeast team continued to coordinate a seasonal early-

warning aerial survey network to alert ships in transit of the presence of right whales. The northeast team met several times in 1995 to consider a similar early-warning network in the northeast and options to seasonally limit fishing gear known to entangle whales in high-use right whale habitats. Little progress was made.

Gulf of Maine Harbor Porpoises — The largest incidental take of any cetacean in U.S. waters is the catch of harbor porpoises in the sink gillnet fishery off New England. Estimated take levels ranged between 1,200 and 2,900 porpoises per year during the early 1990s. Additional animals from the same stock are taken in gillnet fisheries in the Bay of Fundy, Canada, and in coastal waters between New York and North Carolina. The total take is believed to exceed the stock's sustainable replacement level and, with no measures in place to reduce the take, the National Marine Fisheries Service proposed listing the stock as threatened in 1993.

In 1992 fishermen and scientists supported by the Service began testing acoustic devices to reduce porpoise bycatch. Tests late in 1994 were promising and fishing was permitted in several otherwise closed areas by vessels using pinger-equipped nets in 1995. Other management efforts, however, were less successful. The New England Fishery Management Council, at the request of the Service, recommended time-area closures for sink gillnets; these were instituted in spring 1994 in an attempt to reduce take levels by 20 percent. They apparently did not prevent a substantial increase in bycatch levels in 1994. In 1995 the Service was able to complete only preliminary analyses of 1994 bycatch data, and the delay contributed to a lag in instituting stronger measures in 1995.

In 1995, pursuant to the 1994 amendments to the Marine Mammal Protection Act, the Service completed a stock assessment for Gulf of Maine harbor porpoises. It concluded that the stock's potential biological removal level is 403 porpoises a year and that the stock is a strategic stock. Therefore late in 1995 the Service took steps to convene a take reduction team. The team will have six months to develop a recommended plan to reduce incidental-take levels so that total human-caused mortality does not exceed 403 porpoises per year. Statutory time frames for implementing the plan call for measures to be in place early in 1997.

Marine Mammal-Fisheries Interactions (Chapter IV)

Marine mammals are caught and killed incidentally in commercial fisheries, damage fishing gear and caught fish, and compete with fishermen for fish and shellfish. In 1994 the Marine Mammal Protection Act was amended to establish a new regime to govern the incidental take of marine mammals in fisheries. The regime requires development of stock assessments for each marine mammal stock in U.S. waters to provide a scientific basis for management actions, a system for classifying individual fisheries by the frequency with which they take marine mammals, registration and reporting requirements for fishermen, and the development of measures to reduce incidental taking to specified levels.

In consultation with the Commission and others, the National Marine Fisheries Service and the Fish and Wildlife Service developed, and in 1995 completed, stock assessments for 145

and 8 marine mammal stocks, respectively. Also in consultation with the Commission and others, the National Marine Fisheries Service developed regulations in 1995 to classify fisheries by incidental-take levels and took steps to develop take reduction plans in 1996 for certain strategic marine mammal stocks most affected by fisheries.

Exempted from the new incidental-take regime is the eastern tropical Pacific purse seine fishery for yellowfin tuna. The incidental take of dolphins in this fishery, which was once as high as 500,000 dolphins annually, has been reduced to less than 5,000. The fishery has been and continues to be subject to separate provisions of the Act and to management under an international program. In 1995 legislation was considered to amend the Act to place U.S. tuna fishermen on an equal footing with foreign fishermen and to recognize the success of the international program in reducing dolphin mortality.

In certain areas, predation by seals and sea lions has affected recovery of depleted salmon stocks or interfered with aquaculture operations. The 1994 amendments authorize the killing of individual animals contributing to such problems when other possible solutions prove ineffective. In 1995 actions were considered to protect an endangered steelhead trout run in Seattle, Washington, from California sea lion predation. Steps also were taken to assess interactions between harbor seals and aquaculture operations in the Gulf of Maine.

International Aspects of Marine Mammal Protection and Conservation (Chapter V)

The Marine Mammal Protection Act directs the Commission to advise the Secretary of State and other Federal officials on policies and international arrangements for the protection and conservation of marine mammals. In response to this directive, the Commission in 1995 initiated efforts to update the compendium of marine-related treaties and international agreements published in 1994; completed a series of workshops and studies to determine steps that can be taken to improve conservation and management of wild living resources worldwide; provided advice to the U.S. Commissioner to the International Whaling Commission on matters related to implementation of the International Convention for the Regulation of Whaling; and worked with the Department of State, the National Oceanic and Atmospheric Administration, the National Science Foundation, and other Federal agencies and non-governmental organizations to further conservation of marine mammals and other components of the Antarctic marine ecosystem. These and related activities are described in this chapter.

Activities Related to Marine Mammals in the Arctic (Chapter VI)

Many species of marine mammals can be affected by activities in the Arctic. This chapter describes actions by the Commission and others in 1995 to implement the Arctic Environmental Protection Strategy adopted by eight Arctic nations in 1991; develop cooperative agreements to govern conservation of the polar bear and walrus populations shared by the United States and the Russian Federation; implement the provisions of the 1994 Marine Mammal Protection Act amendments authorizing the Secretary of the Interior to issue permits to import

sport-hunted polar bear trophies from Canada; and determine the causes of and steps that might be taken to reverse the alarming declines in populations of northern fur seals, Steller sea lions, harbor seals, and piscivorous birds that have occurred in parts of the Bering Sea and the Gulf of Alaska since the mid-1970s.

Marine Mammal Strandings and Die-Offs (Chapter VII)

Since the late 1970s there has been an apparent increase in the incidence of unusual marine mammal mortalities throughout the world. In 1995 there were two unusual mortality events reported. One involved more than 200 common dolphins along the northwest coast of the Gulf of California, Mexico. Cyanide compounds were found in liver and lung samples taken from the dolphins, but a possible source was not identified. The other involved 10 sea otters found in a seven-day period in July in central California. The cause of these deaths could not be determined.

In response to the deaths of hundreds of bottlenose dolphins along the U.S. mid-Atlantic coast in 1987-1988, Congress enacted the Oceans Act of 1992. This Act added a new title (Title IV) to the Marine Mammal Protection Act, entitled Marine Mammal Health and Stranding Response. This new section directs the Secretary of Commerce to establish a working group to provide advice on measures necessary to better detect and respond to future unusual mortality events and to develop a contingency plan for guiding response to such events. The working group has been established and at the end of 1995 the required contingency plan had been completed for publication in 1996.

Impacts of Marine Debris (Chapter VIII)

Lost and discarded plastic debris, such as ropes, bags, and bottles, has become a serious form of marine pollution. Through entanglement and ingestion, such debris can be a significant source of mortality and serious injury for marine mammals, seabirds, sea turtles, fish, and shellfish. As these impacts came to light, the Commission took a leadership role in initiating responsive domestic and international action in the 1980s, and it has continued to help identify needed efforts. Recent analyses by the Commission indicate that the most hazardous items are rope, line, and derelict gear from commercial fisheries. A 1995 Commission review of information on the catch of marine life in derelict gear (*i.e.*, ghostfishing) indicates that, in addition to posing a hazard to marine mammals, there could be significant impacts to some commercially valuable shellfish and fish resources. The Commission has identified actions needed to assess and mitigate such impacts, but to date little has been done to implement them.

The principal source of Federal support for work, such as organizing national volunteer beach clean-ups, initiating port programs to recycle and dispose of old fishing gear, and disentangling Hawaiian monk seals, has been the National Marine Fisheries Service's Marine Entanglement Research Program. In 1995, as in past years, the Commission helped identify program priorities. Unfortunately, late in 1995 appropriation of funds to support the program

was discontinued. Loss of the program will substantially reduce efforts to address marine debris pollution in 1996 and beyond.

In other developments, changes recommended by the Coast Guard were adopted to strengthen the international convention governing the discharge of garbage by ships (*i.e.*, Annex V of the International Convention for the Prevention of Pollution from Ships). Also, the Navy continued efforts to bring its ships into compliance with Annex V by statutory deadlines.

Outer Continental Shelf Oil and Gas Exploration and Development (Chapter IX)

Marine mammals may be affected by oil spills, routine discharges, noise, vessel and air traffic, and other perturbations caused by activities associated with offshore oil and gas development. The Minerals Management Service has lead responsibility for ensuring that such activities do not adversely affect marine mammals, their habitat, or their availability to be taken for subsistence purposes by Alaska Natives. In 1995 the Commission commented to the Service on plans for two proposed oil and gas lease sales in Alaska and four proposed lease sales in the Gulf of Mexico.

Research and Studies Program (Chapter X)

The Marine Mammal Protection Act directs the Marine Mammal Commission to undertake such studies as it deems necessary to further the purposes of the Act. In 1995 the Commission's research budget was about $100,000 and was used, in part, to begin updating the Commission's 1993 compendium of international treaties and agreements; prepare and publish a report describing the results of the Commission's 1994 workshop to update principles for wild living resource conservation; help curate a photo-identification catalogue of North Atlantic humpback whales; develop a database and suggested data collection protocol for harbor seals hunted for subsistence purposes by Natives in Alaska; assess new and developing research technologies that might be applied to further marine mammal research; monitor recently reestablished gray seal colonies in New England; evaluate key baleen whale habitat components that are particularly important for managers to recognize and protect; help complete and publish the results of studies left unfinished by the death of Francis H. Fay, Ph.D., an eminent marine mammal biologist; and carry out a survey of federally-funded marine mammal research.

The Commission also received funds in 1995 from the National Marine Fisheries Service, the Navy, and the State Department to convene a technical workshop on the use of sound generators and reflectors to reduce marine mammal interactions with fishing gear, to assess the probability of sighting right whales from aerial survey planes operating off Georgia and northern Florida, and to help update the Commission's compendium of treaties and agreements.

Permits and Authorizations To Take Marine Mammals (Chapter XI)

As exceptions to the Marine Mammal Protection Act's moratorium on taking marine mammals, permits may be obtained to take marine mammals for scientific research, public display, and enhancing marine mammal populations. These are issued by the National Marine Fisheries Service and the Fish and Wildlife Service, in consultation with the Commission. Amendments to the Act in 1994 establish a new permit category to allow harassment during commercial and educational photography and also streamline the process for authorizing scientific research that involves only non-injurious disturbance.

In 1995 the Commission reviewed and commented on 34 permit applications and 45 requests for permit modifications. The activities of 17 researchers were authorized under the streamlined general authorization for scientific research. Particular attention was given to permits for research to assess the possible effects of the Acoustic Thermometry of Ocean Climate (ATOC) Program, which involves powerful underwater sound sources to measure broad ocean basin temperature change. The first application for a photography permit was also received.

The Marine Mammal Protection Act also authorizes the National Marine Fisheries Service and the Fish and Wildlife Service to issue regulations for authorizing the take of small numbers of marine mammals incidental to activities other than commercial fishing, provided the taking would have a negligible impact on marine mammal stocks. The 1994 amendments provided a streamlined process when only harassment is involved. In 1995 small-take authorizations were issued for rocket launches at Vandenberg Air Force Base in California, seismic surveys off California, oil and gas exploration off Alaska, explosive removal of old oil and gas platforms in the Gulf of Mexico, and a dock construction project in the State of Washington.

Marine Mammals in Captivity (Chapter XII)

The handling, care, treatment, and transportation of captive marine mammals is regulated by the Animal and Plant Health Inspection Service under the Animal Welfare Act. In 1994 the Marine Mammal Protection Act was amended to reduce the authority of the National Marine Fisheries Service and the Fish and Wildlife Service over such matters. In light of the changes, the Commission offered to convene an interagency panel to review the Animal and Plant Health Inspection Service's marine mammal program to identify staffing and funding needs. It also provided the Service with a draft report to guide the review. The review has not yet been undertaken.

In 1995 the Animal and Plant Health Inspection Service pursued two new rulemaking efforts. In January it published proposed rules to regulate swim-with-the-dolphin programs (previously regulated by the National Marine Fisheries Service under the Marine Mammal Protection Act). Final rules are expected in 1996. The Service also began a negotiated rulemaking process to update standards for the care and maintenance of marine mammals. The

first meeting of the negotiated rulemaking advisory committee was held in September 1995 and a final meeting is scheduled for spring 1996.

The export of marine mammals to foreign countries has been controversial because standards for foreign facilities are often lower than those in the United States, and animals may be subjected to inhumane conditions. Amendments to the Marine Mammal Protection Act enacted in 1994 require that permits to export live marine mammals be granted only if foreign facilities meet standards comparable to U.S. requirements. The Commission has provided advice to the Animal and Plant Health Inspection Service on how best to implement the requirement, including a recommendation that comparability determinations be based in part on inspection of the foreign facilities in question.

Appendices

Appendix A lists recommendations made by the Marine Mammal Commission in 1995. Appendix B lists Commission-sponsored reports published by the National Technical Information Service. Appendix C lists citations for other papers and reports, which also result from Commission-sponsored work, that have been published elsewhere.

Chapter I

INTRODUCTION

This is the 23rd Annual Report of the Marine Mammal Commission, covering the period 1 January through 31 December 1995. It is being submitted to Congress pursuant to section 204 of the Marine Mammal Protection Act of 1972.

Established under Title II of the Act, the Marine Mammal Commission is an independent agency of the Executive Branch. It is charged with developing, reviewing, and making recommendations on the actions and policies of all Federal agencies with respect to marine mammal protection and conservation and with carrying out a research program.

Personnel

The Commission consists of three part-time Commissioners appointed by the President. The Marine Mammal Protection Act requires that Commissioners be knowledgeable in marine ecology and resource management. At the end of 1995 the Commissioners were John E. Reynolds, III, Ph.D., (Chairman), Eckerd College, St. Petersburg, Florida; Paul K. Dayton, Ph.D., Scripps Institution of Oceanography, La Jolla, California; and Vera Alexander, Ph.D., University of Alaska, Fairbanks. During 1995 Jack W. Lentfer, Homer, Alaska, completed his term of service on the Commission.

The Commission's full-time staff members are John R. Twiss, Jr., Executive Director; Robert J. Hofman, Ph.D., Scientific Program Director; David W. Laist, Policy and Program Analyst; Michael L. Gosliner, General Counsel; Gregory K. Silber, Ph.D., Deputy Scientific Program Director; Alison G. Kirk, Permit Officer; Nancy L. Shaw, Administrative Officer; Lisa R. Jackson, Staff Assistant in charge of publications; and Darel E. Jordan and Susan E. Holcombe, Staff Assistants. Anne K. Kiley served as Administrative Officer from 1990 to 1995, when she moved from the area.

The Commission Chairman, with the concurrence of other Commissioners, appoints persons to the nine-member Committee of Scientific Advisors on Marine Mammals. Committee members must by statute be scientists who are knowledgeable in marine ecology and marine mammal affairs. At the end of 1995 its members were Robert L. Brownell, Jr., Ph.D., (Chairman), National Marine Fisheries Service, La Jolla, California; Daryl J. Boness, Ph.D., Smithsonian Institution, Washington, D.C.; Daryl P. Domning, Ph.D., Howard University, Washington, D.C.; Joseph R. Geraci, V.M.D., Ph.D., National Aquarium, Baltimore, Maryland; Steven K. Katona, Ph.D., College of the Atlantic, Bar Harbor, Maine; Lloyd F. Lowry, Alaska Department of Fish and Game, Fairbanks; Bruce R. Mate, Ph.D., Oregon State University, Newport; Jeanette A. Thomas, Ph.D., Western Illinois University, Macomb; and Judith E. Zeh, Ph.D., University of Washington, Seattle.

During 1995 Marc Mangel, Ph.D., University of California, Davis; William Medway, D.V.M., Ph.D., University of Pennsylvania, Philadelphia; and Tim D. Smith, Ph.D., National Marine Fisheries Service, Woods Hole, Massachusetts, completed their terms of service on the Committee.

During 1995 Mr. Caleb Pungowiyi, President of the Inuit Circumpolar Conference and resident of Anchorage and Kotzebue, Alaska, served as Special Advisor to the Marine Mammal Commission on Native Affairs.

Funding

Appropriations to the Marine Mammal Commission's in the past five fiscal years have been: FY 1991, $1,153,000; FY 1992, $1,250,000; FY 1993, $1,260,000; FY 1994, $1,290,000; and FY 1995, $1,384,000. As of 31 December 1995 the Commission's appropriation for FY 1996 had not yet been determined.

Chapter II

REAUTHORIZATION OF THE MARINE MAMMAL PROTECTION ACT AND RELATED LEGISLATION

Several Federal statutes govern activities that affect marine mammals and their ecosystems. Foremost among them is the Marine Mammal Protection Act. Also important are the Endangered Species Act of 1973 and the Magnuson Fishery Conservation and Management Act of 1976.

The Marine Mammal Protection Act provides that the primary objective of marine mammal management should be to maintain the health and stability of the marine ecosystem. Secondarily, whenever consistent with this objective, it should be the goal to obtain an optimum sustainable population of each stock, keeping in mind the carrying capacity of the habitat. In 1994 the Marine Mammal Protection Act was amended and reauthorized for a six-year period. A brief summary of the amendments and steps taken to implement them is provided below.

As noted in Chapter III, several marine mammal species are listed as endangered or threatened under the Endangered Species Act. This Act provides additional protection to these species, including the requirement that actions taken, funded, or authorized by Federal agencies not be likely to jeopardize the species' continued existence or destroy or adversely modify the species' critical habitat. The primary goal of the Endangered Species Act is to restore listed species to a point where the Act's protection is no longer needed.

The Magnuson Act establishes the framework for managing U.S. fishery resources. As such, it has several implications for marine mammals that may compete with fishermen for the same fish and shellfish resources or that may be taken incidentally.

Authorization for the Endangered Species Act expired at the end of fiscal year 1992, and authorization for the Magnuson Act expired at the end of fiscal year 1993. Although bills were introduced in Congress to reauthorize these statutes, no final action was taken. Efforts undertaken during 1995 to effect amendment and reauthorization of these measures are discussed below.

Marine Mammal Protection Act

The Marine Mammal Protection Act was originally enacted in 1972. Since then, it has been reauthorized and amended several times, most recently in 1994. As discussed in the previous annual report, the 1994 amendments (Public Law 103-238) reauthorize appropriations through fiscal year 1999 for the Marine Mammal Commission and the Departments of Commerce and the Interior (the agencies primarily responsible for implementing the Act) and make substantial changes to many of its provisions. A summary of the amendments is included in Appendix D in Commission's annual report for 1994.

The most significant amendments establish a new regime to govern the take of marine mammals incidental to commercial fishing operations. The new regime replaces the interim exemption that had been in place since 1988. Three new sections were added to the Act to address interactions between commercial fisheries and marine mammals. Section 117 requires the preparation of marine mammal stock assessments to provide a scientific basis for the new incidental-take regime. The assessments, among other things, identify strategic stocks for which take reduction plans are needed.

Section 118 sets forth requirements for the new incidental-take regime. It directs the National Marine Fisheries Service to publish a list of commercial

fisheries classified according to the frequency with which they kill or seriously injure marine mammals. Various requirements (*e.g*, a registration requirement and a requirement to carry observers) apply, depending on a fishery's classification. The amendments focus resources on the most pressing marine mammal-fishery interaction problems – those involving strategic stocks. A take reduction plan is to be developed for each strategic stock experiencing frequent or occasional death or serious injury in a fishery.

The new regime also includes a mechanism for authorizing a limited incidental take of marine mammals listed as endangered or threatened, something the interim exemption did not allow. Actions taken with respect to preparation of stock assessments, implementation of the new incidental-take regime, and authorization of the incidental take of endangered or threatened species are discussed in various parts of Chapter III and in Chapter IV. Also discussed in Chapter IV is implementation of revised section 101(a)(4), which allows fishermen and others to employ certain non-lethal deterrence measures to prevent marine mammals from damaging gear, catch, or private property.

The new section 120 addresses interactions between pinnipeds and fishery resources. It provides a mechanism for states to apply to the National Marine Fisheries Service to obtain authorization for the intentional lethal taking of pinnipeds in certain instances. Section 120 also directs the Service to investigate the impacts of growing sea lion and harbor seal populations on the recovery of salmonid stocks and on coastal ecosystems in Washington, Oregon, and California and to establish a pinniped-fishery interaction task force to examine problems involving pinnipeds and aquaculture projects in the Gulf of Maine. Implementation of these provisions is discussed in Chapter IV.

Significant amendments to the Act's permit provisions were also enacted. Among other things, they limit oversight of captive care and maintenance issues under the Marine Mammal Protection Act, provide a streamlined mechanism to authorize scientific research that has the potential to disturb, but not injure, marine mammals, and add authority for issuing permits for educational or commercial photography. The Act's small-take provisions also were changed to streamline procedure for authorizing incidental take by harassment. These and other amendments affecting permits and marine mammal take authorizations are discussed in Chapter XI.

A practical consequence of the amendment limiting Marine Mammal Protection Act oversight of captive marine mammals was an increase in the role played by the Animal and Plant Health Inspection Service under the Animal Welfare Act. Among other things, the Service assumed responsibility for regulating swim-with-the-dolphin programs. Activities with respect to captive marine mammals are discussed in Chapter XII.

The 1994 amendments add a new permitting authority to allow polar bear trophies to be imported from Canada provided certain findings are made. This amendment and actions taken to implement it are discussed in Chapter VI.

Section 110 of the Act was amended to require the Secretary of Commerce to convene a regional workshop to assess human-caused factors affecting the health and stability of the Gulf of Maine marine ecosystem and to recommend a research and management program designed to restore or maintain that ecosystem. A provision was also added to require the Secretary to undertake a research program to monitor the health and stability of the Bering Sea marine ecosystem and to resolve uncertainties concerning the causes of observed declines in populations of marine mammals, seabirds, and other living resources. Actions related to the Gulf of Maine workshop are discussed in Chapter IV. Actions involving Bering Sea ecosystem studies are described in Chapter VI.

In response to concerns that the Agreement on the Conservation of Polar Bears may not have been fully implemented by the United States and other parties, Congress amended section 113 of the Act to require the Secretary of the Interior to initiate reviews of domestic and international implementation. The amendments also directed the Secretary to initiate discussions with Russian officials in pursuit of a bilateral agreement to enhance cooperative research and management of the shared polar bear population. Actions with respect to these mandates are discussed in Chapter VI.

As discussed in Chapter IV, bills to amend the Act's tuna-dolphin provisions were introduced in both Houses of Congress. The only other bill introduced in 1995 to amend the Marine Mammal Protection Act was H.R. 74. That bill, introduced by Representative Porter Goss, would authorize states to reject permits allowing the take of marine mammals from protected state waters.

Endangered Species Act

The Endangered Species Act was last reauthorized in 1988 for a five-year period. Despite efforts over the past four years, Congress has yet to pass reauthorizing legislation. At the heart of the reauthorization debate is the interplay between the protection afforded listed species and economic interests, including protection of private property rights.

No fewer than 16 bills to amend the Endangered Species Act were introduced in Congress during 1995. Some bills were directed at specific aspects of the Act. For example, H.R. 571, S. 191, and S. 503 would establish a moratorium on new species listings until the Act is reauthorized. Other bills would provide compensation to landowners for losses resulting from regulatory actions under the Act, amend the consultation requirements applicable to Federal actions, require a review and relisting of all listed species, require a review of the Act's impacts on hunting, fishing, and fish and wildlife management, and establish mechanisms to improve the flow of information between Federal and local governments.

Other bills contained comprehensive amendments and reauthorizing language. The first such bill, S. 768, was introduced by Senator Slade Gorton on 9 May. The Gorton bill would revise the process for listing species by establishing formal peer review procedures for all proposals to list species or designate critical habitat and by requiring consideration of captive-bred populations when making listing determinations. Also, the implications of listing would be changed by deferring application of the Act's protection pending completion of a conservation plan for a species. The section 7 consultation process would be modified to allow Federal actions to proceed despite issuance of a "jeopardy" biological opinion, if reasonable and prudent alternatives would be inconsistent with the agency's primary mission, and to require preparation of risk assessment and cost/benefit analyses. Other key features of the Gorton bill would redefine "harm" to exclude habitat modification that does not directly kill or injure an identifiable member of an endangered species and add a policy statement to ensure reasonable use of private property and avoid any significant diminishment of property values.

One provision of the Gorton bill of particular concern to the Commission would provide a broad exemption allowing the incidental take of listed marine species other than fish where the take results from otherwise lawful activities and occurs in the territorial sea or exclusive economic zone of the United States.

Representatives Don Young and Richard Pombo introduced H.R. 2275 on 7 September. This bill, which draws on many of the elements of the Gorton bill, is the only Endangered Species Act bill to be ordered out of committee during 1995.

Currently, the purposes of the Act include ecosystem conservation, conservation of listed species, and taking appropriate steps to achieve the purposes of international agreements related to endangered and threatened species. These would be revised under H.R. 2275, such that a primary purpose of the Act would be to provide a feasible and practical means of conserving listed species consistent with protecting the rights of private property owners and ensuring economic stability. Also, the specific goal to conserve ecosystems would no longer be recognized.

In keeping with the revised statement of purposes, the Young-Pombo bill would prohibit any Federal action under the Endangered Species Act that diminishes the value of any portion of privately owned property by 20 percent or more unless full compensation is offered. If the diminution of value exceeds 50 percent, the Federal agency, at the owner's discretion, would be required to buy that portion of the property at fair market value. Any such compensation would be paid from the agency's annual appropriations. However, if the action arises from a requirement imposed by another agency (*e.g.*, under a biological opinion issued by the Fish and Wildlife Service or the

National Marine Fisheries Service), then partial or full reimbursement from the agency imposing the requirement could be sought.

Other provisions of H.R. 2275 would exempt captive-bred wildlife from coverage under the Endangered Species Act, the Marine Mammal Protection Act, and other wildlife statutes if the progeny are not intentionally released to the wild. This could cause conservation problems for some listed species by allowing unrestricted imports and trade even when the captive breeding program is based on capturing parental stock from the wild at an unsustainable level.

Listing decisions would be made subject to additional review. Before proposing a listing, the Secretary would be required to solicit status information from the public for a minimum period of 180 days. Public hearings on the listing proposal would be mandatory in each state where the species occurs. Designation of critical habitat along with a species listing, however, would be made discretionary. In addition, all listing proposals would be subject to a formal peer review requirement. Findings of biological opinions issued under section 7 would also be subject to the new peer review requirements.

Under H.R. 2275, once a species is listed, the Secretary would establish a conservation objective, ranging from recovery of the species to merely prohibiting intentional taking. A conservation plan to achieve the stated objective would then be prepared. Generally, incidental taking would not be prohibited and consultation would not be required until a conservation plan is adopted.

Appropriations for activities under the Act would be authorized by the Young-Pombo bill through fiscal year 2001 at significantly increased levels. However, as is the current procedure, actual funding levels would be set through enactment of annual appropriations measures.

Believing the Young-Pombo bill to be too sweeping, Representatives Wayne Gilchrest and Jim Saxton introduced more moderate proposals. Representative Gilchrest introduced H.R. 2374 on 21 September. Representative Saxton introduced H.R. 2444 on 29 September. Inasmuch as the Young-Pombo bill was reported out of House Resources Committee on 12 October, the fates of these bills is uncertain.

On 26 October Senator Dirk Kempthorne introduced a package of three bills related to the Endangered Species Act. The primary bill, S. 1364, would amend and reauthorize the Act. The other two bills, S. 1365 and 1366, would amend the federal tax code to provide incentives for landowners to enter into conservation easement agreements to protect endangered species habitat.

S. 1364 has many features in common with the Young-Pombo bill. The Kempthorne bill, however, has several unique provisions. The term "Secretary" would be redefined, effectively shifting Endangered Species Act responsibilities for marine species from the Department of Commerce to the Department of the Interior. The term "species" would be redefined so that subspecies and distinct vertebrate populations could be listed only if there is a complete lack of gene flow between population segments. Moreover, if a distinct population segment is listed, only minimal protection would be provided unless a special finding of national significance were made. The definition of an endangered species would be amended to require a showing that, without listing, the species would be placed on an irreversible course to extinction within 40 years. A threatened species would be one that would become an endangered species within 100 years without the protection afforded by the Act. The term "take" would also be redefined to eliminate those aspects that do not entail physical injury or capture (*e.g.*, harassment and pursuit) and to restrict the types of habitat modification that would constitute a taking.

The Kempthorne bill, like the Young-Pombo bill, would establish a right to compensation for the diminishment of property values resulting from Endangered Species Act activities. The right to compensation under the Kempthorne bill, however, would not be subject to a 20 percent threshold — any diminution in value would be compensable.

Another unique feature of the Kempthorne bill would be the creation of a five-member Endangered Species Commission. Each member would be a recognized authority in one of five disciplines — botany, zoology, ecology, resource management, or

economics. Among other things, the commission would oversee establishment of assessment and planning teams to review listing proposals.

At the end of 1995 Congressional schedules for further consideration of Endangered Species Act legislation were uncertain.

Magnuson Fishery Conservation and Management Act

The Magnuson Fishery Conservation and Management Act was last reauthorized in 1990 for a four-year period. Although reauthorizing legislation was considered during the 1993 and 1994 sessions of Congress, no bill was passed. Bills to reauthorize and amend the Magnuson Act were introduced in both Houses of Congress early in the 1995 session.

On 4 January Senator Ted Stevens introduced S. 39 to reauthorize the Magnuson Act through 1999. The bill would also amend the Act to strengthen conservation efforts and rebuild depleted fish stocks. Among other things, the amendments would require fishery management councils to define in each fishery management plan what constitutes overfishing. The Secretary of Commerce would be required to report annually on the status of fisheries and to identify fisheries that are at or approaching overfished levels. Other measures included in the bill to address overfishing are individual transferable quota systems and vessel buy-out programs. These approaches would reduce or limit fishing effort in overfished fisheries.

The bill would require identifying essential habitat for all managed fisheries. It also would expand the authority of the Secretary and fishery management councils to make recommendations on Federal actions affecting such habitat.

The Stevens bill would require fishery management plans to assess the level of bycatch in each fishery and to include measures to minimize waste and discards of unusable fish. In addition, the bill would encourage plans to provide incentives for fishermen to reduce bycatch. Other provisions of the bill would streamline the process for approving fishery management plans and implementing regulations. The bill would also establish new procedures governing conflicts of interest involving members of fishery management councils.

Several hearings to consider various aspects of S. 39 were held by the Senate Commerce Committee during 1995. Further action is expected in 1996, including introduction of a substitute bill.

Congressman Don Young introduced H.R. 39 on 5 January 1995. While somewhat different than the Stevens bill at the outset, many of the differences were reconciled as H.R. 39 proceeded through the legislative process. An amended version of H.R. 39 was passed by the House of Representatives on 18 October 1995. If enacted, the bill would authorize appropriations to carry out the provisions of the Magnuson Act through fiscal year 2000.

H.R. 39 would establish new requirements for fishery management plans. It would require fishery management plans to indicate the amount and species of bycatch and include conservation and management measures necessary to minimize bycatch. Each fishery management plan would be required to include a description of essential fishery habitat and set forth conservation and management measures necessary to minimize adverse impacts to that habitat caused by fishing. Under the House bill, a fishery management plan would also be required to include a measurable and objective determination of what constitutes overfishing in that fishery. Action by the Secretary of Commerce and the appropriate fishery management council would be required if it is determined that overfishing is occurring or has occurred. Definitions of "bycatch," "essential fishery habitat," and "overfishing" are included in the bill.

The bill would provide authority for limiting access to certain fisheries through establishment of individual quota systems. Such quotas would not be transferrable and user fees would be collected from quota holders. The bill would also amend provisions governing the operation of fishery management councils. Most notably, council members would be required to disclose their financial interests and recuse themselves from voting on matters in which such interests would be significantly affected.

Chapter III

SPECIES OF SPECIAL CONCERN

Section 202 of the Marine Mammal Protection Act directs the Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, to make recommendations to the Department of Commerce, the Department of the Interior, and other agencies on actions needed to protect marine mammals. To help meet this charge, the Commission devotes special attention to particularly vulnerable species and populations. Such species may include marine mammals listed as endangered or threatened under the Endangered Species Act, or depleted under the Marine Mammal Protection Act (Table 1), as well as others species or populations facing special conservation challenges.

During 1995 special attention was directed to a number of endangered, threatened, or depleted species or populations found in the United States and elsewhere. These include Florida manatees, Hawaiian monk seals, Steller sea lions, northern fur seals, sea otters, northern right whales, humpback whales, bowhead whales, and vaquitas. Other species not listed but which nonetheless received special attention in 1995 include harbor seals in Alaska, Pacific walruses, gray whales, harbor porpoises in the Gulf of Maine, beluga whales, and polar bears.

Florida Manatee
(Trichechus manatus latirostris)

The Florida manatee, one of two distinct subspecies of the West Indian manatee, occurs only in coastal waters and rivers in the southeastern United States. The other subspecies, the Antillean manatee (*T. manatus manatus*), occupies the remainder of the species' range in the Greater Antilles in the Caribbean, the east coast of Central America, and the northeast coast of South America. As herbivorous marine mammals, West Indian manatees feed on underwater grass beds, marsh grasses, and algae, and can exceed lengths of 3.5 meters (11.5 feet) and weights of 1,000 kilograms (2,200 pounds).

Florida manatees exhibit a high degree of independence in their movements. In winter, when water temperatures fall below about 68 degrees, they aggregate at localized warm-water refuges, principally in the southern portions of their range. Preferred winter refuges for most animals include natural warm-water springs and heated outfalls from industrial facilities, such as power plants and paper mills. A few animals use warm-water refuges as far north as southern Georgia. Some animals also occur at the southern tip of Florida in the Florida Everglades where water temperatures stay above 68 degrees year-round. As water temperatures rise in spring, manatees begin to disperse throughout Florida, and by late spring and summer, some animals migrate hundreds of kilometers northward up the Atlantic coast or westward along the northern rim of the Gulf of Mexico at least as far as the Texas coast.

The manatee population in the southeastern United States is the species' largest known concentration. In 1992, during a severe winter cold front when most manatees were thought to be at warm-water refuges, the State of Florida organized a two-day aerial survey of known winter manatee habitats in Florida and Georgia. The synoptic survey yielded a count of 1,856 animals with approximately equal numbers on the Atlantic and Gulf of Mexico coasts. Similar counts in 1991 and earlier in 1992 produced lower numbers. In January 1995 the Florida Department of Environmental Protection conducted a fourth survey, yielding a count of 1,443 animals, including 665 animals on the east coast and 778 animals on the west coast. Although lower counts were obtained, there was a general consensus that this was due to sampling variability rather than a decrease in population size.

Table 1. Marine mammal species and populations listed as endangered (E) or threatened (T) under the Endangered Species Act and depleted (D) under the Marine Mammal Protection Act, as of 31 December 1995[1]

Common Name	Scientific Name	Status	Range
Manatees and Dugongs			
West Indian manatee	*Trichechus manatus*	E/D	Eastern North, Central, and South America coasts and rivers from southeast United States to Brazil; Puerto Rico and other Greater Antilles Islands
Amazonian manatee	*Trichechus inunguis*	E/D	Amazon River basin of South America
West African manatee	*Trichechus senegalensis*	T/D	West Africa coasts and rivers; Senegal to Angola
Dugong	*Dugong dugon*	E/D	Northern Indian Ocean from Madagascar to Indonesia; Philippines; Australia; southern China; Palau
Otters			
Marine otter	*Lutra felina*	E/D	Western South America; Peru to southern Chile
Southern sea otter	*Enhydra lutris nereis*	T/D	Central California coast
Seals and Sea Lions			
Hawaiian monk seal	*Monachus schauinslandi*	E/D	Hawaiian Archipelago
Caribbean monk seal	*Monachus tropicalis*	E/D	Caribbean Sea and Bahamas (probably extinct)
Mediterranean monk seal	*Monachus monachus*	E/D	Mediterranean Sea; Atlantic coast of northwest Africa
Guadalupe fur seal	*Arctocephalus townsendi*	T/D	West coast of Baja California, Mexico, to southern California
Northern fur seal	*Callorhinus ursinus*	D	North Pacific Rim from California to Japan
Steller sea lion	*Eumetopias jubatus*	T/D	North Pacific Rim from Japan to California
Saimaa seal	*Phoca hispida saimensis*	E/D	Lake Saimaa, Finland
Whales, Porpoises, and Dolphins			
Baiji	*Lipotes vexillifer*	E/D	Changjiang (Yangtze) River, China
Indus river dolphin	*Platanista minor*	E/D	Indus River and tributaries, Pakistan
Vaquita	*Phocoena sinus*	E/D	Northern Gulf of California, Mexico
Northeastern offshore spotted dolphin	*Stenella attenuata*	D	Eastern tropical Pacific Ocean
Eastern spinner dolphin	*Stenella longirostris orientalis*	D	Eastern tropical Pacific Ocean
Mid-Atlantic coastal bottlenose dolphin	*Tursiops truncatus*	D	Atlantic coastal waters from New York to Florida
Northern right whale	*Eubalaena glacialis*	E/D	North Atlantic, North Pacific Oceans; Bering Sea
Southern right whale	*Eubalaena australis*	E/D	South Atlantic, South Pacific, Indian, and Southern Oceans
Bowhead whale	*Balaena mysticetus*	E/D	Arctic Ocean and adjacent seas
Humpback whale	*Megaptera novaeangliae*	E/D	Oceanic, all oceans
Blue whale	*Balaenoptera musculus*	E/D	Oceanic, all oceans
Finback or fin whale	*Balaenoptera physalus*	E/D	Oceanic, all oceans
Sei whale	*Balaenoptera borealis*	E/D	Oceanic, all oceans
Sperm whale	*Physeter catodon*	E/D	Oceanic, all oceans

1 From Fish and Wildlife Service Regulations at 50 C.F.R. § 17.11 and National Marine Fisheries Service Regulations at §216.15.

Table 2. Known manatee mortality in the southeastern United States (excluding Puerto Rico) reported through the manatee salvage and necropsy program, 1978-1995

Year	Vessel-Related Deaths No. (%)	Flood Gate and Lock Deaths No. (%)	Other Human-Related Deaths† No. (%)	Perinatal Deaths No. (%)	Other Deaths‡ No. (%)	Total Deaths in S.E. U.S.
1978	21 (25)	9 (11)	1 (1)	10 (12)	43 (51)	84
1979	24 (31)	8 (10)	9 (12)	9 (12)	28 (36)	78
1980	16 (25)	8 (12)	2 (3)	13 (20)	26 (40)	65
1981	24 (21)	2 (2)	4 (3)	13 (11)	74 (63)	117
1982	20 (17)	3 (3)	2 (2)	14 (12)	78 (67)	117
1983	15 (19)	7 (9)	5 (6)	18 (22)	36 (44)	81
1984	34 (26)	3 (2)	1 (1)	26 (20)	66 (51)	130
1985	35 (28)	3 (2)	3 (2)	23 (19)	59 (48)	123
1986	33 (26)	3 (2)	1 (1)	27 (22)	61 (49)	125
1987	39 (33)	5 (4)	4 (3)	30 (26)	39 (33)	117
1988	43 (32)	7 (5)	4 (3)	30 (22)	50 (37)	134
1989	51 (29)	3 (2)	5 (3)	39 (22)	78 (44)	176
1990	49 (23)	3 (1)	4 (2)	45 (21)	113 (53)	214
1991	53 (30)	9 (5)	6 (3)	53 (30)	54 (30)	175
1992	38 (23)	5 (3)	6 (4)	48 (29)	70 (42)	167
1993	35 (24)	5 (3)	7 (5)	39 (27)	61 (41)	147
1994	51 (26)	16(8)	5 (3)	46 (24)	76 (39)	194
1995*	43 (21)	8 (4)	5 (2)	56 (28)	91 (45)	203

† Includes deaths due to entanglement and ingestion of marine debris, drowning in shrimp nets, poaching, vandalism, *etc.*

‡ Includes deaths due to cold stress, other natural causes, and undetermined causes.

* Figures for 1995 are preliminary.

Source: Florida Department of Environmental Protection

In 1996, shortly before this report was completed, two more synoptic surveys were conducted producing total counts of 2,274 and 2,639 animals, respectively. Because of variable environmental conditions that determine manatee occurrence in warm-water refuges and their visibility during a survey period, these counts cannot be used to estimate population size (except to indicate a minimum number), nor can they be compared between years to detect trends. As a result, the most recent count indicates only that the Florida manatee population numbers at least 2,639 animals; lower counts before 1996 do not necessarily indicate manatee numbers have increased.

Outside of Florida, Antillean manatees appear to occur in relatively isolated groups usually numbering a few hundred animals or less. The largest known groups include those along the southern Yucatan Peninsula in Belize and Mexico and in Cuba, where numbers may reach several hundred animals. Manatee protection laws in these countries are weak or poorly enforced. As a result, protection of the southeastern United States population could determine the species' long-term survival.

West Indian manatees are listed as endangered throughout their range under the Endangered Species Act. Whereas the largest sources of human-related

mortality for Antillean manatees are poaching for food and entanglement in gillnets, for Florida manatees most human-related mortalities are caused by collisions with boats or entrapment in flood gates and navigation locks. For both subspecies, however, the habitat loss due to coastal development may pose the greatest long-term threat.

As shown in Table 2, the number of manatee deaths recorded annually in the southeastern United States increased substantially between the late 1970s and 1990, when a record 214 dead manatees were found. Although a large number of cold-related deaths (about 45 animals) contributed to the record level in 1990, most of the increasing mortality trend during the 1980s was attributed to increases in the number of vessel-related deaths (*i.e.*, propeller wounds, hull impacts, or crushing by the weight of watercraft hulls) and perinatal deaths (*i.e.*, stillborn and newborn calf deaths for which the cause usually is undetermined).

During the 1980s vessel-related deaths increased from about 20 to 50 animals per year. Almost all manatee deaths in the southeastern United States occur in Florida and the increase in watercraft deaths paralleled an increase in the number of boats registered in Florida. In response the Florida Department of Natural Resources (now the Florida Department of Environmental Protection), in cooperation with the Fish and Wildlife Service, began a major initiative in 1989 to increase boater awareness and develop waterway regulations aimed at reducing collisions between manatees and boats. As described below, work on this initiative has continued.

Early in the 1990s total annual mortality declined, but in 1994 and 1995 it again increased to near-record levels. In most of these years the number of vessel-related and perinatal deaths continued to be significant factors determining total annual mortality. Other factors, however, including deaths due to natural causes, drowning and crushing in flood gates and navigation locks, and deaths due to undetermined causes, became increasingly important in some of these years. For example, in 1995 total mortality exceeded 200 animals for only the second time, but vessel-related deaths declined from 51 animals in 1994 to 43 animals, representing only 21 percent of the total mortality. This is the lowest percentage of total annual mortality for the category since 1983. With no cold-related deaths recorded in 1995 and with a decrease in vessel-related deaths, the increase in total mortality between 1994 and 1995 was due mainly to increases in perinatal deaths, which reached a record high, and in deaths from natural causes.

Since beginning the new efforts to reduce vessel-related deaths in 1989, deaths due to this cause have ranged between 35 and 53 animals per year. In contrast to increases in this mortality category through the 1980s, the overall trend since 1989 has been relatively stable. Considering that boat registrations in Florida have continued to increase, the lack of a further increase in vessel-related deaths may be an early sign that measures being taken by State and Federal agencies are beginning to successfully address this source of mortality. It is too soon, however, to draw definitive conclusions.

With a record high 56 perinatal deaths in 1995, the steady increase seen before 1989 in this mortality category appears to be continuing. The causes of perinatal deaths are not clearly understood. They could be related to physiological stress due to the species' location at the northern limit of its range, disease and bacterial infections, disruption of physiological or biochemical processes by pollution, stress among pregnant and nursing females due to vessel traffic or other human activity, and the inexperience of young females raising their first calves. Other possible factors could be increasing levels of pollution or human-related stress. It also is possible that the perinatal death rate is constant, but that the size of the manatee population has increased or that reporting of carcasses has improved giving the appearance of an increased rate.

Although small when compared to perinatal and vessel-related deaths, the numbers of manatees killed in flood gates and navigation locks increased in the 1990s and reached a record high of 16 animals in 1994. In 1995 the number of deaths in this category fell to eight. As discussed below, the increase in the 1990s has prompted efforts led by the South Florida Water Management District and the Army Corps of Engineers to reduce this source of mortality, and there

is good reason for optimism that further reductions will be possible in the future.

In the long term, degradation and loss of habitat may be a greater threat to manatee survival than direct sources of human- related mortality. No other marine mammal population in the United States lives in closer association with human populations than the Florida manatee. The rapid increase in Florida's human population and accompanying development, however, could leave little room for that association to persist. Much of the new development in Florida has occurred along coastal waters and rivers important to manatees. Resulting siltation, nutrient enrichment, and other forms of water pollution, as well as removal and filling of wetlands by construction, degrade or eliminate natural feeding, resting, mating, nursing, and calving areas. If increases in human population, coastal development, and waterborne activity continue unabated, habitat modification and increased vessel traffic could eliminate or nearly eliminate Florida manatees from the wild.

To address these threats the Department of the Interior's Fish and Wildlife Service and National Biological Service and the Florida Department of Environmental Protection have collaborated to build what has become a model cooperative endangered species recovery program. While these agencies form the core of the Florida manatee recovery program, many other agencies and groups share interests and responsibilities in manatee conservation, and much of what the program has been able to accomplish is in large measure due to their outstanding contributions.

Among the notable Federal contributors have been the Army Corps of Engineers, the Coast Guard, the National Aeronautics and Space Administration, and the U.S. Navy. Major contributors at the State and local levels include the Florida Department of Community Affairs, the Florida Game and Freshwater Fish Commission, the Florida Governor and Cabinet, the Florida Inland Navigation District, the Manatee Technical Advisory Council (an advisory body to the Executive Director of the Florida Department of Environmental Protection), the South Florida Water Management District, various county governments throughout Florida, and the Georgia Department of Natural Resources. Important non-governmental participants include, among others, Florida Power & Light Company, Lowry Park Zoo, Miami Seaquarium, Save the Manatee Club, Sea World, Inc., and the general public, whose voluntary donations to the State of Florida and Save the Manatee Club provide much of the financial support for the state's manatee program. As discussed in previous annual reports, the Marine Mammal Commission played a major role in organizing the Florida manatee recovery program in the 1970s and has continued to provide advice and assistance at key points throughout its development.

Major activities undertaken through the Florida manatee recovery program in 1995 are discussed below.

Updating the Florida Manatee Recovery Plan

Section 4 of the Endangered Species Act contains provisions for preparing recovery plans for species listed as endangered or threatened under the Act. The purpose of recovery plans is to identify and organize priority recovery work. With advice and assistance from the Marine Mammal Commission, the Fish and Wildlife Service developed and in 1980 adopted a recovery plan for West Indian manatees. It was the first such plan for a listed marine mammal and it has since served as a model for other species recovery efforts.

As the manatee plan was implemented and new information was developed, the plan's provisions became outdated and the Commission recommended that it be revised. The Service agreed and in 1989 it adopted a revised plan covering a five-year planning period that ended in Fiscal Year 1994. Anticipating the need for a second update, the Commission held a comprehensive review of the manatee program at its 1992 annual meeting in Tallahassee, Florida. Based on the results, the Commission developed a suggested plan outline and sent it to the Service with a request that it be reviewed by the Florida Manatee Recovery Team — a team of agencies and group officials established by the Service to help coordinate and guide the manatee recovery program. The Service did so and at the team's November 1992 meeting a drafting subcommittee, chaired by a representative of the Marine Mammal Commission, was established to

prepare a recommended revised recovery manatee plan using the Commission's outline.

In September 1993 the team transmitted a recommended plan revision to the Service. With some minor changes, the Service circulated the "Technical/Agency Draft Florida Manatee Recovery Plan (*Trichechus manatus*) Second Revision" for public and agency review in November 1994. Like the 1989 plan, the revised plan covered a five-year planning period. It identified and ranked 120 tasks designed to (1) assess and minimize causes of manatee mortality and injury, (2) protect essential habitat, (3) determine and monitor the status of manatee populations and essential habitat, and (4) coordinate and oversee cooperative recovery activities.

On 24 February 1995 the Commission, in consultation with its Committee of Scientific Advisors, returned comments on the draft plan to the Service. In its comments, the Commission recommended that two new tasks be added and that priority rankings for two proposed tasks be increased. As two new tasks, the Commission recommended (1) establishing a population assessment working group to review relevant data and develop appropriate models for monitoring Florida manatee population trends, and (2) convening a workshop to evaluate future recovery strategies that might be used if increasing human population and development overwhelm current recovery efforts. With regard to task priorities, the Commission recommended that two proposed tasks be upgraded to priority one status; the first involves work to strengthen enforcement of relevant regulations, such as boat speed rules, and the second addresses field surveys to assess compliance with boat speed rules.

On 5 April 1995 the Service extended the comment period on the draft revised plan through 5 June to ensure that all interested parties had time to comment. After the comment period closed, the Service incorporated appropriate changes, and at the end of 1995 the revised plan had been submitted for final review and approval by the Service's Regional Director. The second revised Florida manatee recovery plan is expected to be available early in 1996.

Program Funding

Most funding for work identified in the Florida manatee recovery plan is provided through the Fish and Wildlife Service and the Florida Department of Environmental Protection. In 1993 a newly created branch of the Department of the Interior, the National Biological Service, also assumed important funding responsibilities when the Fish and Wildlife Service's manatee research program (the Sirenia Project) was transferred to it.

Following a comprehensive review of the manatee recovery program in spring 1992, the Commission wrote to the Fish and Wildlife Service and the National Biological Service, recommending funding needs to meet the Department of the Interior's manatee research and management obligations in Fiscal Years 1993 through 1997. For 1993 and 1994, departmental funding for both its research and management programs was generally consistent with the levels recommended by the Commission. For Fiscal Year 1995 the Commission recommended funding levels of $689,000 for the Sirenia Project and $289,000 for management-related work. Actual funding levels provided to the programs in 1995 were again generally consistent with these levels. The National Biological Service and the Fish and Wildlife Service jointly provided approximately $625,000 to continue the Sirenia Project and additional support was provided by Save the Manatee Club and another non-governmental source. To carry out management obligations, the Fish and Wildlife Service provided its Jacksonville, Florida, field office about $300,000.

In the fall of 1995 the Commission learned that the National Biological Service was considering eliminating support for manatee research because of proposed reductions in its Fiscal Year 1996 appropriation. The Commission, therefore, wrote to the Service on 26 September 1995, noting that the scientific information developed by the Sirenia Project was absolutely essential for making informed management decisions under the manatee recovery program and for meeting related statutory obligations. It also noted that the manatee recovery program was both nationally and internationally recognized as one of the world's most successful endangered species recovery programs, due in large part to the databases and leadership provided

by the Sirenia Project. While recognizing the difficult budgetary choices faced by the Service, the Commission therefore urged that the Service continue support for the Sirenia Project.

On 11 October 1995 the National Biological Service replied to the Commission, noting that it recognized the essential role of the Sirenia Project in the manatee recovery program, but that a final decision on support would depend on the extent to which its Fiscal Year 1996 appropriation was reduced. At the end of 1995 decisions in this regard had not yet been made and the National Biological Service was continuing to support the Sirenia Project at reduced levels under temporary spending measures. However, significant reductions in the program's funding in 1996 seemed likely.

Recognizing that support for all essential recovery program tasks is beyond its own resources and capabilities, the Fish and Wildlife Service has encouraged direct involvement by many other agencies and groups with shared interest and responsibility for manatee conservation. Of particular note in this regard, the Florida Governor and Cabinet and the Florida State Legislature responded in the 1980s by developing a strong complementary state program to address many needs identified in the Florida manatee recovery plan. The state program is now carried out by the Florida Department of Environmental Protection. During the past Fiscal Year, which ended 30 June 1995, nearly $2.8 million was provided by the State to its manatee program, including more than $1.1 million for research and $1.6 million for management tasks.

Funding for the State's manatee program is provided mainly through the Save the Manatee Trust Fund, authorized by the State Legislature in 1989. Although about one-third of the Trust Fund is derived from a share of annual boat registration fees required by the State, most of its income comes from voluntary donations, including the sale of special manatee automobile license plates and optional check-off donations that boat owners may add to their annual boat registration fees. In a very real sense, therefore, the State's program is a direct reflection of the strong interest and commitment of the citizens of Florida to manatee recovery and conservation.

Boating Regulations

As indicated in Table 2, vessel collisions are the largest source of human-related manatee mortality. Because vessel operators cannot reliably detect and avoid manatees, reducing this cause of mortality appears dependent on giving manatees time to avoid oncoming boats. Therefore, the Florida Governor and Cabinet approved an approach recommended in 1989 by the Florida Department of Natural Resources to develop county-wide boat speed regulations that would slow boats down in areas where manatees are most likely to occur. The recommendation targeted 13 counties where vessel-related manatee deaths were highest and manatee abundance was greatest. To develop the rules, the Department of Natural Resources (now the Department of Environmental Protection) was directed to work with local residents and county officials to review data on local manatee habitat-use patterns and vessel traffic patterns. Based on that information, agreed site-specific measures for each county were to be devised, taking into account needs for both manatee protection and vessel use.

Between 1989 and 1994 rules were developed through a process of negotiations with local representatives and adopted for 12 of the 13 counties. The rules incorporate a suite of site-specific measures, such as channel-exempt, channel-inclusive, and shoreline-only slow speed zones, high-speed water sport areas, and no-entry areas. In 1995 proposed rules for Lee County, the last of the 13 counties, were published and a public hearing was held. As has happened in several other cases, an administrative challenge was filed against the proposal by local interests. In all previous cases, proposed rules have been upheld, but in the case of Lee County, the hearing officer ruled in favor of those challenging the proposal. As a result, the Department will re-initiate the rulemaking process for Lee County in 1996 to develop a new proposal.

While substantial progress has been made in developing new rules, their implementation has been slowed by intense controversy and debate that lengthened the negotiation process. Subsequent rule challenges, as occurred in Lee County, also caused necessary implementation steps, such as posting regulatory signs and enforcement, to be deferred

pending their resolution. In addition, sign posting for some counties lagged a year or more behind the adoption of final rules, and prior to 1993, when the State Legislature relaxed penalties for manatee speed-zone violations from a second degree misdemeanor to an infraction, some enforcement officers were reluctant to issue citations for such violations. As a result of these problems and delays, it will probably be several more years before enforcement and compliance records will provide a good basis for assessing the effectiveness of the boating regulations.

County Manatee Protection Plans

When the Florida Governor and Cabinet approved development of boat speed rules for the 13 key counties in 1989, they also directed those counties to prepare manatee protection plans and adopted an interim policy for siting boating facilities. Although one of the core elements of the county plans was to be the county boating regulations discussed above, other elements were to address the siting of new boating facilities and public awareness. The interim policy, which was to be in effect in the 13 key counties only until their manatee protection plans were adopted, calls for conditionally limiting the construction of new boating facilities and expansion of existing facilities to one power boat slip per 100 feet of shoreline controlled by the developer.

Demands associated with developing boating regulations precluded immediate attention by county planners to other manatee protection plan provisions. As development of boating rules progressed, however, work on other plan elements increased. By the end of 1994 one county manatee protection plan had been adopted. In 1995 plans for three other counties were adopted and work was underway on plans for the remaining nine counties. As these plans were progressing, the Department applied the interim policy on new boating facilities when reviewing permit applications received for constructing new docks and marinas. Required rules for implementing the policy were not developed, however, and during 1995 an administrative challenge was filed against the Department for its failure to meet this requirement. At the end of 1995 it was expected that an administrative hearing would be held early in 1996.

Flood Gates and Navigation Locks

Animals that are crushed and drowned in flood gates and navigation locks constitute the second largest category of human-related manatee mortality. As noted above, the number of such deaths increased early in the 1990s and reached a record level of 16 animals in 1994 when heavy rains and more frequent flood gate openings may have contributed to the high death toll. In 1995 the number of manatee deaths declined to eight but was still substantially above the average annual mortality observed in the 1980s. Most of the gates and locks in which manatees have been killed are owned and operated by the South Florida Water Management District and the Army Corps of Engineers.

To address the problem, officials from these two agencies, the Florida Department of Environmental Protection, Dade County, and the Fish and Wildlife Service formed a task force in 1992. Based on its advice, engineers with the Water Management District and the Corps began work to design pressure-sensitive reversing door mechanisms, similar to those on elevator doors, that could be fitted to the edge of gate and lock doors. The initial design featured a plunger mechanism that would activate a reversing mechanism if depressed by an object caught in a closing door. In 1993 and 1994, under a cost-sharing agreement between the Water Management District and the Corps, prototype devices were tested on two gates with high manatee mortality.

Design problems became apparent during the initial tests. However, anticipating that these could be resolved and recognizing the urgent need for a solution, the Corps requested and received a 1994 appropriation of approximately $2 million under the Water Resources Development Act to design and retrofit existing gates with improved mechanisms.

On 5 May 1995 the Corps requested comments from the Commission and others on a draft project modification report and environmental assessment on plans to redesign and test the reversing mechanisms and then retrofit devices on 20 water control structures in south and central Florida where manatee deaths have been reported. The work was estimated to cost about $2.6 million, and would be supported by

the Corps and the Water Management District under a cost-sharing agreement. On 20 June 1995 the Commission responded, commending the Corps for its attention to this urgent conservation problem and for its efforts to develop and apply innovative solutions in a timely manner. In light of remaining technical problems and limited experience with the improved mechanisms, the Commission recommended that the Corps adopt a flexible approach that would allow construction schedules to be altered as necessary to incorporate refinements that may become apparent as new devices come online.

While the Corps was developing plans to further test and install gate reversal systems, the Water Management District continued to experience fouling and maintenance problems with the modified plunger mechanisms. It therefore contracted for a study to assess a promising new triggering mechanism with no moving parts that might replace the plunger designs. The new approach relies on a strip of piezoelectric film — a tough plastic material that converts mechanical pressure, such as that from an object pinned in a closing door, into an electric current that could activate the reversing mechanism. The study report suggested that the film may well be a feasible, cost-effective alternative. Therefore, at the end of 1995 the District was developing specifications to test the new approach in 1996.

Manatee Rescue, Rehabilitation, and Release

Every year Federal and State officials respond to numerous reports of injured and distressed manatees. In some cases injuries or problems are minor or temporary and require no intervention. In other cases, however, animals must be handled or treated, and are either released on the spot or captured for a period of more intensive care in captivity. Most cases requiring intervention involve animals that are injured by boats, entangled in ropes or nets, or orphaned and unable to survive on their own. The number of rescue attempts in recent years has generally ranged from about 15 to 25 annually. However, in 1994 only 14 rescue attempts were made, while in 1995 the number rose sharply to more than 50 attempts. The leading causes for rescues in 1995 were collisions with boats and entanglement in crab pot float lines. The cause of the high entanglement rate, which increased markedly from previous years, is unclear but may reflect a shift in fishing effort prompted by a 1994 ban on fishing with gillnets in state waters. As of the end of 1995, 18 of the rescued animals had died from their injuries and 19 had been treated and released.

To care for injured and distressed animals that must be brought into captivity, the Fish and Wildlife Service has authorized five Florida facilities (EPCOT, Lowry Park Zoo, the Miami Seaquarium, Sea World, Inc., and the Homosassa Springs State Wildlife Park) to maintain animals under an Endangered Species Act species enhancement permit. Although most animals brought into captivity are released within a few weeks to a year, some animals have been kept permanently because of the nature of their injuries or because of concern that they lacked or had lost skills necessary for survival in the wild. Over the years the number of animals judged to be unreleasable has increased, making space to treat new animals very limited.

As of the end of 1995, 46 animals were being held at the five facilities. To help speed release of rehabilitated animals and to assess the potential of releasing animals previously judged to be unreleasable, the Service constructed a "soft release" facility in 1994. Located in the upper Banana River within the Kennedy Space Center on Florida's east coast, the pen provides an opportunity for animals to adjust to natural conditions and foods while they remain under observation to ensure they are adapting. It is hoped that 10 to 12 animals, particularly animals previously judged unreleasable, might be released annually through the pen.

In August 1994 a rehabilitated adult male held in captivity for four months and two young orphaned calves were placed in the soft-release pen as an initial test. Over the next several weeks all three adjusted well and began feeding on seagrasses in the enclosures. Late in August the adult male was released and tracked with a satellite transmitter. It readapted quickly to the wild. The two orphaned calves, however, were not released because of the approaching winter and concern that time was short for them to associate with wild animals that could lead them to a warm-water refuge. They were therefore returned to captive facilities for the winter.

In May 1995 both orphaned calves were released. One that was originally captured in the St. Johns River was tagged and released directly back into the St. Johns River. He was tracked until late September, when the tag fell off. He appeared to be adapting well, but had not been resighted at the river's major warm-water refuge, Blue Spring, as of the end of 1995. The second orphaned animal was released through the soft-release pen on 1 June with an older animal captured for rehabilitation early in 1995. The second orphaned animal was also tagged and appeared to be adapting well as of the end of 1995. In mid-January 1996, however, he was struck by a boat and killed in a high-traffic canal near the release pen.

After these animals were released, three other long-term captive animals were introduced into the pen in early June. Because of weight loss and some blood chemistry analyses suggesting possible dehydration, the animals were not released but instead were returned to their respective captive facilities late in June. In mid-July 1995 three other animals, all born in captivity since 1990, were introduced into the soft-release pen. By early in August, all three appeared to be ajusting well, and they were released together late in August. In mid-November, however, one of the three was struck by a boat and killed in Biscayne Bay in southeastern Florida. A second animal was tracked through 1995 but was recaptured at a warm-water refuge on 3 January 1996 because he appeared to be underweight and disoriented, swimming in tight circles. Upon examination, he was found to be emaciated and to have ingested some debris, but he soon began eating normally and is being maintained in captivity. Subsequently, the third animal was recaptured in a severely emaciated condition and died during transport to a rehabilitation facility.

In review, of the four young manatees raised in captivity and released through the soft-release pen in 1995, one was recaptured in poor condition and recovered, one was recaptured in very poor condition and died, and two appeared to have been adjusting well but were struck and killed by boats. The status of the fifth animal raised in captivity and released directly into the St. Johns River is uncertain. He may be using one of the area's small, infrequently monitored warm-water refuges.

In addition to these difficult release cases, 13 successfully rehabilitated were released at various locations along the east and west coasts of Florida, usually near their capture sites. Because of past success with such releases, released animals are not usually tagged for satellite tracking. In 1995 three adult females that had been rehabilititated and released in recent years were resighted with new calves conceived and born in the wild.

Manatee Stock Assessments

As part of efforts to reduce incidental take of marine mammals in commercial fisheries, the Marine Mammal Protection Act was amended in 1994 to require, in part, that stock assessments be prepared for all U.S. marine mammal stocks. The assessments are to include estimates of population size and maximum net productivity, a determination of the potential biological removal rate (other than natural mortality) that would allow the stock to reach or remain at its optimum sustainable population level, information on fishery interactions, and a determination as to whether the stock should be considered strategic and possibly require establishment of an incidental-take reduction team and preparation of an incidental-take reduction plan.

In October 1995 the Service released final stock assessments for marine mammal stocks under its jurisdiction, including the Florida manatee and a population of Antillean manatees in Puerto Rico. The assessment for Florida manatees noted that the population numbered at least 1,856 animals and that the best estimate of maximum net productivity was four percent per year. Using this and other information, the potential biological removal level was determined to be three animals per year. Between 1975 and 1994 it noted that 17 deaths had been attributed to interactions with fishing gear, principally shrimp nets, and that a number of injuries and some mortality also had been attributed to entanglement in crab trap lines, hoop nets, trot lines, and monofilament line.

For the Antillean manatee population in Puerto Rico, the assessment estimated a population size of at least 86 animals and a maximum productivity of four percent per year. The potential biological removal level was determined to be zero. The assessment also

noted that manatees in Puerto Rico were sometimes sold for meat and taken in gillnets. Although information was scarce, it appeared that fishery interactions significantly affect the status of the population.

Because of the species' status as endangered and the high levels of natural and human-related mortality, the assessments for both stocks concluded that they should be considered as strategic stocks. As of the end of 1995 no steps had been taken to establish take reduction teams for either stock.

Adventures with Chessie

In the summer of 1994 a Florida manatee was sighted in the Chesapeake Bay in Maryland, establishing a new northernmost record for the species. By September the animal had not begun to move south and its plight became national news. Because of falling water temperatures and limited time to make the 1,000-mile return trip to Florida, the animal was captured on 1 October with the assistance of the National Aquarium in Baltimore. Ten days later it was flown back to Florida on a plane donated by the Coast Guard. The animal, a large male nicknamed Chessie, was subsequently placed in the soft-release pen and released early in October with a satellite transmitter attached by Sirenia Project staff to track its movements. He remained in Florida's coastal water for the remainder of the winter.

In June 1995, with his satellite tag still attached, Chessie again began moving north up the intracoastal waterway, reaching the Chesapeake Bay in July. Although his tag was lost along the way, he was relocated and a new tag was attached. He again became national news as he continued north, reaching Pt. Judith, Rhode Island, on 16 August. There cold water presumably stopped his northward trek and he turned south, again losing his tag on 22 August off Connecticut. Occasional reports placed him in New Jersey on 6 September and contingency plans were made in the event another rescue might be needed.

The opportunity never arose. With his ability to return to Florida before succumbing to cold-stress in doubt, brief sightings reported to the Service and by the media still had him in the lower Chesapeake Bay on 21 September. After several more weeks with a few unconfirmed sighting reports, he was finally seen at a warm-water power plant outfall in Jacksonville, Florida, on 16 November, having completed a five-month odyssey covering nearly 4,000 miles and setting a northern record for the species' distribution.

Hawaiian Monk Seal (*Monachus shauinslandi*)

The Hawaiian monk seal is the most endangered seal in U.S. waters. The species currently is thought to number about 1,300 to 1,400 animals and to have declined significantly since 1990. After the northern right whale, the Hawaiian monk seal is the nation's second most endangered marine mammal. The species occurs only in the Hawaiian Archipelago with most animals living around remote, largely uninhabited islets in the Northwestern Hawaiian Islands extending 1,200 miles northwest of the main Hawaiian Islands (Figure 1).

The largest monk seal colony is at French Frigate Shoals where more than 50 percent of the species' births have occurred in recent years. Most of the remaining seals and almost all other pupping occurs at four other islands and atolls: Laysan Island, Lisianski Island, Pearl and Hermes Reef, and Kure Atoll. A sixth atoll, the Midway Islands, supported a major breeding colony as recently as the 1950s, but the colony virtually disappeared by the late 1960s. About 45 animals, mostly immigrants from nearby atolls, now use that site and a few births occur annually.

Accounts of Hawaiian monk seals before 1900 are rare. Their numbers are believed to have been reduced significantly in the 1800s by a short-lived commercial sealing venture and by transient visitors, including shipwrecked sailors, who killed seals for food. Since then, other human activities and natural factors have suppressed the species' recovery. The principal human threats have been disruption of normal haul-out patterns by people and pets on beaches, interactions with commercial fisheries, entanglement in derelict fishing gear and other debris, pollution from human activities and abandoned equipment, entrapment in old shore protection structures, and overfishing of seal prey species.

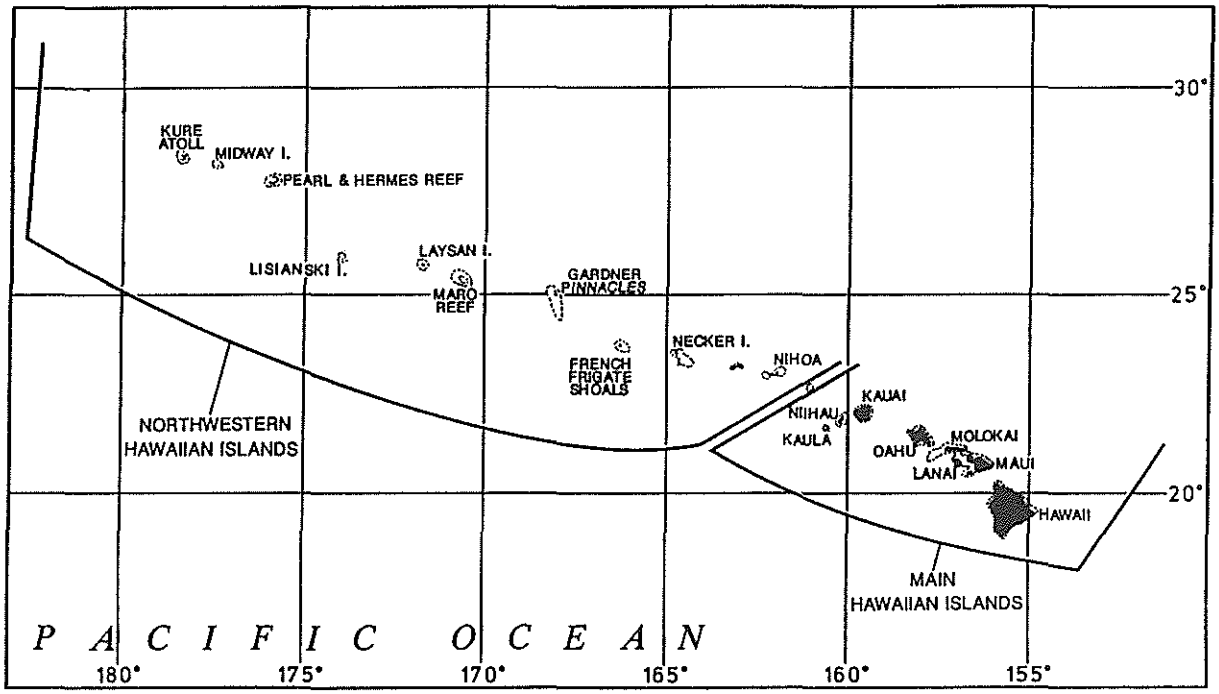

Figure 1. The Hawaiian Archipelago

Natural factors impeding population growth have been the species' limited range and habitat, predation by sharks, die-offs caused by disease or natural biotoxins, attacks on female and juvenile seals by aggressive groups of adult male seals (referred to as "mobbing" behavior), and possibly ecosystem changes, such as climate fluctuation, that may have affected prey abundance and carrying capacity.

Lead responsibility for the recovery of Hawaiian monk seals rests with the National Marine Fisheries Service under authority of the Endangered Species Act and the Marine Mammal Protection Act. Other agencies and organizations, however, share important duties and roles. Because most monk seal pupping and haul-out habitat (*i.e.*, all major breeding sites except Kure) lies within the Hawaiian Islands National Wildlife Refuge, the Fish and Wildlife Service is a particularly important partner. Other key partners include the Navy, the Coast Guard, the Army Corps of Engineers, the Western Pacific Regional Fishery Management Council, the State of Hawaii, and Sea Life Park, Hawaii. As discussed in past annual reports, the Marine Mammal Commission was instrumental in initiating the monk seal recovery program late in the 1970s. Since then, it has provided advice and assistance at key points in the program's development.

Recent Developments

As noted above, Hawaiian monk seal numbers are declining. After a modest increase early in the 1980s, overall beach counts of seals began decreasing late in the 1980s. This trend has continued through 1995 when combined mean beach counts for all islands dropped 26 percent below 1989 levels and 33 percent below 1986 levels. Most of this decline is due to a decrease at French Frigate Shoals, the largest monk seal colony. However, counts also fell during this period at Laysan and Lisianski Islands. Reasons for these trends differ by location.

Based on increasing numbers of underweight and starving animals (mostly pups and juveniles), the decline at French Frigate Shoals is thought to be related to a reduction in the availability of prey resources. At Laysan and Lisianski Islands evidence

of food limitation is less apparent, and instead a combination of factors appears to be involved, including mortality of adult females and juveniles due to attacks by groups of aggressive male seals. Entanglement in marine debris also may be a contributing factor, particularly at Lisianski Island where especially large quantities of nets and other debris wash ashore.

Seal counts on Kure Atoll, the smallest of the five major breeding colonies, and Pearl and Hermes Reef, now approximately the same size as the Lisianski and Laysan Island populations, have increased over the past 15 years, but not enough to offset declines at the other larger colonies.

Against this backdrop there recently have been several significant developments bearing on monk seal recovery. In 1992 the LORAN station operated by the Coast Guard on Kure Atoll was closed. When demolition and clean up work was completed in 1993, Kure was left unoccupied and free of human disturbance for the first time since 1960 when the station began operations. Also, in 1993 the Navy announced plans to close and clean up its Naval Air Station on the Midway Islands and to transfer the atoll to a new owner by 1997. Finally, in response to a failing bulkhead on Tern Island at French Frigate Shoals that could force abandonment of the only airstrip and permanent field station between Midway and the main Hawaiian Islands, the Fish and Wildlife has been developing plans for the construction of a new shore protection system.

In light of these changes and the alarming decline in monk seal numbers, in 1994 the Marine Mammal Commission began a review of the Hawaiian monk seal recovery program and related activities. Members of the Commission's staff met with Federal and state officials in Hawaii in September, and the Commission examined recovery needs at its 16-18 November 1994 annual meeting in Falmouth, Massachusetts. Based on the results, the Commission determined that a comprehensive interagency monk seal program review should be held, and it began planning for an in-depth program review in 1995 with the National Marine Fisheries Service. Pending that review, the Commission wrote to the Service and the Navy on 30 November 1994, providing comments and recommendations on priority recovery needs.

In its letter to the National Marine Fisheries Service, the Commission noted the urgent need to strengthen the recovery program. Among other things, it recommended that the Service:

- expand work begun in 1984 to remove and rehabilitate underweight seals from French Frigate Shoals and relocate them at smaller colonies;
- begin working with the Navy on plans to release rehabilitated seals at the Midway Islands to help restore that breeding colony;
- increase efforts to evaluate monk seal foraging patterns and prey resources at French Frigate Shoals and close waters at that atoll to lobster fishing, pending study results showing that lobster fishing would not reduce a prey resource important to the atoll's seal colony; and
- establish field camps to monitor monk seals at all five major breeding colonies plus the Midway Islands in 1995.

To carry out the most essential research and management work, the Commission recommended that $1.2 million be provided to the monk seal program in Fiscal Year 1995, an amount more than twice the program's base funding level in 1994.

In its 30 November 1994 letter to the Navy, the Commission noted that closure of the Midway air station offered a much needed chance to restore a major monk seal breeding colony to the atoll. Also noting that the disappearance of monk seals from Midway coincided with, and was likely related to, the expansion of station facilities and operations in the 1950s and 1960s, the Commission expressed its belief that the Navy had an obligation to help restore a viable breeding colony of seals at Midway. Soon after announcing its decision to close the facility, the Navy began to assess contaminant clean-up needs and mitigate wildlife hazards. The efforts were well planned and carried out in close cooperation with the Fish and Wildlife Service, the National Marine Fisheries Service, and others, and the Commission commended the Navy for its initiative and commitment to these important tasks. In addition, the Commission recommended that the Navy (1) consult with the National Marine Fisheries Service to identify and help support actions needed to restore monk seals to levels counted at Midway in the late 1950s, and (2)

approve a request by the Fish and Wildlife Service for ownership and use of Midway as a national wildlife refuge.

Both the National Marine Fisheries Service and the Navy responded to the Commission early in 1995. On 23 January 1995 the Service wrote, noting that it agreed with the Commission on the need for an interagency program review and for strengthening the monk seal program. It advised that steps were being taken to increase program funding in 1995, that it was committed to expanding monk seal rehabilitation facilities to handle more animals, that field camps would be established on all major breeding islands in 1995, and that it had begun working with the Navy on cooperative efforts to rebuild the monk seal breeding colony on Midway.

On 3 March 1995 the Navy wrote to the Commission noting that it shared concern about the need for restoring monk seals throughout their range. In addition to steps it had taken to comply with requirements of the Endangered Species Act, the Navy noted it was working with the National Marine Fisheries Service on a proposal to fund monk seal work at Midway in 1996 under the Department of Defense Legacy Program, which is designed to help meet environmental and cultural needs at Defense Department installations. While 1996 funding for the program was uncertain, the Navy expressed hope that funds would be available from this source for monk seal work. It also noted that regulations governing the disposal of excess property would allow it to transfer land to other Federal agencies, and that the Fish and Wildlife Service, the only Federal agency asking for title to Midway, was taking steps to prepare for the transfer.

The transfer of Midway to the Service, however, was placed in doubt by a bill, H.R. 602, introduced in Congress early in 1995. In part, the bill proposed transferring jurisdiction of Midway and certain other remote Pacific islands to the State of Hawaii. In response, state officials began evaluating a range of options for Midway, including development and use that would impact monk seals and other wildlife. Later in 1995 a second bill was introduced proposing transfer of Midway to a foundation interested in developing the atoll as a national historic park. While these bills were not considered in 1995, Congressional action on pending or new bills to transfer Midway to an entity other than the Service is still possible.

The 1995 Hawaiian Monk Seal Program Review

On 11-13 April 1995 the Marine Mammal Commission convened a panel of marine mammal scientists and resource managers to review the Hawaiian monk seal recovery program. Organized with the assistance of the National Marine Fisheries Service's Honolulu Laboratory, the review was held in Honolulu. Participants included officials from the Fish and Wildlife Service, the Navy, the Coast Guard, the Western Pacific Regional Fisheries Management Council, the Army Corps of Engineers, the Hawaii Division of Forestry and Wildlife, the Hawaiian Monk Seal Recovery Team, the academic community, and Sea Life Park, as well as the Commission and the National Marine Fisheries Service. Relevant activities and plans were described by agency representatives, and discussions permitted a thorough, productive review of recovery issues and agency activities.

After the review the panel summarized its findings and recommendations and provided them to the Commission. In separate letters sent on 4 August 1995, the Commission, in consultation with its Committee of Scientific Advisors, forwarded its comments and recommendations based on the panel's findings to the National Marine Fisheries Service, the Fish and Wildlife Service, the Navy, and the Coast Guard. The results of the review are summarized below.

Program Funding and Personnel — For the past 15 years, support for monk seal research and management has been insufficient to carry out all priority work identified in program planning documents and recommended by the Commission and the Recovery Team. To address this problem, review participants from the National Marine Fisheries Service advised the panel that it was taking steps to increase program funding to $1,094,000 in 1995 (about twice the base funding level in the Service's Fiscal Year 1994 budget) and to increase ship support for program work. They also noted that additional funds would be used, in part, to (a) hire field crews for work previ-

ously done by volunteers so that all major breeding colonies, plus Midway, could be monitored in 1995, and (b) contract through a cooperative university program for expert help for tasks that the program had not been able to support in the past. Finally, while it was noted that staff reductions affecting other Service programs would not affect the monk seal program, the panel was advised that the Service's monk seal recovery team leader of 15 years was retiring and that his position might not be retained.

The panel concluded that the Service's plan for funding and logistic support in 1995 was a sound approach consistent with the agency's leadership role in recovery work. It recommended that this level be maintained for at least the next three years. It also noted, however, that this level of support would still not meet all critical needs; hence, other agencies and organizations with shared obligations must be called upon to supplement Service resources. The panel therefore recommended that the Service increase its efforts to encourage contributions of funding, expertise, and in-kind aid from other agencies, universities, laboratories, foundations, and environmental organizations. Noting that departure of the program's long-time leader would significantly reduce staff expertise, the panel also recommended that the Service promptly fill this vacant position.

The Commission concurred with the panel's findings and, in a follow-up letter to the National Marine Fisheries Service, it recommended that the Service maintain its planned 1995 funding level over the next three years and that, if it had not already done so, the Service immediately begin a search for a new recovery program leader.

Population Monitoring — Population trends and management needs differ at the various breeding sites. Because of funding, logistic, and personnel constraints for field work, however, up-to-date information to analyze population trends and management needs for most major colonies is lacking. To meet this need, Service officials advised the panel that field camps were planned for all major breeding sites plus Midway in 1995. The panel agreed with these plans and recommended that camps at all six sites also be established in 1996. For subsequent years, the panel recommended reviewing population monitoring results in light of other program needs to determine if some sites could be monitored at less frequent intervals.

Pup Rehabilitation and Release Program — In 1984 the Service began removing underweight female pups from French Frigate Shoals, rehabilitating them at facilities on Oahu, and releasing them at Kure to help increase that depleted colony. Between 1984 and 1991, 57 percent of the pups collected and released at Kure had survived through the first year of release, and the effort has helped increase the reproductive potential of Kure's seal colony.

Early in the 1990s pup survival at French Frigate Shoals declined sharply, and in 1992 attempts were made to rehabilitate more pups and some juveniles and to shift releases from Kure to Midway. In 1992 and 1993, 18 seals were released at Midway. These releases were not successful like those at Kure; all but two seals died or disappeared. The reasons for the poor suvival have been difficult to assess because funds were not available to monitor the released animals. However, most of the seals released were juveniles rather than pups and, because of limited space, funds, and personnel, the handling and release procedures differed from previous efforts. Because no animals resident at Midway were found dead following the releases, environmental conditions at Midway do not appear to be the cause.

In 1994 the Commission recommended that the Service expand its rehabilitation facilities, hire a veterinarian to oversee rehabilitation work, and make another attempt to release seals at Midway. During the April 1995 program review, Service officials described the various seal handling procedures used in the Midway release effort and advised the panel of plans to try another release of seals at Midway in 1996. To carry out the work, they planned to use one-third of the program's 1995 funding to expand a seal holding facility at Kewalo Basin, contract for full-time veterinary services to help oversee management of captive seals and undertake necessary monitoring and research.

The panel was concerned about the high cost of rehabilitating seals, the adequacy of criteria to guide this work, and the relatively few seals added to the breeding population. However, recognizing the

importance of positive action and the value of adding even a few breeding animals to small colonies, the panel agreed that further rehabilitation and release work was warranted. It recommended, however, that the Service develop a more complete set of criteria to guide decisions on when and how to take and release animals, and how long such efforts should be continued. It also recommended that the Service explore the willingness of Sea Life Park to expand its seal holding facilities, the feasibility of expanding the Kewalo Basin facility to meet needs that cannot be met at Sea Life Park, and contracting for a full-time veterinarian.

The Commission agreed with the panel's recommendations and, in its 4 August letter to the Service, it highlighted the need for developing criteria to guide rehabilitation/release work and for acquiring the services of a full-time veterinarian.

Restoring Monk Seals to the Midway Islands — During World War II the Navy established a naval air station on Midway. The number of seals using Midway prior to that time is unknown, but in 1957 and 1958 when the first seal counts were made at the atoll, up to 68 animals were counted on its beaches, with mean counts of over 50 seals. Late in the 1950s the Navy mounted a major construction effort to expand air station operations. When the next count was made at Midway late in the 1960s, no seals were seen. Between then and the early 1990s, average beach counts ranged from 0 to 10 animals. In the last two years, more intensive studies produced average beach counts of 12 and 16 seals, in 1994 and 1995, respectively, with a total of 29 animals identified in 1994, and 41 animals identified in 1995. Most animals appear to be transient visitors from Kure and Pearl and Hermes Reef.

During the program review, attention focused on ways to restore Midway's monk seal colony, future ownership and use of the atoll, and wildlife habitat restoration. Navy officials provided a thorough briefing on its plans to close the air station and transfer Midway to a new owner by June 1997. They described substantial progress and consultation with other Federal and state agencies to assess contaminants on the island, and expressed a strong commitment to completing as much clean-up work as possible prior to the 1997 transfer. In addition to contaminant clean-up, wildlife hazards, such as debris and rusting bulkheads, also are being identified and many situations have already been corrected. Representatives of the Navy and the National Marine Fisheries Service also noted plans to cooperate on a proposal to fund research and mitigation efforts in 1996 to speed recovery of monk seals at Midway.

Coast Guard officials advised the panel of steps to assess and clean up contaminants from discarded batteries in Midway's lagoon. The batteries, used to power lights on navigation aids marking the atoll's harbor channel, were discarded in past decades during routine maintenance. It was noted that the Coast Guard, in consultation with the National Oceanic and Atmospheric Administration and the Fish and Wildlife Service, had scheduled work in the summer to assess contamination around the discarded batteries to help identify clean-up needs.

The Fish and Wildlife Service, which manages wildlife resources on Midway as an overlay national wildlife refuge under a 1988 agreement with the Navy, has requested title to Midway for use as a national wildlife refuge. Service officials advised the panel that they are working closely with the Navy to assume ownership of the islands. Under Congressional directives for base closures, accommodation of other uses of the islands, such as maintaining and using the island's airfield to refuel Coast Guard aircraft and providing controlled public access for wildlife viewing, also is being considered. As noted above, however, Congressional action could supersede these transfer plans.

The panel strongly endorsed the transfer of Midway to the Fish and Wildlife Service for use as a national wildlife refuge and recommended that the Commission and others ensure that Congressional and State officials are aware of the importance of Midway's habitat for monk seals and seabirds. To speed recovery of its seal colony, the panel recommended that the National Marine Fisheries Service and the Navy design and implement a research and management plan for moving seals to Midway and ensuring their survival. The panel also was impressed by the Navy's contaminant assessment program at Midway and the Coast Guard's commitment to assess contamination by corroded batteries in Midway's lagoon.

Because assessment results were not yet available, however, the panel did not comment on specific clean-up needs.

After the review, the Navy provided funds to the National Marine Fisheries Service to help begin the Midway monk seal restoration program. In light of a need for data on at-sea movements of resident and introduced seals to evaluate seal translocation efforts, the funds were used to acquire radio tags to track seals at Midway. The Navy's prompt action in this regard was a welcome and much-needed contribution to the recovery program, and in its 4 August letter, the Commission commended the Navy for its constructive assistance. To continue recovery work at Midway, the Commission noted that a preliminary cost estimate of $250,000 per year for five years seemed valid, given the costs of transporting seals and personnel, maintaining seal holding pens on Midway, monitoring the population, obtaining and analyzing data, *etc.*

The Commission's letters to the Navy and the Fish and Wildlife Service noted the outstanding merit of managing Midway as a national wildlife refuge. Pending further action by Congress, the Commission expressed hope that the two agencies would do all they could to pursue the transfer. The Commission also wrote to members of Hawaii's Congressional delegation on 4 August 1994, noting the importance of Midway's habitat for monk seals and seabirds and urging that these values be considered in any further actions on bills affecting future use of Midway.

In its 4 August letter to the Coast Guard, the Commission noted the importance of assessing environmental impacts from the discarded batteries in Midway's lagoon and commended the Coast Guard for ensuring that appropriate clean-up work would be undertaken promptly.

Mobbing Behavior — Injuries inflicted by sexually aggressive adult male monk seals have resulted in the death of adult female and juvenile seals at several locations but primarily at Laysan and Lisianski Islands. Monitoring studies carried out in the 1980s found that males outnumbered females at both islands, and Service scientists concluded that this was a factor increasing the likelihood of mobbing behavior. Therefore in 1994 the Service removed 22 adult male seals from Laysan, leaving its sex ratio slightly biased towards females. One seal died in the process and the remaining animals were released around the main Hawaiian Islands. Having taken this step, Service officials advised the panel that field work in 1995 would be limited to monitoring the effects of the removals on mobbing at Laysan. As related matters, they noted that commercial fishermen opposed releasing any more seals in the main Hawaiian Islands because of possible impacts on fishing operations, and that studies were being done on captive northern elephant seals to test an improved testosterone-suppressing drug to reduce aggressive behavior in male seals.

The panel noted that local geographic influences on the distribution of adult male seals may be a more important factor than the sex ratio in causing mobbing behavior. Thus, drug treatment could be a useful mitigation approach. The panel therefore recommended that the Service test the new drug's effectiveness and delivery protocols on captive monk seals to assess future mobbing-related management options that would not involve capturing and moving animals.

Predator-Prey Interactions — As noted above, survival of newly weaned pups and juvenile seals at French Frigate Shoals declined sharply after the late 1980s due to limited prey availability. Beach counts at French Frigate Shoals had doubled between the late 1960s and mid-1980s making it the species' largest colony. It is thought that the colony may have increased to a level exceeding its carrying capacity. During the program review, National Marine Fisheries Service scientists provided information suggesting that a regional decline in marine productivity occurred in the Northwestern Hawaiian Islands in 1990, possibly related to a decadal climate cycle. Simultaneous declines in seabird reproductive success and the size of regional monk seal, reef fishes, and lobster populations were cited in support of the hypothesis.

Service scientists also presented data from scat studies and satellite-tagging work. Scales and bones of reef fishes were the most common prey remains in the scat samples and a few scats contained lobster and octopus parts. Because of small sample sizes and inherent biases in scat studies, the relative importance

of different prey species for different age classes of seals remains poorly known. Satellite-tracking work begun in 1993 has been limited to three sub-adult male monk seals per year at French Frigate Shoals. The results revealed that most tagged monk seals stayed near the atoll; however, some spent time away from the atoll and one moved repeatedly 50 to 100 miles northeast of the atoll, diving to depths exceeding the 500-meter scale of the depth recorder. Highest priority has been placed on monk seal rehabilitation, population monitoring, and mobbing work by the Hawaiian Monk Seal Recovery Team and it has not recommended expanding these tracking studies. Consistent with this advice, the Service advised the panel that it planned to continue scat sampling and satellite-tagging work at current levels. It noted, however, that the additional funds were being considered to test new global positioning system tags to track seals.

Because of their limited mobility and size and their presence near pupping beaches, lobsters and octopuses may be important prey for young seals learning to feed. Lobsters, and incidentally some octopuses, also are taken commercially in the Northwestern Hawaiian Islands. Although most fishing effort has been east and west of French Frigate Shoals at Necker Island and Maro Reef where catch rates are much greater, some fishing has occurred at French Frigate Shoals. Lobster catch rates declined significantly throughout the 1980s and, after the apparent ecosystem-wide decline in productivity in 1990, lobster fishing in the Northwestern Hawaiian Islands was suspended in 1993. The fishery reopened briefly in 1995 to assess stock recovery, but was again closed because of continued low catch rates. Limited lobster fishing is being considered by the Western Pacific Regional Fishery Management Council for 1996.

The panel was concerned that too little was being done to assess monk seal prey preferences and foraging patterns, particularly given the increase in program funding in 1995. With the Coast Guard and the Navy leaving Kure and Midway, respectively, the panel noted that future recovery would probably depend on at-sea factors. Also, because of limited reef habitat in the Northwestern Hawaiian Islands, seals could be particularly vulnerable to impacts from commercial fishing and pollution. The panel recognized the need for data on at-sea habitat use to evaluate such factors and to estimate carrying capacity levels. Therefore it recommended that work on prey analyses and at-sea tracking be expanded and that funding to test new global positioning tags be applied to proven satellite-tagging technology. The panel also recommended that, pending better information on the importance of lobsters in the diet of young seals, any efforts to open the Northwestern Hawaiian Islands' lobster fishery include a closure around French Frigate Shoals.

After the meeting, field researchers reported that initial beach counts at French Frigate Shoals were 25 percent lower than counts in 1994 and that young seals continued to show signs of malnourishment and starvation. The Commission's 4 August letter to the National Marine Fisheries Service therefore expressed concern about commercial exploitation of prey resources for seals at French Frigate Shoals. It noted that the low catch rate of lobsters in past commercial catches at French Frigate Shoals could be the result of lobster consumption by the large local seal population. Given the clear and continuing signs of malnourished seals at this site and the uncertainty about juvenile prey preferences, the Commission recommended that the Service maintain a lobster fishing closure at French Frigate Shoals pending better data to assess impacts so that, if the fishery reopens, a potentially important prey resource for young seals at this site will not be reduced.

Interagency Coordination and Program Oversight — Although many agencies and groups have responsibilities and interests related to the recovery of Hawaiian monk seals, the panel was advised that the National Marine Fisheries Service has not held periodic interagency meetings to review progress and opportunities for cooperative work. Because of staff workloads, agency coordination has instead been handled by the Service's regional office staff on an *ad hoc* basis. Also, the Hawaiian Monk Seal Recovery Team, whose membership has not changed in several years, has not sought to fill this need.

The panel was impressed by the commitment and interest shown by the key agency representatives at the Commission's review and by the efforts of the Service's management staff to work with other agency

officials. However, it also was concerned that the *ad hoc* approach to interagency involvement was not well-suited to keeping agencies and groups informed of critical issues and activities, nor was it the best way to elicit creative ideas on applying their respective programs to help meet monk seal recovery needs. The panel therefore recommended that the Service establish an interagency implementation team, co-chaired by representatives of the Service's monk seal research staff and management staff to review progress and coordinate cooperative agency work.

The Commission concurred with this recommendation and reiterated it in its letter of 4 August to the Service.

Tern Island — Tern Island at French Frigate Shoals is largely an artificial island protected on three sides by a sheet-metal bulkhead. Built by the Navy in World War II for use as an airstrip, the island was used by the Coast Guard as a LORAN station in the 1960s and 1970s and is now a Fish and Wildlife Service field station for the Hawaiian Islands National Wildlife Refuge. As the only airstrip between the main Hawaiian Islands and Midway, the island is an essential support base for wildlife research and management. Among other things, it has enabled rapid airlifts of seals for rehabilitation purposes.

The airstrip and field station, however, are in imminent danger of being lost because of the badly deteriorated seawall protecting the island. To address this threat, the Fish and Wildlife Service contracted with the Army Corps of Engineers for a report evaluating shore protection alternatives. The report was completed in 1993 and, based on its results, the Service again contracted with the Corps to prepare construction plans for a new rock revetment. Corps and Service officials advised the panel that the construction plans would be completed by the end of 1995, but that funding to build the revetment had not been included in either Administration or Congressional budgets for the Service.

The panel noted that everything possible should be done to maintain the airfield and field station and to complete the planning efforts as soon as possible. It also noted that if the bulkhead was allowed to fail, erosion pockets behind the seawall and exposed debris now buried on the island would create entrapment hazards for sea turtles and monk seals and the collapse would itself require expensive demolition and clean-up work. In view of the possible obligations of former occupants who built and buried material that could soon become wildlife hazards, the panel recommended that the Service, in consultation with the Navy, the Coast Guard, and the Corps, re-examine all possible alternatives for stabilizing the island.

The Commission shared the panel's concerns and included the panel's recommendation in its 4 August letter to the Fish and Wildlife Service. The Commission also suggested that certain options, such as involving the Navy Seabees and seeking donations of construction materials, be considered as a possible means of installing a new shore protection system.

Kure Atoll — In 1960 the Coast Guard began operating a LORAN navigation station on Kure Atoll. During the first two decades of operation, mean beach counts of seals declined from about 90 to less than 30 animals, apparently due to human disturbance of seal haul-out beaches. Early in the 1980s the Coast Guard significantly increased its efforts to reduce disturbance on atoll beaches, and the National Marine Fisheries Service began a head start program to protect pups born there. In 1984 the Service also started to introduce rehabilitated female pups from French Frigate Shoals. Together the decline in seals was reduced and by 1992, when the Coast Guard closed the station, beach counts had increased slowly to about 40 animals.

Upon closing the station in 1992 the Coast Guard demolished many of its facilities and undertook contaminant clean-up work, which was completed in 1993. Coast Guard officials advised the panel that some beach sediments with elevated PCB levels had inadvertently been left on the atoll and, in consultation with the National Oceanic and Atmospheric Administration, the Environmental Protection Agency, and the State, it was therefore considering whether and what further action may be needed. Although no analyses for contaminants in seal tissues have been done, there has been no evidence of effects on seal reproduction, survival, or health. Noting that a field camp would be established to monitor seals on Kure Atoll in 1995, the panel recommended that the Service assist the

Coast Guard in collecting sediment and fish samples to assess whether remaining contaminants posed a threat to wildlife that would require further clean-up.

Hawaiian Monk Seal Program Review Follow-up

Based on the program review, there appeared to be broad agreement and support for most of the Service's monk seal recovery plans and since the meeting substantial progress has been made on most of the key issues. Among other things, the National Marine Fisheries Service:

- supported field camps at all major breeding sites plus Midway;
- approved a two-year grant request to significantly increase satellite tracking studies of monk seals at French Frigate Shoals, beginning in 1996;
- worked with the Navy to develop a $250,000 proposal to the Navy's Legacy Program to fund work beginning in 1996 on rebuilding the Midway monk seal colony;
- convened a 5-6 December 1995 interagency planning meeting to develop a cooperative plan of action for restoring monk seals to Midway;
- began construction to expand the Kewalo Basin seal holding facilities for its seal rehabilitation work; and
- removed 12 more underweight pups from French Frigate Shoals for rehabilitation and subsequent release in 1996.

By letter of 5 October 1995 the Service updated the Commission on these and other actions as part of its response to the Commission's 4 August letter. The Commission replied on 1 December, expressing its support and appreciation for the many significant accomplishments made by the Service over the past year. However, the Commission noted that further action was needed in two areas. The first concerned action on the Commission recommendation that a lobster fishery closure be retained at French Frigate Shoals, given the apparent food limitation for seals at that site and the uncertainty about the importance of lobsters in monk seal diets. The Service's letter stated it did not believe information was sufficient to justify the measure. In its reply, the Commission noted that, based on foraging data for other pinniped species, young monk seals may be particularly dependent on slow-moving invertebrates, including lobster, as they learn to feed. Moreover, given the uncertainty surrounding monk seal prey utilization, the Commission observed that the situation was a good example of the need to invoke the precautionary principle supported by the United States internationally and not to fish for lobster at the atoll until better data are available on which to base management decisions.

The second area in which the Commission urged further action was on its recommendation to convene periodic interagency meetings to coordinate efforts among interested parties. The Service's letter indicated that it planned to defer action on this matter because the scope of such implementation teams is narrow compared to recovery teams, and because the evolving partnership on restoring seals to Midway should be evaluated before proceeding with a broader implementation team. In its 1 December reply, the Commission urged that such meetings not be deferred since most key agencies were not members of the recovery team and the positive follow-up to the April 1995 interagency review proved the value of such meetings. At the end of 1995 a response from the Service to these further points had not been received.

In addition to actions by the National Marine Fisheries Service, several cooperating agencies also took important steps. In consultation with the National Marine Fisheries Service, the Coast Guard undertook an assessment of leached contaminants from old navigation light batteries in Midway's lagoon and removed the old batteries for proper disposal.

The Fish and Wildlife Service accelerated its efforts to transfer ownership of the Midway Islands from the Navy and to prepare for assuming administrative responsibility of the island. It also convened an interagency meeting in December 1995 to reexamine alternative actions to respond to the failing seawall on Tern Island at French Frigate Shoals. The Service advised the Commission of these steps by letter of 22 September 1995 and on 1 December 1995 the Commission replied, expressing interest in following progress on these matters. The Commission recommended that the Service contact the National Marine Fisheries Service to schedule section 7 consultations

under the Endangered Species Act on the effects of human activities planned at Midway under the Service's refuge management program.

Throughout 1995 the Navy continued its efforts to assess and clean up contaminants and wildlife hazards on Midway. Planning for these activities was done in close cooperation with other interested agencies and included such actions, as removing debris and a badly rusted seawall along atoll beaches important for the reestablishment of a local seal colony. The Navy also worked closely with the Fish and Wildlife Service on transferring ownership of Midway. At the end of 1995 final action to transfer title to the Service had not yet been taken; however, it was the Commission's understanding that this was expected early in 1996.

Finally, the Navy took several other steps to restore a viable seal colony to the atoll. In cooperation with the National Marine Fisheries Service, the staff of the Naval Facilities Engineering Command of the Pacific Division helped develop a $250,000 funding request to Navy's Legacy Program to initiate efforts in 1996 to reintroduce rehabilitated monk seals to Midway. Although the proposal was highly ranked, at the end of 1995 it was the Commission's understanding that the Department of Defense had recinded Legacy Program funding for 1996, in effect terminating the program. As a result, the Navy expects to receive no funds for this program in the coming year and to be unable to support the proposed work despite its high ranking. In the absence of funding from the Legacy Program, it was unclear what steps could be taken to carry out the contemplated monk seal reintroduction work at Midway in 1996.

Captive Maintenance

In 1995, 12 underweight female monk seals were taken into captivity from French Frigate Shoals for rehabilitation and subsequent release. As indicated above, it is hoped that these seals will be released at Midway in 1996. Prospects for their release in 1996, however, became uncertain when, between early September and the end of 1995, nine of the 12 captive animals developed glaucoma, corneal opacity, and related eye problems. The disease process seems unlike any previously identified in captive or wild Hawaiian monk seals or other seal species. Its source has not been identified and, unless the cause can be determined to be non-infectious and without risk to wild animals, release of the seals will not be possible. Other than the observed eye problems, the animals have remained healthy. Some of the first animals exhibiting eye symptoms have recovered.

Late in August 1995 two male monk seals died during the course of studies to test the effectiveness of testosterone-suppressing drugs. The Commission learned of the deaths late in September. Based on documentation provided by the Service, the deaths apparently were due to the procedures used to collect sperm samples rather than the drugs being tested. The procedures had been used successfully on other seal species but not previously on monk seals.

Steller Sea Lion
(*Eumetopias jubatus*)

Steller sea lions (also called northern sea lions) are one of the world's largest pinnipeds. Adult males reach three meters in length and more than 900 kg in weight. Preferring isolated, rocky shores to give birth, breed, and molt, the species' range extends around the northern rim of the North Pacific Ocean from California to Russia, and in the Bering Sea north to the Pribilof Islands. About three-fourths of all Steller sea lions haul out along U.S. shorelines. In the past Steller sea lions were taken by Alaska Natives for fuel, clothing, food, and materials to make small boats. However, with alternative materials available for many of these uses, Steller sea lions are now taken principally for food.

Over the past 30 years Steller sea lions have experienced one of the most extensive declines of any marine mammal in U.S. waters. Numbers at some major rookeries in the western Gulf of Alaska, the eastern Aleutian Islands, and Russia have decreased more than 90 percent, and some rookeries, including the species' southernmost rookery at San Miguel Island in southern California, have been abandoned entirely over the past 20 years. Population estimates for Steller sea lions in different parts of the species' range are shown in Table 3.

Table 3. Steller Sea lion population estimates, 1960s to 1994 († = estimates excluding pups; ‡ = estimates including pups)

Area	1960s	1970s	1985	1989	1994	% Difference 1960 to 1994
Western Stock						
Russia†	41,000-52,300	--	--	10,000	--	--
Aleutian Islands‡	127,300	115,700	78,400	24,400	19,000	-84%
Bering Sea‡	11,600	5,200	3,800	1,200	2,200	-58%
Gulf of Alaska‡	88,700	70,700	48,900	40,600	22,000	-69%
Total Western Stock‡ (U.S. areas only)	227,600	191,600	131,100	66,200	43,200	-81%
Eastern Stock						
Southeast Alaska‡	9,000	10,300	10,300	15,800	14,600	+62%
British Columbia†	11,500	6,100	6,100	6,100	8,100	-30%
Oregon & California‡	10,300	6,400	6,700	6,800	9,300	-10%
Total Eastern Stock‡ (U.S. area only)	19,300	16,700	17,000	22,600	23,900	+24%

Sources:

Loughlin, T.R., A.S. Perlov, and V.A. Vladimirov. 1992. Range-wide estimation of total abundance of Steller sea lions in 1989. Marine Mammal Science 8:220-239.

Small, R.J., and D.P. DeMaster. 1995. Alaska marine mammal stock assessments 1995. NOAA Tech. Memo. NMFS-AFSC-57. National Marine Fisheries Service. 93p.

Olesiuk, pers. comm. as cited in National Marine Fisheries Service. 1995. Proposed change in listing status of Steller sea lions under the Endangered Species Act. *Federal Register* 60(192):51968-51978.

Causes of the decline are uncertain but may be due to a combination of factors that vary in time and by area. Among the possible causes are reduced prey availability due to commercial fishing or climatic change, incidental taking by foreign and joint-venture trawl fisheries between the late 1960s and late 1980s, human disturbance at haul-out sites, deliberate shooting by fishermen, a commercial sea lion harvest in parts of Alaska from the 1950s to the early 1970s, hunting in British Columbia from the early 1900s to the early 1960s to reduce predation on commercial fish stocks, and subsistence hunting.

In response to the decline, the Marine Mammal Commission recommended in 1988 that the National Marine Fisheries Service list Steller sea lions as depleted under the Marine Mammal Protection Act. It also called upon the Service to convene a conservation team to review needed actions and prepare a conservation plan using a Steller sea lion species account published that year by the Commission (see Appendix B, Lentfer 1988). The Service conducted a range-wide survey in 1989 to help improve the basis for making management determinations concerning the stock, and in 1990 the Environmental Defense Fund petitioned the Service to list Steller sea lions as endangered under the Endangered Species Act. The Service responded by taking emergency action in April 1990 to list the species as threatened, and in December made the listing final. Under provisions of the Endangered Species Act, the Service also convened a recovery team in 1990, and in 1992 it adopt-

ed a recovery plan based on a draft plan prepared by the recovery team using the Commission's species account and other information.

As part of its sea lion recovery program, the Service increased research efforts to monitor the population and determine possible causes of the decline. In addition, the Service designated major rookeries and adjacent waters as critical habitat; established regulations to limit access to rookeries, prohibit fishermen from shooting near sea lions, and restrict commercial fishing around major rookeries; limited proposed increases in commercial catch quotas for pollock, a major sea lion food resource; and adjusted area fishing quotas to divert fishing operations away from sea lion foraging areas.

Despite these measures, there has been no indication that the population has begun to recover. As discussed below, the Service has therefore begun steps to upgrade the species' threatened status under the Endangered Species Act and to strengthen protection measures.

Endangered Species Act Status Review

As noted above, in 1990 the National Marine Fisheries Service designated Steller sea lions as threatened under the Endangered Species Act and established the Steller Sea Lion Recovery Team to help develop a recovery program. In 1992 the Service also adopted a Steller Sea Lion Recovery Plan prepared by the recovery team. One element of the recovery team's recommended plan not adopted by the Service was criteria for delisting and reclassifying the species under the Endangered Species Act. On this point the Service concluded that further analysis was needed, and over the next two years the Service undertook several related studies.

In 1992 the Service conducted another population survey that found Steller sea lion counts were continuing to decline in many areas. Early in 1993 it completed a population viability analysis to assess long-term implications of the decline. Using sea lion counts made between 1985 and 1992, the analysis concluded that there was a high probability that the Steller sea lion population would become extinct within 60 to 100 years if the downward trend was not reversed or slowed. Later in 1993 pup counts at selected rookeries indicated that the decline was continuing. In light of these findings, the Service on 1 November 1993 published a Federal Register notice announcing its intent to review the status of Steller sea lions under the Endangered Species Act to determine if the species should be reclassified as endangered. It also announced plans to conduct another range-wide survey of Steller sea lions in 1994.

In its 6 January 1994 comments to the Service on the notice, the Commission recommended that the status review be completed promptly using available data, and that draft criteria for judging whether the species should be listed as endangered be circulated to the Commission and the recovery team for review. The Service replied on 31 January, advising that it planned to await results of the 1994 population survey before reviewing the species' status because the decline between 1989 and 1992 showed some signs of slowing. It also stated that it would provide reclassification criteria to the Commission and the recovery team for review.

As preliminary results of the 1994 population survey became available, it was apparent that the decline was continuing at an alarming rate. In addition, new analyses of genetic samples and population trends of colonies throughout the species' range indicated that Steller sea lions comprised two distinct stocks exhibiting separate population trends. During 1994 neither the Commission nor the recovery team received proposed reclassification criteria from the Service although the Commission repeated its request by letters of 10 June and 30 November 1994.

In addition, the Steller sea lion recovery team reviewed information on the species' status at its 29-30 November 1994 meeting. Based on its review, the team wrote the Service on 20 December, advising that it had concluded that Steller sea lions should be managed as two separate stocks — an eastern stock from Cape Suckling, Alaska, east and south to California, and a western stock from Cape Suckling west to Russia. The team also concluded that, based on the criteria it had recommended in the draft recovery plan and criteria used by the World Conservation Union, the western stock should be listed as endangered, and the eastern stock should remain listed as threatened.

On 4 January 1995 the Service responded to the Commission's request for reclassification criteria for Steller sea lions. It noted that it had been reviewing the general guidelines for listing species under the Endangered Species Act as well as related scientific analyses but, because of the broad non-objective nature of advice on the matter, it had been unable to develop specific relisting criteria for Steller sea lions. It added, however, that an important element in its deliberations would be the results of population viability analyses. In this regard, it noted that an endangerment threshold generally accepted by the scientific community was the probability of extinction within the foreseeable future, which for many mammalian species is about 100 years depending on life history information. The Service also assured the Commission that it would use the best available scientific information to make its decision.

Final results of the 1994 population survey confirmed that the declining trend was continuing but at a somewhat slower overall rate. Based on the new data, the Service published a proposed rule in the *Federal Register* on 4 October 1995 to change the Endangered Species Act listing for Steller sea lions. Its proposal recognized two stocks separated east and west of Cape Suckling, Alaska, (east of Prince William Sound) and called for listing the western stock as endangered and the eastern stock as threatened.

Regarding the western stock, the Service noted that from 1990, when the species was listed as threatened, to 1994 counts of adult and juvenile sea lions at trend monitoring sites had declined by 21 percent, and pup numbers had declined by 28 percent. Applying population trend data from 1985 to 1994 to two population viability models — one based on composite population trends and the other on individual rookery trends — the Service found a 100 percent probability of extinction within 100 years in both cases. Considering only data from 1989 to 1994, however, the models predicted 100-year extinction probabilities of 65 and 10 percent, respectively.

Unlike the decline of the western stock, counts for the eastern stock have been relatively stable. Overall counts of juvenile and adult animals at monitoring sites in the eastern stock's range increased by 17 percent between 1990 and 1994 and, given its trend, the Service predicted that the eastern stock would persist for the foreseeable future. The Service noted, however, that prior to the decline, the proportion of U.S. Steller sea lions in the area of the eastern stock was less than 10 percent. It also noted that Steller sea lion numbers in California, the stock's southern limit, had declined 50 percent between 1950 and 1980 and 19 percent between 1990 and 1994, suggesting that the species' range may be shifting northward. Also, pup counts in central and southeast Alaska, which had been stable to increasing before 1991, declined by 20 percent between 1991 and 1994. In view of these latter points and other information, the Service concluded that the eastern stock should be considered vulnerable and remain listed as threatened.

At the end of 1995 the Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, was completing a review of the Service's listing proposal and expected to provide comments early in 1996. The Commission found that the Notice provided a thorough, well-reasoned analysis of the proposed changes. With the 1994 counts of Steller sea lions in the western stock's range now less than 20 percent of those in the 1960s, the Commission planned to express support for its listing as endangered. Given the recent declines in pup production at the northern end of the eastern stock's range and the disappearance of the southernmost colony in California, it also planned to support listing of the eastern stock as threatened.

Habitat Protection

As noted above and in previous annual reports, between 1990 and 1994 the Service took a number of actions to protect Steller sea lion rookeries, haul-out sites, and prey resources. In 1995 the measures specifically relating to Steller sea lions were not modified or expanded. However, in its 4 October 1995 *Federal Register* notice on the species' status under the Endangered Species Act, the Service noted that, given the western stock's high probability of extinction within 100 years under current trends, actions taken during the next 20 years would be crucial for the survival of that stock. To help identify additional measures that might be taken, the *Federal Register* notice invited comments on needed changes with respect to buffer area rules protecting important

Steller sea lion habitats, provisions to minimize commercial fishing impacts on sea lion prey resources, and other management issues.

As a related matter, the Service's notice also described certain conclusions and recommendations made by the Steller sea lion recovery team.. To assure that the Service's research program provides the best possible basis for making management decisions, the team had recommended constituting a series of separate review panels with appropriate team members and outside experts to evaluate Service plans for work in the areas of satellite telemetry, physiology and health, and food habits. It also noted that the team had concluded that a change in food availability is the leading hypothesis for explaining the cause of the western stock's decline.

In reviewing the Endangered Species Act listing proposal late in 1995, the Commission considered the above points with a view towards including comments on management related needs. Based on its review, the Commission concurred with the recovery team concerning the likelihood that prey availability was an important factor in the decline of Steller sea lions. Noting the importance of better information on sea lion food preferences and foraging ecology to evaluate this hypothesis and related management actions, the Commission expected to recommend to the Service that (1) the research program reviews suggested by the recovery team be prioritized to first examine plans for satellite-telemetry studies and foraging ecology research, and (2) the Service set aside funds as the recovery team may need to conduct reviews and other business in a timely manner.

The Commission also observed that it seemed possible, if not probable, that commercial fishing was among the factors affecting sea lion prey. Unfortunately, despite considerable research efforts, information remains insufficient to determine precisely which fisheries may have the greatest effect on sea lion prey resources, the fishing areas of greatest concern, or the extent to which fisheries may affect sea lion prey availability.

Given these gaps and recognizing the urgent need to reverse the sea lion decline, the Commission concluded that the most effective way to develop and evaluate appropriate fishery management measures may be through an experimental approach whereby different regulations or management measures are applied to different haul-out sites, feeding areas, or parts of the sea lion's range. The Commission also recognized the need for a comprehensive review of how commercial fisheries are being and should be managed to mitigate potential impacts on sea lion prey, similar to the review of research program elements recommended by the recovery team. The Commission therefore expected to recommend that the Service, in consultation with the recovery team, convene a panel of experts to evaluate and make recommendations on the full range of fishery management practices that may be useful for reversing the decline of Steller sea lions.

Steller Sea Lion Stock Assessments

Amendments to the Marine Mammal Protection Act in 1994 established a new regime to govern the incidental taking of marine mammals in commercial fisheries. Among other things, they required the National Marine Fisheries Service to prepare stock assessments for all marine mammal stocks in U.S. waters. Each assessment is to estimate the size and maximum productivity rate of the stock, calculate a potential biological removal level (not including natural mortality) that would allow the stock to increase towards its optimum sustainable population level, assess incidental-take levels in commercial fisheries, and determine if a stock is a strategic stock requiring special attention.

The Service circulated draft stock assessments in August 1994 that included assessments for two stocks of Steller sea lions — a western U.S. stock and eastern U.S. stock. Final stock assessments were circulated in August 1995.

Based on the 1994 sea lion population survey, the final assessment for the western U.S. Steller sea lion stock estimates the total stock size at 43,200 animals, including 9,600 pups. As data were not available to calculate the stock's maximum productivity rate, a general default value for all pinnipeds of 12 percent per year was considered the best estimate for this population parameter. With these estimates and other data, the Service calculated a potential biological

removal level of 766 animals per year for this stock. Using observer data for the groundfish trawl, longline, and pot fisheries in both the Bering Sea/Aleutian Islands area and the Gulf of Alaska, and salmon gillnet fisheries in various parts of Alaska, the Service estimated that the annual incidental-take level in Alaska fisheries for the western U.S. sea lion stock is 33.4 sea lions per year. It also estimated that about 8 more animals per year are killed by gear-related injuries and illegal shooting.

The final stock assessment for the eastern U.S. Steller sea lion stock estimated its size at 23,900 animals, including 5,300 pups. As it did for the western stock, the Service assumed a maximum productivity rate of 12 percent for the eastern stock. The calculated potential biological removal level for the stock was determined to be 1,056 animals. The assessment considered certain coastal gillnet fisheries to be the only commercial fisheries posing an incidental-take threat to Steller sea lions. Based on observer reports and other data for those fisheries, the assessment concluded that the annual incidental take of Steller sea lions from the eastern U.S. stock was no more than five animals per year.

Because the species, including both stocks, is listed as threatened, both stocks were automatically considered strategic stocks under the Marine Mammal Protection Act. At the end of 1995 no action had been taken to establish an incidental-take reduction team for either stock. Given the low incidental-take levels, it was the Commission's understanding that the Service considered the need for sea lion take reduction teams to be low priority.

Steller Sea Lion Subsistence Harvests

Although Steller sea lions have been a traditional component of the subsistence harvests of Alaska Natives in some coastal communities, little information is available regarding harvest levels prior to 1992. That year, however, the National Marine Fisheries Service contracted with the Alaska Department of Fish and Game to assess subsistence use of Steller sea lions, as well as harbor seals, by surveying Native hunters and households in 65 coastal villages.

Table 4. Estimated take of Steller sea lions, 1992-1994

Year	No. Landed	No. Struck & Lost	Total Take	95% Confidence Limit for Total Take
1992	370	179	549	452-712
1993	348	139	487	390-629
1994	336	80	416	330-554

Source: Wolfe, R.J. and C. Mischler. 1995. The subsistence harvest of harbor seal and sea lion by Alaska Natives in 1994. Technical Paper 236. Alaska Department of Fish and Game. Juneau, Alaska. 70p. + Appendices.

The surveys have been continued since then with support from the Service, but results from work in 1995 was not yet available as of the end 1995. The estimated take levels for 1992 through 1994 from these surveys are shown in Table 4.

Almost the entire subsistence take of Steller sea lions has been in the range of the western U.S. stock, and more than three-fourths of that take occurred on the Pribilof and Aleutian Islands. The highest annual take from the eastern U.S. stock between 1992 and 1994 was estimate at six animals in 1992.

In light of concern about the decline of Steller sea lions and their importance as a subsistence resource, Native residents in the Pribilof and Aleutian Islands are considering steps to establish a Steller Sea Lion Commission to develop a system of self-regulation and to explore co-management arrangements with Federal and State resource managers. As of the end of 1995, it was the Marine Mammal Commission's understanding that the Sea Lion Commission had not yet met or scheduled a time to meet, but that membership and organizational matters had been discussed among Native village representatives, and that the National Marine Fisheries Service had offered to provide funding for the Sea Lion Commission to meet.

Harbor Seals in Alaska
(Phoca vitulina richardsi)

Harbor seals occur in temperate and sub-arctic coastal waters of the North Atlantic and North Pacific Oceans. In the North Pacific Ocean their range extends from San Ignacio Lagoon in Baja California Sur, Mexico, northward and westward around the rim of the ocean basin to Hokkaido, Japan. In Alaska the species is found along the shores of the Gulf of Alaska, the Aleutian Islands, and the southeastern Bering Sea.

Harbor seals haul out to rest, pup, and molt on remote beaches, tidal mud flats, offshore rocks and reefs, sea ice, and objects such as buoys and log rafts. They generally remain within about 20 kilometers of shore near estuaries and protected coastal waters. Tagging studies indicate that some harbor seals migrate up to 1,000 km between summer and winter habitats; however, in most cases, their seasonal movements are much more confined, usually extending from less than a hundred to a few hundred kilometers. Within their individual ranges, harbor seal movements may be influenced by the tides, weather, food availability, and other factors. In some cases, they move seasonally into freshwater streams and lakes.

Early in the 1970s approximately 270,000 harbor seals were estimated to occur in Alaska coastal waters. In the 1980s, however, substantial declines were detected in the central and western Gulf of Alaska from Prince William Sound through the Kodiak Island region, as well as in the southeastern Bering Sea. For example, at what was once the world's largest harbor seal colony on Tugidak Island southwest of Kodiak Island, maximum counts declined from more than 9,000 in the mid-1970s to less than 2,000 in the mid-1980s. The reasons for the decline are uncertain but may be related to reductions in prey resources. As described in previous annual reports, the Commission provided funds to the Alaska Department of Fish and Game in 1988 and 1990 to monitor harbor seal population trends at index sites in southeastern Alaska, Prince William Sound, and Tugidak Island. In 1991 the National Marine Fisheries Service began a program to obtain minimum estimates of harbor seal abundance throughout Alaska.

Because harbor seals occur close to shore, they may be affected by a variety of human activities, including coastal pollution and coastal development. They are also an important subsistence resource for Alaska Natives. These factors, and the sharp declines in some parts of Alaska, have given rise to concern about the need to strengthen conservation efforts for the species in Alaska.

Alaska Native Subsistence Harvests

Although harbor seals have been a traditional subsistence resource for Alaska Natives in many areas of the State, information on harvest levels prior to the 1990s is limited. Beginning in 1992 the National Marine Fisheries Service provided funds to the Alaska Department of Fish and Game to gather information on the subsistence use of harbor seals (and also Steller sea lions) in Alaska. From surveys with hunters and Native households in coastal villages throughout the State, details of the subsistence take, including an estimate of total take (*i.e.*, landings plus animals struck but lost), have been developed for the years 1992 to 1994.

The estimated total Native subsistence take of harbor seals in Alaska for those years was 2,888 in 1992, 2,736 in 1993, and 2,620 in 1994. In each of those years, more than half the take occurred in southeastern Alaska where harbor seal numbers have generally been stable or increasing. Survey results for 1995 are expected to be available in 1996.

Co-Management of Harbor Seals in Alaska

The 1994 Marine Mammal Protection Act was amended to provide for the establishment of co-management agreements between the National Marine Fisheries Service and Alaska Native organizations. The purpose of the agreements is to provide a framework for cooperative efforts related to the conservation of marine mammal species of mutual concern in Alaska. In this regard, Native harbor seal hunters in villages along the Gulf of Alaska formed the Alaska Native Harbor Seal Commission in 1994 to assist in

such co-management efforts for harbor seals. In 1995, with funding provided by the National Marine Fisheries Service, the Alaska Native Harbor Seal Commission held several organizational meetings to develop bylaws and to develop a strategy for meeting co-management objectives.

As a related matter, discussed in Chapter X, the Commission provided funding in 1995 for a study to determine what more might be done to develop a database on harbor seals taken by Alaska Natives. Among other things, the study is to review data collected by Native harbor seal hunters and determine how it might be made available without compromising proprietary information. The data are presently stored with the Alaska Native Harbor Seal Commission and the Alaska Department of Fish and Game. It also will suggest data collection protocols that could be used by Native hunters.

Alaska Harbor Seal Stock Assessments

The 1994 amendments to the Marine Mammal Protection Act direct the National Marine Fisheries Service to prepare stock assessments for all marine mammal stocks in the United States to help manage incidental take of marine mammals in U.S. waters (see Chapter IV). The assessments are to include estimates of the minimum stock size, the maximum net productivity, and the potential biological removal level (not including natural mortality) which, if taken, would still allow a stock to reach or remain within its optimum sustainable population level. The assessments also are to review information on take levels in commercial fisheries and in other human-related activities and to determine whether stocks are "strategic" stocks, which could require special management attention to reduce incidental-take rates.

The Service distributed draft stock assessments in August 1994, including assessments for two harbor seal stocks in Alaska: a southeastern Alaska stock and a Gulf of Alaska/Bering Sea stock. For both stocks, the draft assessments concluded that human-caused mortality appeared to exceed the estimated potential biological removal levels and that they should therefore be considered strategic. As described the previous annual report, the Commission's 1 December 1994 comments to the Service on the draft stock assessments questioned the minimum stock size estimate for the southeastern Alaska stock and the justification for its designation as depleted. For the Gulf of Alaska/Bering Sea stock, the Commission suggested evaluating abundance, fishery take, and subsistence harvest data by region.

In August 1995 the Service circulated its final stock assessments, including those for three harbor seal stocks in Alaska: a southeastern Alaska stock, a Bering Sea stock, and a Gulf of Alaska stock. For the first two stocks, respectively, the assessments cited minimum population estimates of 32,745 and 17,243 seals, assumed (given limited direct data) maximum net productivity rates of 12 percent per year, and calculated potential biological removal rates of 1,965 and 1,035 seals per year. It also concluded that the southeastern Alaska stock was stable and that, while counts in the Bering Sea area between 1975 and 1991 showed a decline, a potentially anomalous count in 1976 makes such a trend equivocal.

For both the southeastern Alaska and Bering Sea stocks, incidental-take levels based on fishery observer data and fishermen's logbooks indicate take levels for the regions were below 10 percent of their estimated potential biological removal levels. Most of the incidental take in both regions involved set and drift gillnet fisheries for salmon. Combined with estimates of subsistence take in those regions, total human-caused mortality also was estimated to be below the calculated potential biological removal rates, and neither stock therefore was considered strategic under the Marine Mammal Protection Act.

Estimates of minimum population size and potential biological removal levels were not provided for the Gulf of Alaska harbor seal stock. Instead determinations regarding these estimates and the population's status with regard to being a strategic stock were deferred pending analyses of information to be obtained through a co-management program. The period of the deferral and the information to be analyzed was not specified in the assessment. It was noted, however, that current estimates of population size are low compared to those from 1970s and 1980s.

Harbor Seal Status Review

In 1988 the Commission published a series of species accounts for selected marine mammal species in Alaska, including harbor seals (see Appendix B, Lentfer 1988). In light of the sharp decline in harbor seal abundance in parts of Alaska, the Commission contracted for an update of the harbor seal species account, which was completed and published in 1994 (see Appendix B, Hoover-Miller 1994).

In addition, the National Marine Fisheries Service initiated steps in 1992 to develop a harbor seal conservation plan under provisions of the Marine Mammal Protection Act. Work on the plan, however, was suspended in 1994 when efforts were redirected toward conducting a status review to determine whether harbor seals in Alaska should be designated as depleted under the Marine Mammal Protection Act. The Service announced its intent to conduct the status review in the *Federal Register* on 11 April 1994.

In response to the notice the Commission provided the Service with a copy of the final harbor seal species account on 10 May 1994. On 10 June 1994 it also commented to the Service on factors that should be considered in determining whether harbor seals in Alaska should be designated as depleted. Among other things, it noted that harbor seal numbers had clearly declined in some areas of Alaska but have been stable or increasing in other areas. Given the limited understanding of harbor seal population structure throughout Alaska, the Commission recommended that the Service work with Alaska Native hunters and the Alaska Department of Fish and Game to gather harbor seal tissue samples from different parts of the State for analyses of possible genetic differences. Also, given the substantial decline in harbor seal numbers in the central and western Gulf of Alaska and the need to determine and eliminate causes of that decline, the Commission recommended that the Service appoint a group of experts to complete a conservation plan for harbor seals in those areas. Subsequently the Service amended the subsistence contract with the Alaska Department of Fish and Game to provide for collection of genetic samples as part of the Native subsistence sampling effort.

As of the end of 1995 the Service had not yet published the result of its status review and had not yet completed a harbor seal conservation plan.

Ongoing Research and Population Monitoring

As noted earlier, there are uncertainties about the abundance and apparent population declines of harbor seals in certain areas in Alaska. In an attempt to improve population estimates and resolve other uncertainties, the National Marine Fisheries Service convened a workshop in Anchorage on 11-13 November 1995 to review Alaska harbor seal population assessment data. A member of the Commission's Committee of Scientific Advisors participated in the workshop. Based on their review of harbor seal survey designs, data analyses procedures, and actual count data for various areas, participants provided recommendations for future research. A workshop report is expected to be available early in 1996.

In addition, a number of studies have been and are being done to assess harbor seal declines, natural history, and abundance. Between 1991 and 1995 biologists at the National Marine Mammal Laboratory conducted replicate abundance surveys throughout Alaska, and radio-tracking studies to estimate the fraction of seals likely to be away from a haul-out beach during a survey period to develop a correction factor for calculating total abundance. Following the 1989 *Exxon Valdez* oil spill, the Alaska Department of Fish and Game, in cooperation with the National Marine Fisheries Service, conducted oil spill damage assessment studies to document the spill's effects on harbor seals. Since 1992 oil spill restoration studies have been conducted annually to monitor harbor seal numbers and to investigate harbor seal biology in the Prince William Sound region.

Beginning in 1993 additional funding provided by Congress to the Alaska Department of Fish and Game through the National Oceanic and Atmospheric Administration has allowed harbor seal studies to be conducted in southeastern Alaska and the Kodiak area. These multifaceted studies are addressing seal behavior on land and at sea, physiology, disease, population dynamics, and trophic relationships, and have involved collaboration with the Service, the University of Alaska, Texas A&M University, and others.

Northern Fur Seal
(*Callorhinus ursinus*)

Northern fur seals occur in coastal waters of the North Pacific Ocean from southern California to Japan and in pelagic waters from about 35 degrees north latitude to the central Bering Sea (Figure 2). Approximately three-fourths of all northern fur seals breed and pup on Alaska's Pribilof Islands. Most other northern fur seals breed in Russia on the Robben Islands, the Kuril Islands, and the Commander Islands. Two small rookeries also occur on San Miguel Island in southern California and Bogoslof Island in the central Aleutian Islands.

Northern fur seals exhibit a high degree of site fidelity. Most animals three years of age or older return to their natal islands in summer to breed, pup, and molt. Tagging studies document only occasional movement of individuals between the various rookery sites. At other times of the year, fur seals generally remain at sea feeding, sometimes migrating long distances. Most one-year-old fur seals and some two-year-old animals remain at sea year-round.

Northern fur seals were harvested commercially for their pelts beginning in the late 1700s. By the 1800s excessive pelagic harvests of males and females of all ages threatened the species' economic as well as biological viability. As a result, the principal harvesting nations — Canada, Japan, Russia, and the United States — signed the Fur Seal Treaty of 1911. The treaty banned pelagic harvests in lieu of arrangements to share pelts from a managed onshore harvest of sub-adult male seals taken on U.S. and Russian rookeries. By limiting the harvest to sub-adult males, fur seal numbers were able to increase substantially over the next 30 years.

With World War II, the treaty and fur seal harvests lapsed, and by the early 1950s the Pribilof Islands' fur seal herd had swelled to about two million animals — a number thought to be at or near its pre-exploitation size. Harvests were soon resumed on the Pribilof Islands. At the time the prevailing wildlife manage-

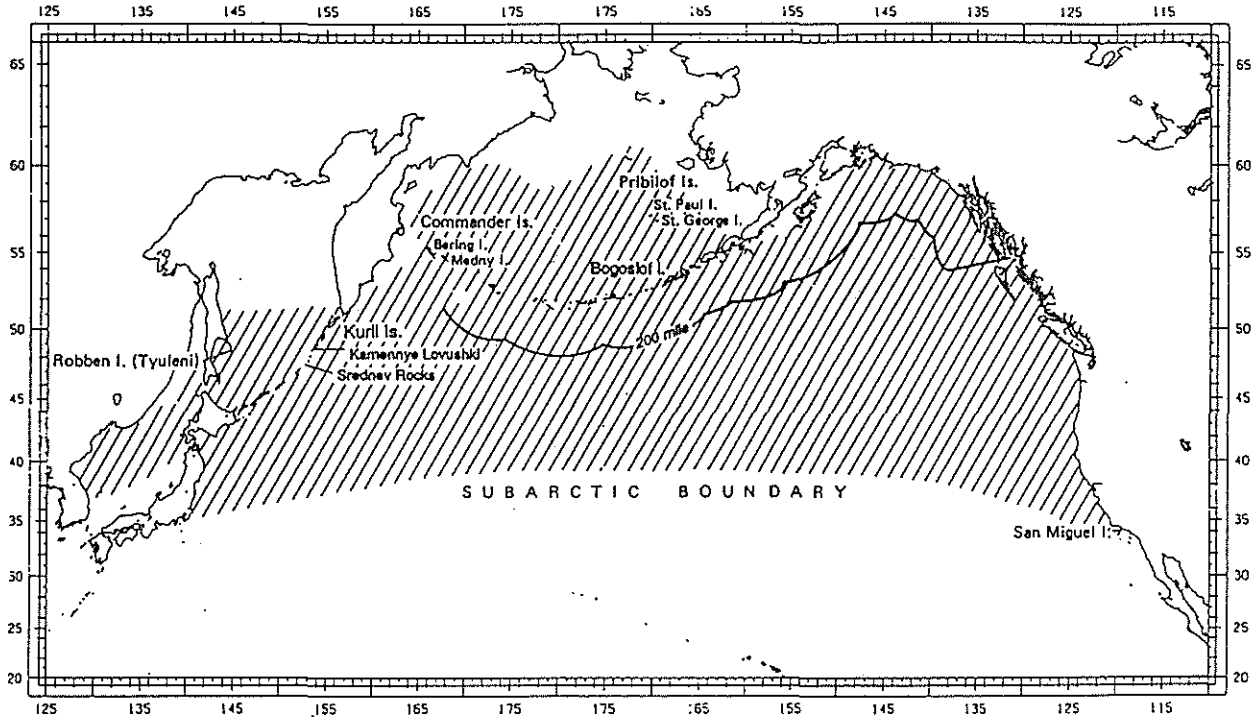

Figure 2. Range and breeding islands of the northern fur seal

ment theory predicted that, after an initial decline in fur seal numbers, pup production, and pup survival would increase as the population attempted to compensate for animals removed by the harvest. Therefore beginning in 1956 some female as well as juvenile male fur seals were taken an effort to increase population productivity. In 1957 the four signatories to the former treaty signed the Interim Convention for the Conservation of North Pacific Fur Seals, under which land-based harvests were again managed and the take of both adult females and juvenile males continued.

Under the harvest strategy the population began to decline as expected, but instead of rebounding a few years later, it continued to decline. The take of females was therefore stopped in 1968. As expected, the population continued to decline through 1970 due to a residual effect of the female harvest, and then began to increase early in the 1970s. But from 1974 through the early 1980s, it again declined at a rate of about eight percent per year for reasons that could no longer be attributed to the female harvest. By 1983 its number had dropped to about 877,000 animals, less than half its size in the early 1950s.

Throughout this period the interim convention was extended by a series of protocols until 1984 when it lapsed. At that time management authority for fur seals in the United States reverted to domestic authority under the Fur Seal Act of 1966 and the Marine Mammal Protection Act. Under these acts, commercial harvests were stopped and only a much smaller subsistence harvest by Aleut Natives on the Pribilof Islands continued. Since the early 1980s the Pribilof Islands' fur seal herd has remained relatively stable, but because of the magnitude of its decline prior to that time the population was designated as depleted under the Marine Mammal Protection Act in 1988. Based on a 1994 census (the most recent survey), its current size is estimated at about 1,014,000 animals, or about 1,019,000 animals if Bogoslof Island fur seals are included.

While causes of the population decline in the 1970s remain puzzling, research indicates that it was related to an increase in mortality of juvenile seals during their first few years of life. Among the more plausible factors thought to have been involved are entanglement in marine debris, incidental take in high seas driftnet fisheries in the North Pacific Ocean, long-term environmental change, and reduced prey availability. Effects of disease and parasites are poorly understood but also may have been a factor. Causes not thought to be significant include lingering effects of the commercial harvest of females in the 1960s, the commercial harvest of sub-adult males prior to 1985, emigration, and predation. Failure of the population to recover since the early 1980s is equally puzzling but may be related to the continuing effects of marine debris, environmental change, and reduced prey.

Subsistence Harvest

Before 1985 Aleut residents of St. George and St. Paul Islands in the Pribilof Islands used a portion of the commercial fur seal harvest for food and other purposes. Since then, these needs have been met by a much smaller subsistence harvest of sub-adult male seals taken between June and August using methods similar to past commercial harvests. The subsistence harvest is managed by the National Marine Fisheries Service pursuant to regulations authorized by the Fur Seal Act and the Marine Mammal Protection Act.

The regulations require that, before the actual harvests begin, the Service estimate the upper and lower harvest levels likely to meet the annual subsistence needs of Aleut residents on the Pribilof Islands. Whenever the estimated lower level is reached, harvesting is suspended until it can be determined how many additional seals are needed. In 1994 the Service projected that subsistence needs for 1994, 1995, and 1996 could be met by annual harvests of between 281 and 500 fur seals on St. George Island and between 1,645 and 2,000 fur seals on St. Paul Island.

In 1995 the total subsistence harvest was 1,525 fur seals, including 260 animals on St. George and 1,265 animals on St. Paul. As shown in Table 5, the 1995 harvest was slightly lower than recent harvests. When the Service requested public comments on its projected subsistence harvest needs for the years 1994 to 1996, some commenters suggested that the estimates were too high because recent butchering methods used by Aleut sealers did not fully utilize all suitable parts of seal carcasses. Data on butchering techniques employed in the 1995 harvest indicate seal carcasses were fully utilized.

Table 5. Subsistence harvest levels for northern fur seals in the Pribilof Islands, 1985-1995[1]

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
St. Paul	3,384	1,299	1,710	1,145	1,340	1,077	1,645	1,482	1,518	1,616	1,265
St. George	329	124	92	113	181	164	281	194	319	161	260
Total	3,713	1,423	1,802	1,258	1,521	1,241	1,926	1,676	1,837	1,777	1,525

[1] Data provided by the National Marine Fisheries Service, Alaska Region.

Northern Fur Seal Stock Assessments

In 1994 the Marine Mammal Protection Act was amended to provide a new approach for managing interactions between marine mammals and fisheries. In part, it required that the National Marine Fisheries Service prepare stock assessments for all marine mammal stocks in U.S. waters. The assessments are to include estimates of key population parameters, such as size and maximum productivity, in order to calculate a potential biological removal level (not including natural mortality) that, if taken, would allow a stock to increase towards its optimum sustainable population level. To assure that commercial fisheries do not cause mortality in excess of this level, the assessments also must include a determination as to whether the stock is a "strategic stock" possibly requiring the establishment of an incidental-take reduction team and preparation of an incidental-take reduction plan.

The Service circulated draft stock assessments for review in August 1994 and final stock assessments in August 1995. It concluded that northern fur seals in U.S. waters consisted of two distinct stocks — an eastern Pacific stock composed of animals breeding on the Pribilof Islands and Bogoslof Island and a San Miguel Island stock in southern California.

Eastern Pacific Stock — Based on fur seal census data collected in 1994, the final stock assessment for the eastern Pacific fur seal stock estimated its size to be 1,019,192 animals, including an estimated 5,173 animals on Bogoslof Island. Using population growth trends from 1912 to 1940 — a period of steadily increasing numbers — the Service concluded that the maximum net annual productivity rate for the population is 8.6 percent. Based on this and other data, the stock's potential biological removal level was calculated to be 20,846 animals per year. Because the Pribilof Island fur seal population is listed as depleted under the Marine Mammal Protection Act, the stock was automatically considered a strategic stock (see Chapter IV for discussion of strategic stocks).

In commenting on the draft assessment in 1994 the Commission noted that, unless it could be inferred why the stock presently is not growing, it would seem that a potential biological removal level could not be calculated for this stock. The Service's determination of a potential biological removal level, however, did not address this point, and given the lack of population recovery since the early 1980s, it is questionable whether the estimated potential biological removal level would allow the population to increase if that number was actually removed.

Based on fishery observer and logbook data, the Service noted that incidental take in commercial fisheries appears to be insignificant, approaching a zero mortality and serious injury rate. Six fisheries in the Bering Sea and Gulf of Alaska are thought to be potential sources of incidental take for northern fur seals. The Service estimated that these fisheries resulted in a total annual mortality rate of less than 10 animals now that high-seas driftnet fishing, a previous source of incidental take, was no longer authorized. Considering the low incidental-take rate, no action was taken in 1995 to constitute a take reduction team for this stock even though it is considered a strategic stock.

San Miguel Island Stock — The final stock assessment for the San Miguel Island stock of fur seals estimated its population size in 1994 to be 10,536 animals and assumed that the estimated annual maximum recovery rate for the eastern Pacific stock (8.6 percent) also applied to this stock. Except for a sharp decrease in numbers in 1982, the year of a severe El Niño event, the population has increased steadily since the early 1970s. The potential biological removal level was calculated to be 227 fur seals. Noting there have been no reports from fishery observers or fishermen of fur seals being taken incidentally in California gillnet fisheries in the past five years, the Service determined that the San Miguel Island fur seal stock was not a strategic stock, and no action was taken in 1995 to constitute a take reduction team.

Development on the Pribilof Islands

With the end of commercial fur seal harvests on the Pribilof Islands in 1984, Native residents began to encourage development of regional fishing and seafood processing industries as a new base for the islands' economy. Port facilities were improved and, since the late 1980s, new seafood processing plants have begun operating on St. Paul and St. George Islands. In addition, several processing vessels have begun anchoring nearshore where they discharge processing waste during the fishing season. Coincident with this development, concern arose over the effects of discharged seafood processing waste, vessel traffic, and oil spills on fur seals and rookeries.

In 1990 a condition previously unreported in marine mammals called white muscle disease syndrome was observed in fur seal pups at rookeries close to a broken sewage outfall pipe on St. Paul Island. At the time, both sewage and seafood processing waste was being discharged through the municipal waste system and the pipe was leaking close to shore. Although the syndrome has not recurred and its cause was never identified, some sort of oxidizing compound or chemical dumped into the waste treatment system was a possible factor in the occurrence of the incident.

Late in 1993 and early in 1994 several new processing plants opened. As a result of installation and design problems in the waste discharge outfalls, some of the outfalls using plastic pipe soon ruptured, allowing discharges closer to shore than permitted. Coincident with the peak crab processing season in February, crab shells, rubber packing bands, and other processing wastes began washing onto rookeries close to the outfalls. That summer researchers found that, while the overall number of northern fur seals on St. Paul Island remained steady, numbers at the two rookeries nearest the outfalls and the industrial area had declined.

Also early in 1994, both islands experienced an incident where a vessel ran aground and released fuel and other materials on or near fur seal haul-out beaches. During the subsistence harvest the following summer, a sharp increase in the number of fur seals with tar-like material in their ventral pelage was observed among the fur seals harvested from rookeries near the outfalls on St. Paul Island. Although the origin of the substance was not determined, the groundings and increased nearshore vessel traffic were considered among the possible sources.

While these observations raised concern about impacts on wildlife from seafood processing discharges and increases in associated vessel traffic, information was insufficient to predict possible impacts and develop appropriate management measures.

Waste outfalls from seafood processing plants for most parts of Alaska, including the Pribilof Islands, have been authorized under a single five-year National Pollution Discharge Elimination System general permit issued by the Environmental Protection Agency under the Clean Water Act. In 1994 the agency proposed replacing a 1989 general permit, scheduled to expire in October 1994, with a new permit incorporating more restrictive provisions on discharges near significant biological resources. Many of the new restrictions were precipitated by concern for the many fur seal rookeries, seabird nesting sites, and critical habitats on the Pribilof Islands and would have limited the nearshore areas around the islands where discharges could be allowed. The proposed restrictions raised concern among some residents of the Pribilof Islands and seafood processors that seafood processing plants would be precluded from operating on or near the Pribilof Islands.

In response to these concerns, in 1994 the Alaska Division of Government Coordination issued a consistency determination under the State's Coastal Zone Management Program, finding that seafood processors on the Pribilof Islands should be exempted from the statewide general permit and instead be covered under an interim two-year general permit. Pending issuance of the interim permit, pre-1994 discharge restrictions would apply, and an interagency task force of local, state, federal, and industry officials would evaluate key issues and recommend conditions for the two-year interim permit period. During that two-year permit period, monitoring studies would be undertaken to resolve uncertainties about potential wildlife impacts. Based on their results, general permit conditions specific to the Pribilof Islands would be developed for implementation when the interim permit expired.

During 1995 several steps were taken to address problems that had arisen with the various waste outfalls. Two of the three seafood processing plants on St. Paul Island replaced waste outfalls made of plastic pipe with steel pipelines, which were properly secured to prevent rupturing. Leaks in the remaining plastic pipe were also repaired, and municipal sewage from the city of St. Paul was then discharged through that pipeline, pending construction of a new municipal outfall to be completed in 1996. Heavy seas and sea ice conditions common in the Pribilof Islands in winter and early spring, however, remain a threat to the integrity of this outfall.

Also in 1995 the Environmental Protection Agency developed a proposed two-year general permit for all seafood processors on or within three miles of the Pribilof Islands. Its provisions would ban discharges of solids larger than one-half inch in any dimension and prohibit all discharges within one-half nautical mile of any fur seal rookery or protected seabird nesting area. Other provisions would prohibit discharges within three nautical miles of Walrus Island (a major Steller sea lion rookery) and require monitoring studies to document evidence of discharged wastes on the sea floor, the sea surface, and adjacent shorelines. Public comments on the proposed permit were received by the agency late in 1995 and a final decision on the proposed two-year interim permit is expected early in 1996.

The development of plans to carry out an adequate research program to help identify needed actions after the two-year interim period remain uncertain although some steps have been taken. To help assess the likely movement of discharged seafood processing wastes, the Environmental Protection Agency provided funds to study ocean currents around the Pribilof Islands and, as noted below, the National Marine Fisheries Service undertook monitoring studies to detect possible impacts from outfall discharges at fur seal rookeries on the Pribilof Islands. The interagency task force responsible for identifying and evaluating problem areas, however, has not met to develop final recommendations on needed research and monitoring studies, and it was not clear what steps would be taken to address this need. As a related matter, a separate task force to consider vessel traffic problems and oil spills was to be convened by the Coast Guard, but as of the end of 1995, it too had not yet met.

Northern Fur Seal Research Activities in 1995

In response to recommendations by the Marine Mammal Commission and a requirement added to the Marine Mammal Protection Act in 1988, the National Marine Fisheries Service developed and, in 1993, adopted a conservation plan for northern fur seals. The plan's primary purpose is to identify and guide research and management actions needed to restore the depleted fur seal population on the Pribilof Islands. As described elsewhere in this section, fur seal management activities in 1995 focused on the subsistence harvest, waste discharges from seafood processing plants and associated vessel traffic, and incidental mortality due to commercial fishing operations.

To provide an informed basis for making management decisions, the fur seal conservation plan includes research provisions for monitoring the status and trends of fur seal populations, and clarifying the causes of the recent population decline and lack of recovery of the Pribilof Islands population. However, after the Interim Fur Seal Convention lapsed in 1984, funding for fur seal research declined significantly. In recent years, funding has been sufficient to carry out little more than basic population monitoring work, which itself was cut back in 1985 from an annual effort to a biennial program. This work has been supplemented by cooperative studies with Native

organizations, universities in the United States, and research institutes in nations party to the former Fur Seal Convention — particularly Japan and Russia.

In 1995, however, the Service provided $291,000 for fur seal research, significantly increasing the species' research budget. As a result, Service scientists were able to continue basic population monitoring work and cooperative studies and also to initiate work in several new areas. With regard to ongoing population monitoring work, the Service conducted counts of adult males at rookeries on the Pribilof Islands, collected and analyzed scat samples to monitor prey utilization, took measurements of pups to assess their condition, and evaluated the accuracy of the methodology used to estimate population size.

As noted above, the decline in fur seal numbers has been linked to a decrease in juvenile survival. To help assess factors affecting juvenile survival rates, the Service used some of its 1995 funding to initiate two new lines of study. The first involves investigating the proportion of time pups spend at sea and on land prior to their weaning and departure from the rookeries to begin their one- to three-year period of life at sea. The second area of new work involves developing and constructing lightweight satellite tags suitable for safe use on fur seal pups to determine their at-sea habitat-use patterns. The Service expects to deploy the tags built with this year's funding during the 1996 field season.

Finally, the Service continued partial funding for cooperative studies. Among the cooperative research projects undertaken in 1995 were investigations of differences in female foraging patterns and rates of milk transfer to pups during the lactation period; an evaluation of the effect of ending the commercial harvest on population growth and demography; genetic studies to assess movement of animals between rookeries in different parts of the species' range; an assessment of the effect of pollutants on the immune response system of fur seal pups; monitoring marine debris entanglement rates among juvenile male fur seals returning to the rookeries after their first few years at sea; and monitoring population trends and mortality at rookeries on the Pribilof Islands for possible impacts associated with discharges from seafood processing plants.

Pacific Walrus
(Odobenus rosmarus divergens)

The world's largest stock of walruses, and the only stock found in U.S. waters, occurs over continental shelves in the Bering and Chukchi Seas between Alaska and Russia (Figure 3). Numbering more than 200,000 animals, this stock represents perhaps 80 to 90 percent of the world's walruses. It also is the only stock comprising the Pacific walrus, which is recognized as a distinct subspecies.

Other walrus stocks, which belong to either one or possibly two other subspecies, are located in northeastern Canada, Greenland, Svalbard and Franz Josef Land in the northern Barents Sea east of Greenland, and northern Russia. The seven or eight stocks in these areas failed to recover from intense commercial hunting that began in the 1500s and continued into the early 1900s. Their current sizes are estimated to range from less than 500 to about 6,000 animals. As recently as the 1700s walruses also reportedly occurred in very large numbers in the Gulf of St. Lawrence and as far south as Sable Island, southeast of Nova Scotia, Canada. In both of these areas, however, they were extirpated by commercial hunters and there have been no signs of recolonization.

Most Pacific walruses migrate seasonally with the advance and retreat of sea ice. When the pack ice reaches its maximum extent between January and March, nearly all walruses are in the Bering Sea, principally south and west of St. Lawrence Island and south and east of Nunivak Island. During the summer months, animals move north with the receding pack ice and by August most of the reproductive component of the herd (females and dependent calves) have moved through Bering Strait into the Chukchi Sea between Wrangel Island, Russia, and Barrow, Alaska. However, adult males and some immature males remain year-round in the Bering Sea along the east coast of Russia between the Chukotka and Kamchatka Peninsulas and as far south as Bristol Bay in Alaska.

The Pacific walrus has experienced at least three cycles of depletion and recovery brought on by episodes of excessive commercial hunting. In the 1860s they were hunted intensively for oil and ivory

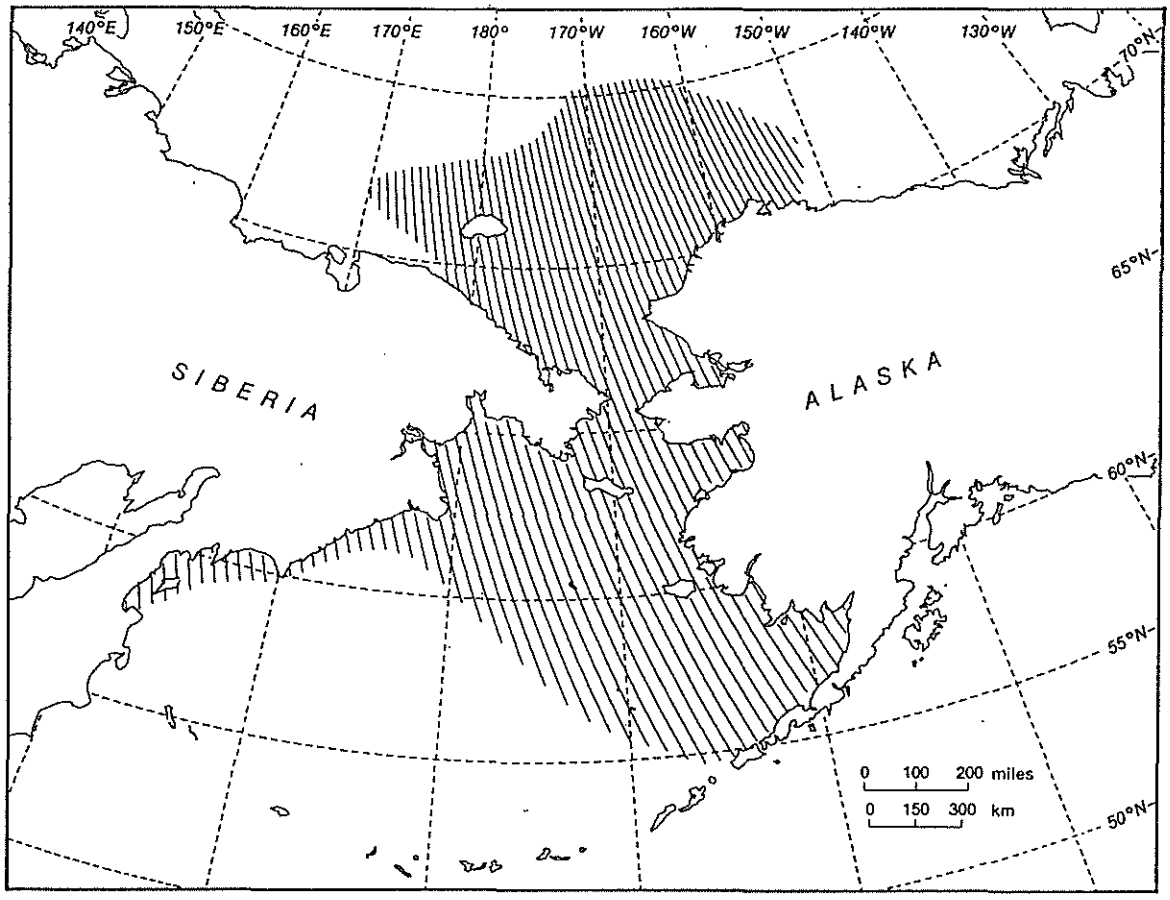

Figure 3. Range of the Pacific walrus

by American whalers. The resulting depletion in the 1870s caused widespread starvation and death among Native villages around the Bering Sea that were reliant on walruses for food. When walruses became scarce, commercial hunting pressure diminished, and walrus numbers rebounded in the late 1800s. Early in the 1900s Pacific walruses were again taken by U.S., Canadian, and Norwegian traders who used the animals to barter with Alaska and Chukotka Natives for furs. This practice declined in the 1920s, again leaving walrus numbers depleted but apparently not so depleted as in the 1870s. The third cycle began in the 1930s when Russian hunters began taking about 8,500 walruses annually for hides, oil, and ivory. By the mid-1950s, the population was again severely depleted. The most recent recovery occurred in the 1960s and 1970s under management measures adopted independently by the State of Alaska and the Soviet Union.

In the United States, lead management authority for marine mammals shifted to the Federal Government following passage of the Marine Mammal Protection Act in 1992. Under provisions of the Act allowing transfer of this responsibility to interested state governments, the State of Alaska requested a return of management authority for walruses and certain other marine mammals. As discussed in previous annual reports, problems arose in acting on this request and, after a protracted period of uncertainty about who would have lead responsibility over the long term, the State of Alaska decided in 1988 not to pursue its interest in this regard.

To help reach agreement on Alaska marine mammal conservation needs, whether under Federal or State leadership, the Commission in the mid-1980s initiated a cooperative effort involving all interested parties to prepare a series of species accounts for Alaska marine mammals. The series included accounts for walruses and nine other Alaska marine mammals with each account providing research and management recommendations. These were completed in 1988 (see Appendix B, Lentfer 1988). With the determination that lead responsibility for walrus conservation would remain with the Fish and Wildlife Service, the Commission wrote to the Service late in 1988 recommending that it use the walrus species account to prepare a walrus conservation plan as suggested under the Marine Mammal Protection Act. The Service agreed, but work on the plan was soon interrupted by the *Exxon Valdez* oil spill and other matters. With further assistance from the Commission, and in consultation with Native walrus hunters, the State of Alaska, and others, a final walrus conservation plan was completed and adopted by the Service in March 1994.

Under current management programs in both the United States and Russia, authorized taking of walruses is limited principally to Native subsistence harvests and the take of a few animals for purposes of research and public display. Illegal hunting of walruses for ivory, however, is an important management issue in both countries. Other important walrus conservation issues shared by the two countries include the effects of contaminants on the health of both walruses and Native people who consume walruses, the effects of tourism on walrus behavior at some of the few land-based haul-out sites in the Bering Sea, and determining the status and trends of the Pacific walrus stock.

Recognizing the importance and benefits of cooperation on these matters, government officials and Native community leaders in the United States and Russia began work in 1994 on parallel government-to-government and Native-to-Native agreements to build an international framework to conserve the Pacific walrus stock. Efforts to develop these agreements are discussed in Chapter VI; other walrus conservation efforts in the United States are discussed below.

Pacific Walrus Harvest Monitoring Program

Native peoples in coastal areas throughout the Arctic have depended on walruses for thousands of years. The meat from harvested animals was an indispensable source of food for both people and dogs, while other walrus parts were used for fuel, tools, and construction materials essential for everyday living. Although Native hunters now use rifles instead of the lances and harpoons used by their forbearers, walruses remain a vital cultural and subsistence resource. Native communities still rely on them for food, for ivory that can be worked into handicrafts and sold for needed income, and for maintaining cultural traditions. To meet these needs, the Marine Mammal Protection Act exempts Alaska Natives from its moratorium on taking marine mammals, provided the taking is not wasteful and the population is not listed as depleted under the Act.

Native residents in at least 20 Alaska villages have taken walruses in recent years, but 50 to 80 percent of the annual harvest typically occurs in three villages — Gambell and Savoonga on St. Lawrence Island and Diomede on Little Diomede Island in Bering Strait. In the 1950s the Alaska Department of Fish and Game initiated a program to monitor walrus harvests. In 1980 the Fish and Wildlife Service and the Alaska Eskimo Walrus Commission assumed responsibility for the harvest monitoring program, which has been conducted each year except 1991 and 1992 when limited funding forced suspension of operations. In addition to providing data to estimate harvest levels, the program offers an important opportunity to work with Native hunters and to gather biological samples.

Estimates of annual catch levels in Alaska since 1980, as well as the reported catch in Russia and the combined total catch in both countries, are shown in Table 6. These estimates do not include animals that are shot but escape mortally wounded. Most hunting occurs at sea while animals are on ice floes, and animals that are shot on ice floes may roll into the water and sink before they can be retrieved. Also, some hunting occurs while animals are swimming and some of those shot in the water may sink before they can be retrieved. A recent analysis of struck and lost rates from data on Alaska hunting between 1952 and 1972 concluded that 42 percent of the walruses shot

by hunters were not recovered. The need to update this analysis is identified in the walrus conservation plan, and the Service is discussing work in this regard with Native hunters.

The percentage of struck and lost animals that survive is uncertain, but based on the rare observation of healed bullet wounds on stranded animals and other information this may be low. As a result, the catch figures in Table 6 may reflect only 60 to 70 percent of the total number of animals killed annually by hunters. In light of the combined catch estimates for the United States and Russia and animals stuck but lost, the Service has expressed concern that harvest mortality in the mid-1980s may have approached or exceeded replacement levels.

Table 6. Estimated catch of Pacific walruses in Alaska and total reported catch of walruses in Russia, 1980-1995 (Catch figures do not include animals struck and not retrieved.)

Year	Alaska Catch	Soviet Catch	Total Catch
1980	2,625	2,653	5,278
1981	3,518	2,574	6,092
1982	2,557	3,569	6,124
1983	2,261	3,946	6,207
1984	4,929	4,424	9,353
1985	3,903	4,708	8,611
1986	3,207	3,884	7,091
1987	2,734	4,673	7,407
1988	2,567	3,989	6,556
1989	1,008	3,678	4,686
1990	--	3,269	--
1991	--	2,514	--
1992	1,485	1,750	3,235
1993	1,352	856	2,208
1994	1,681	1,103	2,784
1995	1,979	--	--

Sources: Fay, F.H., and C.E. Bowlby. 1994. The harvest of Pacific walrus, 1931-1989. Technical Report MMM 94-2. U.S. Fish and Wildlife Service, Anchorage, Alaska. 44 pp. Data for 1990-1995 from Fish and Wildlife Service.

Another source of data on walrus harvests is the marine mammal marking, tagging, and reporting program begun by the Service in 1988. The program's purposes are twofold — to help control illegal trade in marine mammal parts, including walrus ivory, and to improve information on the number of animals being taken. Under the program, walrus tusks taken in the subsistence harvest are tagged by authorized Service agents. The tags must thereafter remain with the uncarved tusks. From 1990 to 1994 tusks were tagged from 1,466, 2,163, 1,678, 1,173, and 1,303 walruses, respectively. Preliminary data indicate 966 animals were tagged in 1995. Walrus calves, which are sometimes taken by hunters, are not reflected in the tagging data because they lack tusks.

Resumption of Subsistence Hunting at Round Island

One of the four major terrestrial haul-out sites for walruses in the United States is on Round Island in northern Bristol Bay. In recent years, peak summer counts of walruses at Round Island have ranged from about 4,000 to 7,000 animals; in 1995 the peak count was 7,800 animals, the highest since 1986. Telemetry studies indicate that the walruses at Round Island are part of a regional group that also hauls out on beaches in at least two other Bristol Bay areas — Cape Seniavin on the Alaska peninsula and Cape Peirce on the mainland.

Round Island was traditionally a walrus hunting site for Native hunters in nearby villages; however, in 1960 the State of Alaska designated the Walrus Islands, which include Round Island, as a state game sanctuary. Established to protect what had become one of the last viable terrestrial walrus haul-out beaches in North America, the sanctuary was placed under management authority of the Alaska Board of Game and the Alaska Department of Fish and Game. As part of the action, Round Island was closed to hunting and access was restricted by a permit system. Since 1960 the sanctuary has become an increasingly popular destination for tourists interested in viewing walruses in their natural habitat. In 1991 Native hunters from several Bristol Bay villages asked the Alaska Board of Game to allow access to Round Island to resume a small subsistence hunt for walrus-

es. Action on the request was deferred pending collection of additional information and in 1993 a task force established by the Department met to examine the request. The task force concluded that a controlled harvest of up to 10 walruses in October likely would not have a serious impact on the walrus population or on use of the island as a major walrus haul-out site. After further consideration, the Board adopted new regulations on 20 March 1995 allowing the Department to issue access permits to the islands by qualified hunting parties.

To represent their interests, Native walrus hunters in seven nearby villages formed the Qayassik (Round Island) Walrus Commission. The Department of Fish and Game, the Fish and Wildlife Service, the Eskimo Walrus Commission, and Qayassik Walrus Commission then developed a cooperative management agreement and recommended regulations to govern subsistence harvesting on Round Island. Signed by the four parties on 22 September 1995, the agreement provides for a controlled harvest of up to 10 animals during the month of October.

The cooperative agreement calls for limiting the harvest to experienced walrus hunting captains approved by the Qayassik Walrus Commission. In addition, authorized hunters are to provide advance notice of hunting trips to the Department to facilitate monitoring of the harvest and its impact, all hunting is to be done on land, and the Qayassik Walrus Commission is to designate individuals to help collect biological samples from harvested animals for research purposes. As funding permits, the Department and the Service are to participate in monitoring the harvest to assess effects of the hunts on the walrus herd and other island resources, and the Eskimo Walrus Commission is to review and, as needed, assist activities of the Qayassik Walrus Commission.

Permits for the hunt were subsequently issued by the Department and the Qayassik Walrus Commission, and the hunt took place 3-14 October 1995. A representative of the Department accompanied the hunters and a Service biologist monitored the behavior of the walruses from a remote vantage point. A total of 10 male walruses were killed and butchered as part of the hunt. In addition, one animal that was found very badly injured from natural causes was shot for humane reasons under the authority of the Service official monitoring the hunt's impact on walruses. Because of its poor condition, meat was not taken from it. Four other walruses appeared to have been seriously wounded by bullets apparently passing through adjacent target animals. All wounded animals escaped into the water.

The Service biologist monitored walrus haul-out patterns before, during, and after hunting periods. The observations found no evidence of abandonment of the haul-out site except while hunters were on the beach. In many cases, groups of walruses remained a few meters off shore while hunters were on the beach and they usually returned to shore by the morning after a hunt. During the harvest, blood, liver, kidney, lung, tooth, and other biological samples from the butchered animals were contributed by the hunters for research purposes.

In 1996 results of the 1995 hunt will be reviewed by parties to the agreement to determine how best to proceed with future subsistence harvests at Round Island. The cooperation exhibited in preparing the agreement and carrying out the hunt is widely viewed as an important and positive step in the development of a collaborative co-management approach between responsible government agencies and the Native community on walrus conservation issues.

Walrus Research and Monitoring Studies

To provide information necessary for management purposes, the Service supports various projects identified in the walrus conservation plan. The National Biological Service provides support to address fundamental biological questions on walrus behavior, ecology, and population dynamics, while the Fish and Wildlife Service's Marine Mammals Management Office supports monitoring studies to help detect and assess potential human-related effects.

In 1995 walrus studies by the National Biological Service were directed to two principal areas: compilation of a database of biological information on Pacific walruses, and telemetry studies to determine movement patterns. The former effort, being done in cooperation with scientists in Russia, will combine available information in both the United States and

Russia on counts of walrus at haul-out sites, walrus distribution, population censuses, harvests, and other topics. The work is scheduled to be completed early in 1998 and is being done in conjunction with a project to develop a geographic information system database of biological and ecological data for the entire Bering Sea ecosystem. The telemetry studies involved attaching VHF and satellite tags to 17 walruses in Bristol Bay to determine haul-out patterns and to locate feeding areas. The results are expected to be available in 1996 when work is planned to field-test new global positioning system satellite tags that provide more accurate location data. If successful, it is hoped that the new tags can be used on walruses hauled out along the ice edge to assess behavioral responses to vessel traffic and aircraft overflights.

Monitoring studies carried out by the Fish and Wildlife Service's Marine Mammals Management Office have focused on three areas, in addition to the harvest monitoring work noted above. In 1995 the Office contracted for laboratory analyses of contaminant levels and effects in walrus livers and kidneys collected in cooperation with Native hunters during spring hunts at Gambell and Savoonga between 1992 and 1994. Past studies have found high levels of mercury and cadmium in these tissues, and the studies are part of a continuing effort to detect trends and assess possible effects. A report of the work will be available early in 1996.

Also in 1995 the Division supported laboratory analyses of blood samples from 20 walruses for signs of unusual diseases. None were found. It was also determined that there were no signs of exposure to several highly contagious animal diseases, such as morbillivirus or brucellosis. To monitor walrus health, the Service also has encouraged Native hunters to report observations and collect samples from walruses with unusual physical conditions. Among other things, laboratory analyses of samples collected by Native hunters found two samples that were apparently coated with crude oil and two liver samples with fibrosis possibly caused by infection.

Pacific Walrus Stock Assessment

In 1994 amendments to the Marine Mammal Protection Act directed the Fish and Wildlife Service to prepare stock assessments for marine mammal stocks under its jurisdiction. The purpose of the assessments is to provide a basis for managing the incidental take of marine mammals in commercial fishing gear. Among other things, the assessments are to include estimates of population size and maximum productivity, and to calculate the potential biological removal level (not including natural mortality) that could be taken annually and still allow the stock to reach or remain within optimum sustainable population levels. The assessments also are to provide information on annual incidental-take rates and to determine whether the stock is a "strategic" stock, which could require special management action (see Chapter IV).

The Service circulated draft stock assessments for walruses and certain other species in August 1994. As described in the previous annual report, the Commission provided comments to the Service on 1 December 1994. The draft assessment concluded, among other things, that the Pacific walrus stock should be considered a strategic stock because the combined average annual harvest in the United States and Russia over the past 30 years exceeded its estimated potential biological removal level. In its comments to the Service on this conclusion, the Commission noted that if the analysis was limited to harvest levels since 1990 — the date of the population estimate used to calculate the potential biological removal level — the average annual harvest number would not exceed the potential biological removal level. The Commission, therefore, recommended that the Service reassess its finding that the stock should be considered strategic.

Final stock assessments were provided to the Commission by the Service in October 1995. The assessment for Pacific walruses concluded that the stock probably numbers between 200,000 and 250,000 animals, but that, based on coefficients of variation from the most recent population survey, the best minimum stock estimate is 188,316 animals. It also concluded that the best current estimate of the maximum productivity rate is eight percent per year.

Using these and other data, the Service calculated a potential biological removal rate of 7,533 animals per year. National Marine Fisheries Service observer data

from 1990 to 1994 for various sectors of the Bering Sea groundfish fishery, the only fishery reported to incidentally take walruses, indicated an annual incidental-take rate of about 16 animals. The Service concluded this was an insignificant level that met the Marine Mammal Protection Act goal of approaching a zero level of mortality and serious injury.

Considering total catch landings of walruses in the United States and Russia, plus an estimate of animals that were struck and lost, the Service estimated that the average annual level of human-related mortality and serious injury for the past five years was 5,894 animals. As this was below the estimated potential biological removal rate, the Service concluded that the Pacific walrus stock was not a strategic stock.

Sea Otter (*Enhydra lutris*)

The sea otter is the smallest marine mammal in the world with the exception of the marine otter (*Lutra felina*). It is the only member of the genus *Enhydra*, and comprises three identified subspecies: *E.l. lutris*, *E.l. nereis*, and *E.l. kenyoni*.

Sea otters were historically found in nearshore waters of the North Pacific Ocean, from Hokkaido in northernmost Japan through the Kuril Islands, Kamchatka Peninsula, the Commander Islands, the Aleutians, peninsular and south coastal Alaska, and southward down the west coast of North America to Baja California. Prior to the mid-18th century, the worldwide population of sea otters was estimated at 150,000 to 300,000 animals.

The Russian discovery of Alaska in 1741 led to intense commercial exploitation of sea otters that continued without regulation for 150 years. By the early 1900s, the total sea otter population was reduced to as few as 1,000 to 2,000 animals existing in 13 small and widely scattered remnant groups.

Commercial exploitation of the species ended with the North Pacific Fur Seal Convention of 1911, an agreement between the United States, Russia, Great Britain, and Japan. With this protection, sea otters have recolonized or have been reintroduced into a substantial part of their historic range in Russia, the Aleutian Islands, south coastal Alaska, British Columbia, Washington, and California.

In the past 20 years, however, new threats have developed. They include possible oil spills from tanker accidents and well blow-outs, entanglement in fishing gear, and marine pollution.

Efforts by the Marine Mammal Commission and others to ensure the continued protection of sea otters and their habitat have been discussed in previous annual reports. A summary of these actions and a discussion of efforts undertaken in 1995 follows.

The Central California Population

The sea otter population in California was nearly eradicated by commercial hunting. By the time protection was afforded in 1911, the total sea otter population in California may have numbered fewer than 50 animals found within a few miles of nearshore habitat along the rocky Point Sur coast. Under the Fur Seal Convention and additional protective measures later implemented by the State of California, the population increased slowly. By the mid-1970s, approximately 1,800 sea otters inhabited nearshore areas along 160 miles of the central California coast. More recent population counts are shown in Table 7; the 1995 counts continued an upward trend that began in the 1980s.

Because of its small size and limited distribution, and the growing risk of oil spills as a result of increasing tanker traffic in the area, the population was designated as threatened under the Endangered Species Act in January 1977. At that time, it was recognized that perhaps the best way to minimize the risk from oil spills would be to encourage further expansion of the population's range. However, such range expansion could impact commercial and recreational abalone and other shellfish fisheries that had developed in the absence of sea otters. In response to this realization, the Fish and Wildlife Service, acting on a December

Table 7. California sea otter population counts by the Fish and Wildlife Service and the California Department of Fish and Game, 1982-1995

Year		Independent Otters	Dependent Pups	Total
1982	Spring	1,124	222	1,346
	Fall	1,194	144	1,338
1983	Spring	1,131	120	1,251
	Fall	1,062	164	1,226
1984	Spring	1,181	123	1,304
	Fall	—	—	—
1985	Spring	1,124	236	1,360
	Fall	1,066	155	1,221
1986	Spring	1,345	225	1,570
	Fall	1,088	113	1,201
1987	Spring	1,430	220	1,650
	Fall	1,263	104	1,367
1988	Spring	1,505	219	1,724
	Fall	—	—	—
1989	Spring	1,574	290	1,864
	Fall	1,484	115	1,599
1990	Spring	1,466	214	1,680
	Fall	1,516	120	1,636
1991	Spring	1,700	241	1,941
	Fall	1,523	138	1,661
1992	Spring	1,810	291	2,101
	Fall	1,581	134	1,715
1993	Spring	2,022	217	2,239
	Fall	1,662	143	1,805
1994	Spring	2,076	283	2,359
	Fall	1,730	115	1,845
1995	Spring	2,095	282	2,377
	Fall	2,053	137	2,190

1980 recommendation by the Marine Mammal Commission, adopted and implemented a management strategy recognizing the need for "zonal" management of sea otters and the need to establish one or more sea otter colonies at a site or sites not likely to be affected by an oil spill in or near the population's present range. The zonal management concept was incorporated into the Service's Southern Sea Otter Recovery Plan adopted in February 1982.

As discussed in previous annual reports, the Fish and Wildlife Service initiated efforts in 1981 to establish a sea otter "reserve" off California. In 1986 Congress passed Public Law 99-625, which included provisions authorizing and encouraging the development and implementation of a program to establish at least one sea otter colony outside the then-existing sea otter range in California. The Fish and Wildlife Service, in consultation with the Marine Mammal Commission, the California Coastal Commission, and the California Department of Fish and Game, subsequently developed and adopted a plan to establish a reserve sea otter colony at San Nicolas Island in the California Channel Islands.

Translocation Efforts — Capture of sea otters for translocation to San Nicolas Island began on 24 August 1987. As of June 1990, 139 animals had been transported to and released at San Nicolas Island. No animals have been captured for translocation since mid-1990.

Between August 1987, when the translocation program was initiated, and December 1993, 28 pups are known to have been born at the San Nicolas Island translocation site and 9 of these are believed to have survived to weaning. Of the 139 sea otters translocated to San Nicolas Island during that period, 14 are known to have died, 10 have been recaptured in the sea otter management zone south of Point Conception, 36 have been resighted back in the mainland range, and a few remain at San Nicolas Island. The fate of the remaining animals is unknown.

In 1993 funding and opportunities to observe the San Nicolas population were reduced. At least six pups were observed. However, the population did not appear to be growing and was estimated at 12-14 animals, about the same as the previous year. Counts conducted in 1994 and 1995 indicate that the San Nicolas sea otter population is remaining stable at about 15 animals. Six pups were known to have been born at San Nicolas Island in 1995.

Sea Otter Necropsy Program — The California sea otter population has not grown as rapidly as populations in Alaska. Through an agreement reached in 1991 between the Fish and Wildlife Service and the California Department of Fish and Game, veterinary

pathologists with the National Biological Service's National Wildlife Health Center in Madison, Wisconsin, have been conducting necropsies on all fresh beach-cast sea otter carcasses collected along the California coast to determine if there are unusual causes or rates of mortality.

National Wildlife Health Center pathologists have determined that 42 percent of southern sea otter deaths can be attributed to infectious diseases. These include acanthocephalan peritonitis (15.9 percent), protozoal encephalitis (11.4 percent), coccidioidomycosis (6.8 percent) and other diseases (7.9 percent). Other sources of mortality have included trauma, such as shark bite, lacerations, *etc.* (18.2 percent), emaciation (11.4 percent), tumors (3.4 percent), and various conditions of mechanical or functional impairment (9.1 percent). The cause of death of 15.9 percent of animals is undetermined at this time.

Between 16 and 25 July 1995, 11 southern sea otters were found dead or dying along the beach in Monterey County, California. This was substantially more than normal and the event prompted a multi-agency investigation involving, among others, the Fish and Wildlife Service, the National Biological Service, the California Department of Fish and Game, and the Monterey Bay Aquarium. Necropsies and diagnostic tests on 10 of the 11 carcasses were carried out by the National Wildlife Health Center, and additional tests were performed through the Department of Fish and Game and the Aquarium. Samples were also collected from apparently healthy animals captured in the Monterey Bay area. Despite the thorough investigation, no cause of the mortality has been identified. A number of tissue samples from the dead animals have been frozen and saved for possible future investigation. As of the end of 1995 no further unusual mortalities had been observed in the area.

Update of the Southern Sea Otter Recovery Plan — In 1989 the Fish and Wildlife Service reconstituted the Southern Sea Otter Recovery Team to review and recommend changes necessary to update the Southern Sea Otter Recovery Plan. This action was precipitated, in part, by the 1989 *Exxon Valdez* oil spill and the subsequent realization that the entire California sea otter population could be jeopardized by a similar oil spill.

Based on the recovery team's recommendations, the Fish and Wildlife Service drafted a plan update and in August 1991 provided it to the Commission and others for review and comment. The Commission, in consultation with its Committee of Scientific Advisors, reviewed the draft and provided comments to the Service on 8 November 1991. As discussed in previous annual reports, the Commission recommended that a second draft be done and be provided to the Commission and others for review and comment.

On 8 July 1992 the Service advised the Commission that it had decided not to prepare a second draft for further agency and public review. The Service indicated that the recovery team had reviewed the comments on the draft recovery plan update and had proposed to redirect the focus of the update specifically to actions needed to remove the population from the List of Endangered and Threatened Species.

Subsequently a number of industry and conservation groups expressed concern to the Fish and Wildlife Service that revision of the recovery plan was being done without public input and consideration of socio-economic factors. In response to these concerns, early in 1993 the Fish and Wildlife Service formed a public interest group to identify and suggest ways for resolving conflicting views regarding needed conservation actions.

Members of the recovery team finalized a revision of the update for review at the end of 1994. Early in 1995 the revision was submitted to the Service's Regional Director. At the end of 1995 it was the Commission's understanding that the proposed update of the recovery plan was still under review in the regional office.

Pup Survival Study — The California sea otter population has experienced a relatively slow rate of increase compared to sea otter populations in Washington and Alaska. This could be due to low pup survival. As discussed in Chapter X, in 1995 the Commission provided funds to support analysis of data on patterns of sea otter pup survival and development in different geographic areas. A draft report was completed and circulated for review in December 1995. It is anticipated that the final report will be available early in 1996.

The Washington Sea Otter Population

As noted above, sea otters historically ranged along the North Pacific coast of the United States and Canada from the Pribilof Islands in the north to California in the south. During the 18th and 19th centuries the species was extirpated from most of its range. Between 1965 and 1972 Federal and state agencies cooperated in a project to translocate sea otters from Alaska to parts of the species' former range. As part of this effort, in 1969 and 1970, 59 animals were translocated and released in waters off the State of Washington. In 1995 it was estimated that the population numbered about 360 individuals occupying a small range off remote portions of the Olympic Peninsula. The population is thought to be growing at a rate of 15 to 20 percent annually and within the next decade could expand into waters supporting active shellfish and set-net fisheries. Based on experience in Alaska and California, it can be anticipated that this expansion will lead to conflicts between sea otters and fisheries, as well as the increased likelihood of incidental take of sea otters in set-net fisheries.

In order to anticipate and possibly avoid potential problems involving the Washington sea otter population, the Marine Mammal Commission provided support in 1995 for an assessment of potential fisheries conflicts in Washington State waters. During 1995 a draft report was provided to the Commission for review. This is discussed further in Chapter X.

The Alaska Sea Otter Population

Small groups of sea otters survived the era of commercial exploitation in several remote areas of Alaska. Since then, sea otters have repopulated most of their former range in Alaska although they have not yet reached carrying capacity in some areas. No sea otters survived in southeast Alaska, and repopulation of the area was initiated by translocating otters from Amchitka Island and Prince William Sound in the late 1960s and early 1970s.

The best available data indicate that there currently are 100,000 to 150,000 sea otters in Alaska. Although the population is large and growing, there are a number of existing and foreseeable threats and conservation issues. These include (1) conflicts with commercial, subsistence, and recreational shellfish fisheries that have developed in the absence of sea otters; (2) incidental take in gillnet and other fisheries; (3) oil and gas development and transportation; (4) logging, mariculture, and other coastal development; (5) Native subsistence hunting; and (6) the increasing tourist industry in Alaska.

The reality of these threats is illustrated by the 1989 *Exxon Valdez* oil spill, which directly killed 3,500 to 5,500 sea otters and may have affected many others through contamination and destruction of food species.

As described in past reports, the Commission initiated efforts in 1984 to develop conservation plans for sea otters and other marine mammals in Alaska. Also as described in past reports, the Fish and Wildlife Service completed and adopted conservation plans for sea otters, walruses, and polar bears in 1994.

Marking, Tagging, and Reporting Program — In 1981 the Marine Mammal Protection Act was amended to give the Fish and Wildlife Service and the National Marine Fisheries Service authority to promulgate regulations requiring the marking, tagging, and reporting of marine mammals taken by Alaska Natives. The purposes of the amendment were to obtain better information on the numbers and species of marine mammals taken for subsistence and handicraft purposes and to help control illegal trade in products from those species.

Marking, tagging, and reporting regulations were issued by the Fish and Wildlife Service on 28 June 1988. They require that within 30 days of taking a polar bear, walrus, or sea otter, Native hunters must report the take to the Service and present specified parts of the animal to be marked and tagged. Since promulgating its regulations, the Service has worked closely with Native groups and the State of Alaska to implement the marking, tagging, and reporting program. Data obtained from the program are maintained by the Service in a computerized database. During 1995, 589 sea otters were presented for marking and tagging by Alaska Natives. The number of sea otters tagged for the years 1990 through 1994 were 166, 231, 637, 1,242, and 830, respectively.

Developing a Co-Management Plan — In December 1988 Alaska Natives formed the Alaska Sea Otter Commission to promote Native participation in development of policies and programs affecting sea otters and their use in Alaska. The Commission is comprised of representatives from Alaska coastal regions where sea otters occur.

To facilitate Native involvement in developing and implementing an agreed sea otter conservation plan, the Alaska Sea Otter Commission drafted and in 1991 proposed that the Fish and Wildlife Service, the Alaska Department of Fish and Game, and the Sea Otter Commission enter into a formal Memorandum of Agreement specifying their respective responsibilities related to the conservation of sea otters in Alaska. Subsequently the Marine Mammal Commission, in consultation with the Sea Otter Commission and others, developed a draft sea otter conservation plan, which it provided to the Fish and Wildlife Service on 5 May 1992. The Sea Otter Commission also began work on regional sea otter management plans to complement the statewide sea otter conservation plan being developed by the Fish and Wildlife Service.

A Memorandum of Agreement satisfactory to all three parties was signed on 1 February 1994 by representatives of the Fish and Wildlife Service, the Alaska Department of Fish and Game, and the Alaska Sea Otter Commission. The purpose of the agreement is to assist signatories in the cooperative management of sea otters in Alaska by providing for the exchange of biological, management, and socioeconomic information, and to support the requirements of pertinent laws, regulations, and resolutions. Further, in 1994 the Sea Otter Commission completed draft management plans for sea otters in the Chugach (Prince William Sound), southeast, and Kodiak regions. During 1995 draft plans for the remaining three regions — Bristol Bay, Cook Inlet, and Aleutian-Pribilof — were completed and forwarded to the Native communities for review.

Internal review has been completed for the Chugach, southeast, and Kodiak regions. The Service has reviewed and commented on the southeast management plan. Thus far, the review process does not include a response to comments prior to finalization of the plans. When the internal review is completed, the draft plans will be provided to the Fish and Wildlife Service, the Alaska Department of Fish and Game, and the Marine Mammal Commission for review.

CITES Permit Request — The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) requires that before species listed on Appendix I or II may be exported, a permit must be obtained. The responsible government agency may issue a permit only if it determines that the specimen was acquired lawfully and that the proposed export would not be detrimental to the species' survival.

As noted in the previous annual report, on 1 April 1994, Kuiu Kwan Inc., of Lynnwood, Washington, applied to the Fish and Wildlife Service for a permit to export three sea otter pelts on which were painted Alaska Native artwork. The pelts were to be used as product samples to determine if a foreign market existed for painted pelts.

In response to a 31 May 1994 *Federal Register* notice on the permit application, the Marine Mammal Commission by letter of 14 July 1995 provided comments to the Service. The Commission noted that a decision on whether to issue a CITES export permit in the Kuiu Kwan case would hinge on whether the proposed export would be detrimental to the survival of the species and whether the pelts were acquired lawfully.

In the Commission's opinion, the export of pelts from three animals would not be detrimental to the survival of the Alaska sea otter population or any subpopulation. The Commission noted, however, that the export of the pelts would be merely a prelude to further exports, should a foreign market be developed. Therefore, the Commission advised that, if an export permit is issued, the Service should advise the permittee that making future findings of "no detriment" may be difficult for any large-scale commerce in sea otter pelts that may result.

As to whether the animals were lawfully acquired, the Commission noted that this requirement would have been met in this instance only if the painted sea otter pelts constitute "authentic Native articles of handicrafts" as defined in the Marine Mammal Protec-

tion Act. The critical issue identified by the Commission was whether the pelts had been "significantly altered from their natural form." The Commission was concerned that the painted pelts, once exported, could readily be transformed into other saleable items, in no way related to the Native artwork.

The 1994 amendments to the Marine Mammal Protection Act prohibit export of any marine mammal or marine mammal product taken in violation of the Act or for any purpose other than public display, scientific research, or enhancement of the species or stock. The Commission noted that the proposed export would not be for one of these enumerated purposes and may be impermissible.

On 6 October 1994 the Service wrote to the petitioner denying the request to export and re-import the three sea otter pelts. It stated that, while export of just three pelts may not adversely affect the Alaska sea otter population, the specimens were taken as part of a total harvest that may not be biologically sustainable at the local population level. The Service also concluded that the pelts did not qualify as Native articles of handicrafts because they had not been significantly altered from their natural form. The Service noted that, if the petitioner's intent was to market Native paintings, rather than sea otter pelts or handicrafts, a different substrate could be used. The Service also questioned whether the proposed development of a broad foreign market would contravene the Marine Mammal Protection Act's provisions against producing handicrafts through mass production.

On 8 November 1994 Kuiu Kwan Inc. wrote to the Service seeking reconsideration of the permit denial. The petitioner alleged that the Service was improperly seeking to protect sea otters from possible overharvesting by means that are contrary both to the Marine Mammal Protection Act and the Service's own regulations. The petitioner contended that there are only two legal bases for denying a permit request under CITES: (1) the subject wildlife was not lawfully taken or (2) the proposed export activity would be detrimental to the survival of the species. The petitioner argued that the Service had no factual basis for finding that the proposed export would be detrimental.

The Service's alternative ground for denial — that the proposed export would violate the Marine Mammal Protection Act provision limiting sale to "authentic Native handicrafts" — was also challenged by the petitioner. The petitioner argued that, because the proposed export activity specifically excludes any sale in commerce, it could not possibly result in a violation of the Act. The petitioner also disputed the Service's conclusion that the pelts were not significantly altered from their original form, and questioned the basis for the Service's speculation that a buyer of the handicrafts might subsequently alter the pelts.

By letter of 3 January 1995 the Service responded to the petitioner's request for reconsideration, again denying the permit application. In its letter the Service stated that the applicant's request for reconsideration neither introduced any new evidence nor refuted in any way the Service's basis for its initial denial of the permit request. By way of clarification, the Service noted that Article IV(2)(a) of CITES requires a finding of no-detriment prior to allowing the export of specimens of species listed in Appendix II, and that the Service continued to be unable to find that the proposed export would not be detrimental to the survival of the species.

As a second point, the Service noted that it cannot issue a CITES permit for an activity that would be in violation of the Marine Mammal Protection Act. The Service found that the export of not-for-sale samples for market research is considered a commercial activity. Because the altered pelts do not qualify as Native handicraft, these items cannot be exported under the Marine Mammal Protection Act.

On 15 February 1995 the applicant appealed the decision to the Director of the Fish and Wildlife Service. A decision on the matter was postponed for six months to allow the Service time to develop a handicraft policy. Subsequently, the Director asked the Service's Alaska regional office to work with Native groups to develop a handicraft policy. On 18 September the regional office circulated a draft policy to Native groups for review.

On 9 November 1995 the Deputy Director of the Fish and Wildlife Service wrote to the applicant denying the request for a CITES export permit. That

decision marked the end of the plaintiff's administrative review process.

Sea Otter Stock Assessments

As discussed in Chapter IV, amendments to the Marine Mammal Protection Act in 1994 established a new regime to govern the incidental taking of marine mammals in commercial fisheries. Among other things, they required the National Marine Fisheries Service and the Fish and Wildlife Service to prepare stock assessments for all marine mammal stocks in U.S. waters. Each assessment is to estimate the size and maximum productivity rate of the stock, calculate a potential biological removal level (not including natural mortality) that would allow the stock to remain or increase towards its optimum sustainable population level, assess incidental-take levels in commercial fisheries, and determine if a stock is a strategic stock requiring special management attention.

On 15 August 1994 the Fish and Wildlife Service distributed to the Marine Mammal Commission and others draft stock assessments for marine mammal populations under its jurisdiction, including sea otter stocks in California, Washington, and Alaska. As discussed in the previous annual report, the Commission, in consultation with its Committee of Scientific Advisors, reviewed the drafts and by letter of 1 December 1994 provided comments to the Service.

Final stock assessments for sea otters and other marine mammals under its jurisdiction were circulated by the Fish and Wildlife Service on 4 October 1995. Based on its 1994 spring survey, the minimum size of the California sea otter population was estimated at 2,359 animals. The population is continuing to increase, and its maximum net productivity rate is estimated at six percent a year. Based on available data, the estimated potential biological removal level for the California sea otter stock is 7 animals. The assessment noted, however, that this estimate serves no practical purpose since incidental take of the California sea otter is not governed under section 118 of the Marine Mammal Protection Act.

The assessment further noted that, since 1985, when fishing restrictions were enacted to protect sea otters from incidental take in gill and trammel nets, known fishing-related mortality was zero in 1991 and 1992, one in 1993, and zero in 1994. However, the level of take of sea otters in lobster and crab fisheries in California is unknown. The assessment concluded that, if the restrictions on gill and trammel nets were lifted, the California sea otter stock would be classified as a strategic stock.

The Service's final stock assessment of the Washington sea otter stock estimates a minimum population of 360 animals and a maximum annual growth rate of about 20 percent. The potential biological removal level is set at 11 animals. The assessment noted that known instances of incidental take of sea otters in fisheries are rare and other sources of human-caused mortality are not well documented.

The Washington sea otter stock has no federal designation as either threatened or endangered although it is legally designated as endangered by the State of Washington. The Service's stock assessment concluded that the population is below its optimum sustainable population level.

The Service's final assessment for the Alaska sea otter population established a minimum population estimate of 100,000 animals. The assessment noted that information on population growth rates is not available for all areas in Alaska; therefore, it adopted a maximum net productivity rate of 20 percent. Using these data, the Service calculated the potential biological removal level at 10,000 sea otters per year. It noted, however, the impact of such a removal could realistically be considered not adverse only if the removal is allocated throughout the state and takes into account the sex and age of the harvested animals.

With respect to human-caused mortality, the assessment noted that activities associated with oil and gas development have the potential for adversely impacting sea otters and their habitat in Alaska, and that approximately 2,650 sea otters died as a result of the 1989 *Exxon Valdez* spill. Subsistence harvest of sea otters is estimated at approximately 1.2 percent of the total population and is not believed to have affected the Alaska sea otter population as a whole. The assessment noted, however, that the harvest must be spread throughout the population's range to ensure that overharvesting does not occur in local areas.

Northern Right Whale (*Eubalaena glacialis*)

The northern right whale occurs in both the North Atlantic and North Pacific Oceans and is the world's most endangered large cetacean. Right whales, the first of the great whales to be targeted by a regular whaling industry, have been exploited since at least the 11th century along the coast of present day France and Spain, and at least the 1600s in Japan. By the late 1800s northern right whales were commercially extinct in both oceans. Even so, whalers seeking other species continued to take right whales opportunistically until the mid-1900s pushing the species to the edge of extinction.

Although small populations of northern right whales survive in both the North Atlantic and North Pacific Oceans, their numbers are so small that their continued existence is in serious doubt. In the North Pacific Ocean, catch records and sighting data suggest that right whales in the eastern and western parts of the ocean basin constitute separate stocks. Because sightings in the eastern North Pacific over the past 20 years are so few and include neither groups of animals nor a single calf, the present generation could well be the last generation for eastern North Pacific population. Sighting records from the western North Pacific Ocean and Okhotsk Sea, while scarce, are more numerous than in the eastern North Pacific. As they also include some sightings of groups, it seems possible that the western North Pacific population may still number in the low hundreds.

In the North Atlantic Ocean, between 300 and 350 whales occur seasonally off the east coasts of the United States and Canada. Rare sightings also occur off Greenland, Iceland, Europe, and northwest Africa. These could represent either remnants of an eastern North Atlantic population or stragglers from the western North Atlantic. Since 1980 an average of 10 to 12 calves per year have been counted along the U.S. and Canadian coasts making the species' prospects for recovery in the North Atlantic Ocean tenuous, but still brighter than in the North Pacific Ocean. For the years 1993 to 1995, however, the number of calves counted declined to 6, 9, and 7, respectively.

Although international laws banning commercial hunting of right whales have been in place for about 50 years, ship collisions, entanglement in fishing gear, and perhaps other human activities threaten the species' potential recovery. Between 1970 and the end of 1995 more than one-third (13 of 35) of all right whale carcasses found along the east coast of North America died from apparent human-related causes. Ten deaths (29 percent) are attributed to collisions with ships and three (9 percent) to entanglement in fishing gear. Analyses of identifiable right whales in a photographic catalogue of the North Atlantic population suggest that more than half of the population has scars or are trailing line indicative of entanglement interactions, and that seven percent has scars apparently from ship collisions.

Observed carcasses represent an unknown percentage of total northern right whale mortality. However, it seems likely that at least as many deaths have gone unrecorded. Between 1980 and 1995 researchers documented 175 calves in the western North Atlantic and confirmed 26 deaths. Analyses of data in a right whale photo-identification catalogue have suggested an annual population growth rate of 2.5 percent which, assuming a current population of 325 animals, would equal an increase of about 100 animals since 1980. If this growth rate is correct and if all calves in the population were recorded since 1980, about 75 deaths have occurred since 1980, of which only about one-third (26 of 75 carcasses) have been documented. The proportion of unrecorded deaths could be even greater if estimated 2.5 percent growth rate is high or some calves are not counted. If the causes of death for documented carcasses are representative of total mortality, deaths due to ship collisions and entanglement could be three times or more greater than documented levels.

Other potential human threats to the species include disturbance and displacement of whales from seasonally important habitat by noise and human activity, prey reduction caused by perturbations to local environmental conditions in preferred feeding grounds, physiological impacts caused by chemical pollutants, and entanglement and ingestion of marine debris. Specific human activities that could contribute to one or more of these impacts include discharges by municipal sewage and storm-water outfalls, offshore

disposal of dredge spoil and excavation wastes, commercial and recreational vessel traffic, aquaculture, and offshore mineral exploitation. Natural factors affecting population recovery include predation by killer whales, disease, and perhaps inbreeding due to the extremely small size of remaining populations.

Northern right whales are listed as endangered under the Endangered Species Act and, at the recommendation of the Marine Mammal Commission, the National Marine Fisheries Service adopted a recovery plan for the species in 1991. In 1994 the Service also designated three areas off the U.S. Atlantic coast as critical habitat for northern right whales under the Endangered Species Act. The areas include winter calving grounds off the coast of Georgia and northeast Florida and two spring feeding areas off Massachusetts — one in Cape Cod Bay and the other in the Great South Channel about 40 miles east of Cape Cod. Information in support of the designation was compiled in a report prepared for the Commission and provided to the Service (see Appendix B, Kraus and Kenney 1991). Although the Commission recommended that the Service include rules with the critical habitat designation to reduce hazards from fishing gear and vessel traffic during seasons of peak whale abundance, the recommendation was not adopted.

To help carry out actions in the recovery plan, the National Marine Fisheries Service established two regional implementation teams composed of representatives of Federal and State agencies, environmental groups, industry, and the research community. The Southeast U.S. Right Whale Recovery Plan Implementation Team was established in August 1993 to coordinate and guide actions needed to conserve whales on the winter calving grounds off Florida and Georgia. The Northeastern U.S. Right Whale and Humpback Whale Recovery Plan Implementation Team was established in August 1994 to serve a similar purpose for both right whales and humpback whales using spring and summer feeding areas off New England.

Recent Right Whale Injuries and Mortalities

Since 1970, 35 right whale mortalities have been confirmed in the western North Atlantic, including two deaths in 1995. On 17 July 1995 a 33-foot-long juvenile male born in 1993 washed ashore on Second Beach in Middletown, Rhode Island. Several lines thought to be from lobster pots were wrapped tightly around a pectoral fin and had cut several inches into the underlying bone. The animal was first seen entangled in 1993 as a calf about six months old and was resighted in August 1994 in Cape Cod Bay, still entangled. During the second sighting, the staff of the Center for Coastal Studies made an unsuccessful try to remove the entangling gear, but suspended efforts, in part because the degree of entanglement did not seem critical. Because entangled whales sometimes free themselves and because human intervention can pose risks to both whales and people, a decision as to whether to disentangle an animal can be a difficult. The experience with this whale was an unfortunate but important lesson with regard to decisions on future disentanglement efforts.

On 20 October 1995 the carcass of a 40-foot-long male right whale washed ashore on the Bay of Fundy coast in Nova Scotia, Canada. Researchers responding to the report found signs of crushed vertebra and, upon a closer laboratory examination, they concluded that the animal died as a result of a ship collision.

In addition to the two confirmed deaths, two human interactions were reported. In March 1995 the Navy reported that a submarine leaving Morehead City, North Carolina, struck a whale that might have been a right whale. No carcass was found and there is no further information to confirm either the species or the fate of the whale. In September a right whale was observed in Canadian waters east of Grand Manan Island towing about 800 feet of gillnet anchor line. Researchers from the New England Aquarium were able to remove about 700 feet of the rope; however, 100 feet of line trailing from the animal's mouth could not be dislodged. The animal was not seen again in 1995, and its fate is uncertain. From previous sighting records in the right whale photo-identification catalogue, the animal was determined to be a four-year-old male bearing scars from a previous ship collision and entanglement.

Northern Right Whale Research in 1995

On 3-7 October 1994 the National Marine Fisheries Service's Northeast Fisheries Science Center held a scientific peer review of its research program for the

North Atlantic right whale population. Its purpose was to formulate recommendations on future research priorities. During 1995 the Service used the results of the review to direct the allocation of $156,000 in Fiscal Year 1994 funding and $200,000 in Fiscal Year 1995 funding to needed studies.

Work supported by the Northeast Fisheries Science Center in 1995 included (a) maintenance of the right whale photo-identification catalogue essential for monitoring the status of the North Atlantic population, (b) responding immediately to reports of stranded and entangled right whales and humpback whales, (c) assessing and developing means of avoiding vessel-related impacts in high-use right whale habitats, (d) studies of whale foraging patterns and prey resources in Cape Cod and Massachusetts Bays, (e) analyzing a backlog of genetic samples to improve information on reproductive patterns and potential inbreeding effects, and (f) population modeling and data analyses to refine understanding of demographic parameters and habitat use patterns. Some of the funds also are to be used for satellite tracking off New England in 1996 to try to locate other summer nursing and wintering areas used by northern right whales.

In the southeastern United States, the National Marine Fisheries Service has provided funding to the Georgia Department of Natural Resources and the Florida Department of Environmental Protection to survey areas further offshore and to assess the sighting efficiency flights in an early-warning survey program. As discussed below, early-warning survey flights were initiated in recent years off Florida and Georgia to provide vessel traffic with up-to-date information on the location of right whales using the winter calving grounds. The assessment of flight sighting efficiency will be done by a second plane following the same track as the early-warning survey flight a few minutes later to evaluate the extent to which whales are not sighted during a single overpass. In addition, to improve information on fine-scale movements of right whales on their calving grounds, the National Marine Fisheries Service contracted with the New England Aquarium, the Florida Department of Environmental Protection, and the Georgia Department of Natural Resources to satellite-tag and track at least four animals on the winter calving grounds.

Northern Right Whale Management in 1995

In October 1994 the National Marine Fisheries Service received a request from an environmental group to establish regulations prohibiting vessels from approaching within 500 yards of any right whale and 100 yards of all other whales. In response the Service published an advance notice of rulemaking in the *Federal Register* on 27 December 1994 asking for comments and information to help identify and evaluate appropriate conservation measures to minimize harmful effects of noise and vessel traffic on northern right whales. The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, wrote to the Service on 27 March 1995 and forwarded several Commission-sponsored reports indicating that noise and vessel traffic are potential concerns that merit management attention, particularly in high-use right whale habitats.

In its letter the Commission noted that management measures reducing close approaches to right whales would help address both ship collision and disturbance impacts, provided that the measures themselves had no adverse impact. To help assess the usefulness of the petitioned action, the Commission suggested consideration in three areas.

First, it suggested considering the practicality of the petitioned measure to actually reduce close approaches. To prevent approaches closer than 500 yards, vessel operators would need to detect and identify right whales at distances greater than 500 yards in all weather and sea conditions and at night. The Commission noted that it may not be reasonable to expect vessel-based observers to do this routinely at distances that may need to be considerably greater than 500 yards for large vessels. The Commission suggested instead that the Service estimate the distances at which observers might be expected to routinely detect and identify right whales under different sighting conditions. It also suggested that it may be more practical to (a) prohibit deliberate approaches, diversions, or stopping to observe right whales; (b) apply the measure to certain types of vessels, areas, and/or times; and/or (c) establish guidelines for whale avoidance maneuvers in cases where it is determined that a vessel is within or likely to come closer than 500 yards of a right whale.

Second, the Commission suggested considering the extent to which the measure may complement other management actions. In this regard, it noted that, while the petitioned action may not be feasible as an isolated measure, it may be useful if done in conjunction with other existing or planned measures (*e.g.*, real-time notices to mariners on the location of whales) to help vessel operators locate and avoid right whales.

Finally, the Commission suggested evaluating the measure's merit in different geographic areas, given right whale habitat use patterns and vessel traffic patterns. For example, it suggested that approach limits might be useful in high-use right whale habitats or other areas where vessel interactions seem likely to occur, but of little value in areas were the occurrence of whales or ship traffic is negligible. Also, focusing the approach in problematic areas could help heighten operator awareness and caution in those areas. As of the end of 1995 it was the Commission's understanding that the Service was considering the publication of proposed rules on the matter.

Off the southeastern United States, efforts in 1995 continued to focus on the development of an early-warning system to alert vessel operators of the location of right whales during the winter calving season off Georgia and northeast Florida. For the winter of 1995-1996, as in the previous winter, the Navy, the Coast Guard, and the Army Corps of Engineers initiated a program of daily aerial surveys beginning 1 December to obtain whale location data that can be passed on to ships transiting the winter calving grounds. The daily surveys, which are to continue through 31 March 1996, cover waters within 15 miles of the coast from a point about 10 miles north of Brunswick, Georgia, to a point 10 miles south of the St. Johns River in Florida. Whale locations are then provided to operators of large vessels by the Coast Guard through its Notices to Mariners as well as to harbor pilots and the Navy.

Southeast U.S. Implementation Team for the Recovery of Right Whales

The southeast implementation team includes representatives of the Army Corps of Engineers, the Navy, the Coast Guard, the port of Fernandina Beach (Florida), the Florida Department of Environmental Protection, the Georgia Department of Natural Resources, the Georgia Ports Authority, the Glynn County (Georgia) Conservancy, the Jacksonville Port Authority, the National Marine Fisheries Service, the New England Aquarium, and the University of Georgia. The team met twice in 1995 and, as in previous years, it gave particular attention to developing and implementing the early-warning network to alert vessel operators of recent right whale sighting locations.

For the 1995-1996 winter right whale season, the team developed a set of recommended safe operating procedures for large vessels transiting the right whale calving grounds. The recommended measures offer non-binding advice on posting observers aboard transiting ships, communicating information to incoming and outgoing ships on right whale sightings, suggested actions for ships to take under alternative right whale sighting scenarios, and the reporting of right whale sightings by transiting ships. The recommended procedures are intended for use by port personnel participating under a voluntary partnership agreement among team members. The team also considered recommendations to restrict hazardous fishing gear in portions of the right whale calving grounds. Although the team did not offer specific advice on the issue, it urged the agencies and groups represented on the team to submit comments and advice on appropriate restrictions to the Service.

At its final meeting in 1995, the southeast implementation team also considered a recommendation to the National Marine Fisheries Service to prohibit gillnets from use in Federal portions of the right whale calving grounds during the winter whale season. The states of Georgia and Florida already prohibit gillnets in State waters eliminating potential entanglement threats from gillnets in those areas. The team decided that rather than submitting a formal recommendation in this regard to the Service, individual agencies represented on the team should provide advice on the matter directly to the Service. As of the end of 1995, the Commission was not aware of what actions may have been taken or planned in this regard by agencies represented on the team.

Northeast U.S. Right Whale and Humpback Whale Recovery Plan Implementation Team

The northeast implementation team includes representatives of the National Marine Fisheries Service, the Marine Mammal Commission, the Coast Guard, the Environmental Protection Agency, the Stellwagen Bank National Marine Sanctuary, the New England Fisheries Management Council, the Massachusetts Water Resources Agency, MASSPORT, the Massachusetts Coastal Zone Management Office, the Massachusetts Office of Non-Game and Endangered Species, the New England Aquarium, the Center for Coastal Studies, and the University of Rhode Island. At its initial and only meeting in 1994, the team agreed that attention should be directed to work on reducing ship collisions and entanglement in fishing gear, encouraging high priority research, and protecting and monitoring essential right whale habitat.

During 1995 the team met three times. It exchanged information on related activities and projects potentially affecting right whale conservation. It also considered further actions needed with regard to northern right whale research and funding, restricting hazardous fishing gear in right whale critical habitats, advice to fishermen on how to disentangle whales caught in gear, establishing an early-warning system to alert ships transiting off New England to the location of right whales, plans for constructing a sewage outfall tunnel in Massachusetts Bay, and issuing permits for proposed scallop aquaculture projects in Cape Cod Bay.

Progress on these issues was slow, and the team developed specific advice and recommendations only with regard to proposed aquaculture projects in Cape Cod Bay. A permit for placing aquaculture equipment at sea is required from the Army Corps of Engineers and the team provided comments to Corps and National Marine Fisheries Service officials who were reviewing related permit applications pursuant to Endangered Species Act consultation requirements. In its comments the team noted the need to consider impacts related to entanglement, physical obstructions to right whale feeding, effects on plankton communities on which right whales feed, and potential effects of predator control programs. Among other things, the team identified facility designs that would minimize entanglement risks and recommended studies to assess the effects of aquaculture on whale prey.

Although the northeast implementation team did not take final action before the end of the year, it also considered a recommendation to the National Marine Fisheries Service to prohibit the use of fishing gear, such as gillnets and offshore lobster gear that could pose an entanglement threat to right whales, in high use right whale habitats during periods of peak whale occurrence. At its final meeting in 1995 the team agreed to postpone the recommendation pending a determination of possible action in this regard by the New England Fishery Management Council.

Right Whale Stock Assessment

In August 1995 the National Marine Fisheries Service distributed final assessments of all marine mammal stocks in U.S. waters. As required by amendments to the Marine Mammal Protection Act in 1994, these assessments are to provide a basis for managing the incidental take of marine mammals in commercial fishing operations. Among other things, each assessment is to include an estimate of the potential biological removal level (not including natural mortality) that would allow the stock to increase towards its optimum sustainable population level, and a finding as to whether the stock is a strategic stock requiring special management attention. For stocks designated as strategic and subject to taking in numbers greater than the estimated potential biological removal level, the Service is required to designate a take reduction team and prepare a take reduction plan. Stocks of species listed as endangered under the Endangered Species Act, such as northern right whales, are to be considered strategic automatically.

For the North Pacific stock of right whales, the Service's final assessment cites population estimates of 100 to 200 right whales, but concludes that the estimates are not reliable and that a potential biological removal level of zero should be assumed given its small size. The only fishery interaction record from the North Pacific Ocean involves a right whale carcass found entangled in a gillnet on the coast of Russia in 1989. With no fishery interaction records involving

right whales in U.S. North Pacific waters, no action was taken in 1995 to establish a take reduction team for the North Pacific stock of right whales.

The Service's assessment for the western North Atlantic stock cites a minimum population estimate of 295 whales and concludes that the potential biological removal level is less than one whale. It also cites records of fishery interactions, including entanglement, involving large-mesh gillnets, cod traps, and herring weirs. At the end of 1995, the Service had not yet established an incidental take reduction team to address the western North Atlantic right whale population, but it was the Commission's understanding that it planned to convene a team early in 1996 to jointly address take reduction needs for right whales and other endangered whales along the east coast.

Right Whale Litigation

On 7 June 1994 a complaint was filed in the U.S. District Court for the District of Massachusetts (*Strahan* v. *Linnon*) alleging that the Coast Guard had violated provisions of the Endangered Species Act, the Marine Mammal Protection Act, the National Environmental Policy Act, and the Whaling Convention Act. In the past four years, Coast Guard vessels had struck and killed two northern right whales, including one off Florida in 1993. The plaintiff alleged that such taking of right and other whales was prohibited.

Accordingly, the plaintiff sought to enjoin certain Coast Guard operations, including issuance of inspection documents to private vessels allowing them to operate in U.S. waters, that may result in the death, injury, or disturbance of any of six species of whales. Among other things, the plaintiff asked the court to order the Coast Guard to prevent its vessels and other vessels from approaching within 500 yards of a northern right whale or 100 yards of any other whale.

The complaint also alleged that the Coast Guard had violated the National Environmental Policy Act by not preparing an environmental assessment on the effects of its operations. It further alleged that the Coast Guard had failed to consult with the National Marine Fisheries Service to determine that its operations are not likely to jeopardize the continued existence of right whales or other endangered species in violation of the Endangered Species Act.

To address some of the points raised in the complaint, the Coast Guard initiated consultations with the Service on the effects of its activities on endangered whales and sea turtles. It also reviewed its vessel operating procedures to identify ways it could better avoid collisions with marine species.

A hearing on the matter was held on 10 February 1995 and on 2 May the court issued its ruling. As a preliminary matter, the court ruled that the plaintiff only had standing to challenge Coast Guard activities in the First Coast Guard District, which includes the area between New Jersey and Maine.

With regard to the Endangered Species Act, the court ruled that until the consultations under section 7 were complete, the Coast Guard would not be in full compliance with the Act. It found, however, that the Coast Guard did not need to consult on its inspection and documentation activities for other vessels because the Coast Guard was statutorily required to issue vessel documents if specific criteria were met and, thus, did not have the discretion to withhold such documents because of potential risks to endangered whales. Noting recent efforts by the Coast Guard to prevent its vessels from striking whales, the court found the question of whether additional whales might be struck to be a disputed material fact and declined to rule on that issue until after the section 7 consultation is completed. It noted, however, that an injunction may ultimately be needed to prevent further incidental taking of right whales by the Coast Guard.

With respect to the Marine Mammal Protection Act, the court found that the Coast Guard is required to apply for a small-take authorization if it anticipates that it will take a marine mammal at any time during the course of its operations. Based on this ruling, the court ordered the Coast Guard to apply for a small-take authorization by 31 May 1995.

The court also found the Coast Guard to be in violation of the procedural requirements of the National Environmental Policy Act. The court ordered the Coast Guard to prepare, by 30 June 1995, a draft environmental assessment and to provide to the court

a schedule for completion of a final environmental assessment.

The court ruled in favor of the Coast Guard on plaintiff's claims arising under the Whaling Convention Act. The court found that the Coast Guard activities did not constitute whaling, which is prohibited by the Act, even though "whaling" is defined to include killing of whales.

On 15 September 1995 the National Marine Fisheries Service issued a biological opinion on the Coast Guard's activities along the Atlantic Coast. The Service concluded that Coast Guard activities were not likely to jeopardize any endangered or threatened species, but specified that, if another endangered whale was struck, consultations should be reinitiated. Subsequently a Coast Guard vessel struck an unidentified whale, thought possibly to have been a humpback whale, off Cape Cod.

On 22 September 1995 the Coast Guard circulated and requested comments on a draft environmental assessment concerning the potential impacts of its activities along the Atlantic coast. The assessment identified steps the Coast Guard would take to avoid collisions with whales and, based on those measures, proposed a finding of no significant impact. The proposed measures include plans for using safe, slow vessel speeds when transiting marine sanctuaries and critical habitat areas during non-emergency operations, posting lookouts on all vessels, giving wildlife a wide berth during non-emergency operations, notifying other vessels by radio of the location of whales and broadcasting seasonal notices about the need for caution in critical habitat areas, carefully reviewing permit applications for regattas and boat races to ensure events are not held in sensitive areas when vulnerable species are likely to be present, and continuing to serve on the southeast U.S. right whale recovery plan implementation team and participate in southeastern U.S. right whale early-warning surveys.

On 24 October 1995 the Commission, in consultation with its Committee of Scientific Advisors, commented on the draft environmental assessment. The Commission noted that the proposed measures would improve protection for right whales and other marine wildlife and supported their adoption. The Commission also suggested additional measures that might be taken. In this regard, it suggested that the Coast Guard participate on other relevant planning teams, such as the northeastern right whale and humpback whale implementation teams, consider using forward-looking sonar on some vessels, and assist with logistic support for research and monitoring programs set forth in endangered species recovery plans.

Regarding the latter point, the Commission noted that information from such surveys could be an important source of up-to-date data on areas where vessel-wildlife encounters may be most likely. Noting Coast Guard plans to alert vessels by radio of the location of whales and the potential for such broadcasts to increase close approaches by whale-watchers, the Commission suggested that the Coast Guard consider developing guidelines on the situations, methods, and frequency of such communications so as to avoid collisions by transiting ships, but also to avoid attracting large numbers of whale watching boats to individual animals.

On 2 June 1995 the Coast Guard applied to the National Marine Fisheries Service seeking a small-take authorization under section 101(a)(5)(A) of the Marine Mammal Protection Act. Action on the application was deferred pending completion of consultation under the Endangered Species Act. At the end of 1995, the Service was reviewing the Coast Guard request.

Humpback Whale
(*Megaptera novaeangliae*)

Humpback whales occur in all oceans of the world. They typically migrate from calving and nursing regions in tropical and sub-tropical latitudes to temperate to polar latitudes where they feed during warmer months. Thirteen humpback whale stocks have been identified worldwide. Four of these occur in U.S. waters: the western, central, and eastern North Pacific stocks and western North Atlantic stock.

All humpback whale stocks were severely depleted by commercial whaling. The International Whaling Commission adopted a series of measures between the

mid-1950s and the early 1960s banning the hunting of humpback whales in certain areas. By 1966 all stocks were fully protected. Humpback whales were listed as endangered under the U.S. Endangered Species Preservation Act in 1970, a designation carried forward under the Endangered Species Act of 1973.

Under this protection some stocks have shown signs of recovery. However, recovery rates may be slowed by human-related impacts associated with noise disturbance, entanglement in fishing gear, offshore oil and gas exploration and development, oil spills, whale-watching activities, coastal development, and depletion of prey.

Humpback Whales in Alaska

At least two stocks of humpback whales occur seasonally in U.S. waters in the Pacific: the central North Pacific stock, with winter calving areas near the Hawaiian Islands and summer feeding grounds off Alaska and Canada, and the eastern North Pacific stock, with winter calving grounds off mainland Mexico and Central America and summer feeding grounds along the coasts of California, Oregon, and Washington. Members of the western North Pacific stock also may use feeding grounds off Alaska in summer. The winter calving grounds for this stock are around the Ryukyu, Bonin, and Mariana Islands in the Philippine Sea off Southeast Asia.

Glacier Bay National Park — During the summer, a portion of the central North Pacific stock of humpback whales feeds in the coastal waters of southeastern Alaska, including Glacier Bay. The bay, lying entirely within Glacier Bay National Park and Preserve and administered by the National Park Service, is a popular destination for cruise ships.

Late in the 1970s the number of humpback whales in Glacier Bay declined suddenly. It was thought that noise and disturbance from boats may have caused whales to avoid the bay. The Park Service reviewed the problem and subsequently limited vessel entries into the bay.

In 1983 the National Marine Fisheries Service provided the Park Service with a biological opinion pursuant to section 7 of the Endangered Species Act. The opinion recommended that vessel traffic not be allowed to increase unless the number of whales using Glacier Bay remained at or above the 1982 level. The opinion also provided recommendations regarding research and monitoring programs. The Park Service adopted these recommendations which have remained in effect since 1985. In 1986 and 1987 the number of whales using the bay exceeded the 1982 level. At the urging of cruise ship companies, the National Park Service increased the allowed number of cruise ship entries for the 1987 and 1988 seasons to 107 per season. Between 1988 and 1991 the number of whales using the bay again declined. Reasons for the decline were not clear.

In 1991 the Park Service initiated steps to evaluate alternatives for managing boat traffic in the bay. A draft vessel management plan was prepared by the Park Service and provided to the National Marine Fisheries Service, which reviewed the document and returned a biological opinion in February 1993.

The National Marine Fisheries Service concluded in its opinion that an increase in vessel entries is not likely to jeopardize the continued existence of any threatened or endangered species. The Service also noted that previous declines in the number of whales using the bay was a source of concern, and the possibility that some whales may avoid the bay because of vessels could not be ruled out. However, establishing a relationship between the declines and boat disturbance was not possible because the noise levels produced by boats in the bay and the abundance and distribution of whale prey and other variables had not been monitored. The opinion recommended that the Park Service (1) implement a research program to obtain information on the movement, distribution, and abundance of humpback whales in Glacier Bay and to assess the effects of vessels on the distribution of whales, and (2) continue monitoring programs to document the number of humpback whales that feed in the bay and their length of residence.

In 1993, 1994, and 1995 the National Park Service continued to limit cruise ship entries to 107 per year. However, on 5 June 1995 the Park Service published a proposed rule in the *Federal Register* to revise the regulations, including vessel entry quotas, that

were established to protect humpback whales and other resources in the bay. The notice also announced the availability of, and requested comments on, the Service's Glacier Bay National Park and Preserve Management Plan and Environmental Assessment.

In the Service's plan, the preferred alternative proposes a 72 percent increase in the number of cruise ships entering the bay in June, July, and August. The proposed action would not authorize an increase in the number of smaller vessels allowed to enter the bay but would authorize tour boat companies to offer passengers kayaking and hiking excursions from the boats.

By letter of 24 August 1995 the Commission commented to the Park Service on the plan and environmental assessment. In its letter, the Commission made reference to the National Marine Fisheries Service's February 1993 biological opinion on the proposed rule. The Commission indicated that it concurred with the Service's conclusion that the proposed increase in vessel entries is not likely to jeopardize the continued existence of either humpback whales or other endangered species such as Steller sea lions. It also concurred with the Service's recommendation that monitoring be continued to document the number and length of residence of humpback whales in the bay, and that studies be done to document the distribution, abundance, and movement patterns of humpback whales in adjacent areas.

Also, the Commission pointed out that it is not clear that an increase in cruise ships would not cause humpback whales or other species to abandon or avoid the bay. Therefore, the Commission suggested that an adequate, fully funded monitoring program, necessary to detect and determine the cause of significant declines in humpback whale use of the bay, should be an integral part of the vessel management plan. In this regard, the Commission recommended that the Park Service consult with the National Marine Fisheries Service and the cruise ship industry to determine (a) the monitoring program required to detect and determine the cause of any significant declines in the use of Park waters by humpback whales, (b) the funding, personnel, special equipment, and logistical support required to carry out the program, and (c) possible alternative means for funding the required program.

As of the end of 1995 the Park Service was reviewing comments on the draft plan and expected to issue a final rule and a decision on the revised regulations early in 1996.

Humpback Whales in Hawaii

A number of researchers and research groups study humpback whales wintering in Hawaii, and there is concern that duplicative work could result in unnecessary disturbance of the whales. In 1992 and 1993 the Commission provided funds to help support meetings of the Hawaiian humpback whale researchers to coordinate research and identify and avoid studies that are unnecessarily duplicative.

At the meetings, the researchers presented recent research findings and discussed ways to improve cooperation and data-sharing. Participants at the 1993 meeting recommended that the workshops be held annually and that they include time on the water to help standardize data collection procedures. Workshops have been held annually since then. As described in Chapter X, the Commission provided partial support for the meetings held prior to the 1995 and 1996 seasons. As before, the 1996 meeting is expected to include time in the field and will be open to all humpback whale research groups.

The Hawaiian Islands Humpback Whale National Marine Sanctuary - National marine sanctuaries are administered by the Sanctuaries and Reserves Division of the National Oceanic and Atmospheric Administration's National Ocean Service under the Marine Protection, Research, and Sanctuaries Act. The goal of the sanctuaries is to protect and manage areas of special importance for their ecological, historical, recreational, and aesthetic marine resources. On 4 November 1992 the President signed into law legislation designating the Hawaiian Islands Humpback Whale National Marine Sanctuary.

The Hawaiian Islands sanctuary, as originally designated, consists of approximately 1,300 nmi^2 of Federal and state waters and includes the area within the 100-fathom isobath adjoining Lanai, Maui, and Molokai, including the Penguin Bank, the deep-water area of the Pailolo Channel, and the waters adjacent to the Kilauea National Wildlife Refuge on Kauai.

Not included are waters within three nautical miles of the island of Kahoolawe. These waters are high-use areas for humpback whales.

Although the sanctuary was designated by an Act of Congress, no comprehensive management plan, implementing regulations, or draft environmental impact statement was developed prior to the designation. The responsibility for developing these lies with the Sanctuaries and Reserves Division. In 1994 and 1995 Commission staff met several times with personnel from the Division and the National Marine Fisheries Service to discuss factors that should be considered in designing the sanctuary's management program.

As part of the process of preparing a draft environmental impact statement and management plan, the Division, in conjunction with the National Marine Fisheries Service, convened a workshop on 26-28 April 1995 to identify and establish priorities for research and management activities. Prior to the workshop, members of the Commission staff helped identify the goals and structure of the workshop. A Commission representative participated in the workshop, as did humpback whale researchers and representatives of Federal, state, and local governments and environmental groups.

Subsequently the Division developed a draft environmental impact statement and management plan and announced their availability in a 15 September 1995 *Federal Register* notice. The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, reviewed the document and will provide comments early in 1996.

In its letter the Commission will concur with the conclusions regarding the proposed boundary and recommend that the Division proceed with efforts to designate and implement the preferred boundary alternative. In addition, the Commission will concur with the conclusions that management activities should continue year-round, and research and education programs would should provide a complementary mixture of leadership and support. The Commission will also agree that a sanctuary advisory council should be established but will suggest that a separate scientific review panel be established to review and provide recommendations to the sanctuary manager on scientific issues and the sanctuary research program. The Commission will point out that the results of the research planning workshop convened by the Division were not but should be considered in the draft environmental impact statement.

The Commission also will point out that the highly endangered Hawaiian monk seal occurs within the sanctuary boundary and will recommend that the Division take the steps necessary to include this species as a resource of national significance for special protection within the sanctuary. The Commission will recommend further that the Division contact the National Marine Fisheries Service about identifying and implementing education programs designed to inform the general public about where and when hauled-out seals may be encountered, the legislation and regulations that protect monk seals and the consequences of violating them, and the appropriate responses to take if monk seals are encountered.

Acoustic Thermometry of Ocean Climate Program — As discussed in Chapter XI, the Defense Department's Applied Research Projects Agency provided funding in 1993 to the Scripps Institution of Oceanography for a 30-month study to determine whether travel times of low-frequency sounds across ocean basins can be measured accurately and used to detect changes in ocean temperature associated with global climate change. The effect, if any, that the sound transmissions will have on humpback whales and other marine organisms is uncertain.

During the 30-month pilot study, low-frequency sound transmitters are to be installed and operated periodically in the deep sound channel off Hawaii and California. The California transmitter was installed late in October. A series of transmissions were done during the installations to test the transmitter. At about the same time, a dead humpback whale was observed near Stinson Beach, California, and two additional humpback whale carcasses were seen floating near the Farallon Islands. Although it was suspected that the sound transmissions may have caused or contributed to the deaths of the whales, assessments of available information on the effects of sounds on marine mammals, the estimated time of the deaths relative to the time of the transmission, and the distance the whales were from the sound source

strongly suggests that the sound transmission was not responsible for the deaths.

Humpback Whales in the North Atlantic

At least two stocks of humpback whales are thought to exist in the North Atlantic Ocean — an eastern and a western stock. The western stock winters in coastal waters of countries bordering the eastern Caribbean Sea. Its known summer feeding grounds include the Gulf of Maine, the Bay of Fundy, the Gulf of St. Lawrence, and waters off Newfoundland, Labrador, southwestern Greenland, and Iceland. The location of the winter calving grounds of the eastern North Atlantic humpback whale stock is uncertain; its summer feeding ground appears to be west and north of Norway in the Norwegian Sea.

Project YONAH — A major cooperative research effort on the abundance, population structure, vital rates, and migratory movements of North Atlantic humpback whales was begun early in 1992. The program, titled Years of the North Atlantic Humpback Whale, or Project YONAH, involves scientists from seven countries (Canada, Denmark, the Dominican Republic, Iceland, Norway, the United Kingdom, and the United States).

The first two years of the project, 1992 and 1993, were devoted primarily to field work. Biopsy samples for genetic analysis and photographs for individual identification were collected from both summer feeding areas in the northeast and breeding areas in the West Indies. About 2,500 individual whales have been identified from more than 5,200 photographs, and about 2,600 biopsy samples for genetic analysis have been collected.

The field work has been completed and data analysis is underway. As indicated in Chapter X and in previous annual reports, the Commission provided funds in 1991, 1993, and again in 1995 to assist with project administration, data analysis, and dissemination of results. In addition, the Commission provided partial funding in 1995 for assessing the quality of photographs in the North Atlantic humpback whale photo-identification collection. Much new information on the species' North Atlantic population is expected to result from this large-scale project.

Humpback Whale Stock Assessments

The 1994 amendments to the Marine Mammal Protection Act direct the National Marine Fisheries Service and the Fish and Wildlife Service to prepare stock assessments for all marine mammal stocks occurring in U.S. waters (see Chapter IV). The assessments are to provide information on take levels in commercial fisheries and in other human-related activities and to include estimates of the minimum stock size, maximum net productivity rate, and potential biological removal level which, if taken, would still allow a stock to remain within its optimum sustainable population level. The assessments are to determine whether stocks are "strategic" stocks, which could require special management attention to reduce incidental take rates.

As indicated previously, the Commission in 1994 reviewed draft marine mammal stock assessments prepared by the National Marine Fisheries Service and the Fish and Wildlife Service. In letters dated 1 and 12 December 1994, the Commission provided comments to the National Marine Fisheries Service on draft assessments of humpback whale stocks occurring in the North Pacific and North Atlantic Oceans. The Commission indicated that the western North Atlantic humpback whale stock assessment should provide better justified estimates of population size and productivity and more thorough assessments of human-related threats to the population.

With regard to the central North Pacific stock, the Commission noted that the draft assessment should provide information on the demography and threats to whales wintering in Hawaiian waters. The draft assessment of the eastern North Pacific (California/Mexico) humpback whale population provided a reasonably complete summary and evaluation of available information.

Final assessments for North Pacific marine mammal stocks were distributed by the National Marine Fisheries Service in July 1995, including three humpback whale stock assessments. Assessments for North Atlantic stocks were distributed in September 1995. Humpback whales, listed as endangered under the Endangered Species Act, were automatically classified as strategic stocks.

The western North Atlantic humpback whale stock assessment indicated that the stock size is an estimated 5,543 individuals, the maximum net productivity is assumed to be 4 percent (a default value used for all cetaceans when data are inadequate to estimate the value), and the potential biological removal rate is 9.7 whales per year. The assessment indicated that the level of human-caused mortality and serious injury in commercial fisheries and other human activities is unknown, but current data indicate it is significant.

The central North Pacific humpback whale stock assessment indicates that an estimate of population size for this stock is not currently available, the maximum net productivity is assumed to be 4 percent, and the potential biological removal rate is 2.8 whales per year. It indicates that the level of human-caused mortality and serious injury likely does not exceed the rate of potential biological removal.

The eastern North Pacific (California/Oregon/Washington - Mexico) humpback whale stock assessment indicates that the estimate of this stock is approximately 597 whales, and there are no estimates of maximum net productivity. The assessment also indicates that the potential biological removal level is 0.5 whales per year, and the estimated annual mortality due to entanglement and ship strikes exceeds the level of potential biological removal.

The stock assessment for the western North Pacific humpback whale stock indicates that for this stock there is no reliable estimate of abundance, the assumed maximum net productivity is 4 percent, and without a population estimate, it is not possible to determine the potential biological removal level. The estimated mortality rate incidental to commercial fisheries is believed to be zero, but without an estimated level of potential biological removal, it is not possible to determine what annual level of incidental mortality is considered significant.

In 1996 the Commission will follow developing issues regarding vessel traffic in Glacier Bay, review the results of Project YONAH, and otherwise provide advice regarding the recovery of North Pacific and North Atlantic humpback whale stocks.

Bowhead Whale
(*Balaena mysticetus*)

Bowhead whales occur only in the northern hemisphere and are circumpolar in distribution. There are believed to have been at least four separate stocks, all of which were severely depleted by commercial whaling in the late 19th and early 20th centuries. The period of exploitation and extent of depletion differed for each. The western Arctic stock off Alaska (also called the Bering-Chukchi-Beaufort Seas stock) was most heavily exploited between 1848 and 1915. This is the largest surviving stock of bowhead whales. During spring whales from this stock migrate from wintering areas in the northern Bering Sea to the Chukchi and Beaufort Seas. There they spend much of the summer before returning to the Bering Sea in autumn. The bowhead whale is an important subsistence resource for Alaska Natives who hunt them as they migrate along the coast of Alaska in both spring and fall.

Bowhead whales are listed as endangered under the Endangered Species Act and are considered depleted under the Marine Mammal Protection Act. All stocks of bowhead whales are classified as protected stocks by the International Whaling Commission (IWC). As such, commercial whaling quotas are set at zero; however, under subsistence whaling provisions for aboriginal hunters, limited catch quotas are recommended by the IWC for the western Arctic stock of bowhead whales.

Factors such as environmental change, pollution, and noise disturbance from activities related to offshore oil and gas exploration, combined with subsistence take, could have a cumulative effect that might hinder recovery of the western Arctic bowhead whale stock. With regard to oil and gas activities, the Marine Mammal Commission provided comments to the Minerals Management Service in 1995 on a draft environmental impact statement regarding a proposed oil and gas lease sale in the Beaufort Sea. These are described in Chapter IX.

Bowhead Whale Stock Assessment

The 1994 amendments to the Marine Mammal Protection Act direct the National Marine Fisheries Service and the Fish and Wildlife Service to prepare stock assessments for all marine mammal stocks occurring in U.S. waters (see Chapter IV). The assessments are to include estimates of the minimum stock size, maximum net productivity rate, and potential biological removal level which, if taken, would still allow a stock to remain within its optimum sustainable population level. The assessments also are to provide information on take levels in commercial fisheries and by other human-related activities. They are to indicate whether stocks are "strategic" stocks and could require special management attention to reduce incidental take in commercial fisheries.

The Commission reviewed draft marine mammal stock assessments prepared by the National Marine Fisheries Service and provided comments concerning Alaska stocks to the Service on 1 December 1994. With regard to the western Arctic bowhead whale stock, the Commission indicated that the draft report did not appear to provide a complete assessment of all available information concerning estimates of the potential biological removal. The Commission also noted that if there is reason to believe that bowhead whales or their habitat could be adversely affected by offshore oil and gas or other activities, the Service, in consultation with the State of Alaska and appropriate Native organizations, should develop a recovery plan for bowhead whales.

The National Marine Fisheries Service distributed final assessments of Alaska marine mammals in September 1995. The assessment of the western Arctic bowhead whale stock indicated that unusually good counting conditions in 1993 resulted in what was considered the most accurate population estimate to date for this stock: 8,000 whales, with a confidence interval of 6,900 to 9,200. The assessment also indicated that the best estimate of the maximum net productivity rate is 4 percent and indicated that the estimated potential biological removal level is 75 whales, but noted that the IWC subsistence harvest quotas, described below, take precedence over the potential biological removal estimate for the purpose of managing the Alaska Native harvest. The assessment concluded that the level of human-caused mortality and serious injury does not exceed the potential biological removal level nor the IWC quota for 1995. Nonetheless, the stock is listed as endangered under the Endangered Species Act and was thus classified as a strategic stock.

Eskimo Whaling

Bowhead whales are hunted by Alaska Natives for subsistence and cultural purposes. Allowable catch levels are established by the IWC, based on established need, and are implemented by the National Marine Fisheries Service and the Alaska Eskimo Whaling Commission under the terms of a memorandum of agreement.

In 1982 the IWC amended its Schedule of Regulations and set forth guidelines for establishing catch limits for aboriginal subsistence whaling. The new guidelines formally recognized the distinction between commercial and aboriginal subsistence whaling, and codified the IWC's past practice of attempting to strike a balance between the subsistence, cultural, and nutritional needs of aboriginal people and the need to protect depleted whale stocks.

In response to the guidelines, the U.S. Department of the Interior developed a quantitative procedure for determining the subsistence and cultural needs of Alaska Eskimos. Based on information available in 1988, the subsistence and cultural needs of Alaska Eskimos for bowhead whales was estimated to be 41 whales.

In 1991, on behalf of Alaska Natives, the United States requested a quota of 54 strikes per year for the years 1992, 1993, and 1994 with not more than 41 whales to be landed in any year. In response, the IWC adopted a three-year block quota allowing a total of 141 bowhead whales to be struck during 1992-1994. In addition, the IWC adopted a provision allowing 13 unused strikes from the 1989 through 1991 quota to be carried forward and added to the new quota. Thus, Alaska Native whalers were authorized up to 154 strikes during 1992-1994. During any single year, however, the number of strikes could not exceed 54 and the number of whales landed could not exceed 41.

Table 8. Quotas and number of bowhead whales taken by Alaska Eskimos, 1973-1995[1]

Year	IWC Quotas[2] (Landed/ Struck)	No. Landed	Struck but not Landed	Total Struck	% Struck and Landed
1973	--	39	20	59	66
1974	--	20	34	55	36
1975	--	15	28	43	35
1976	--	48	43	91	53
1977	--	29	82	111	26
1978	14/20	12	6	18	67
1979	18/27	12	15	27	44
1980	18/26	16	28	44	36
1981	17/27	17	11	28	61
1982	17/27	8	11	19	42
1983	17/27	9	9	18	50
1984[3]	—/43	12	13	25	48
1985[3]	—/26	11	6	17	65
1986[3]	—/26	20	8	28	71
1987[3]	—/32	22	9	31	71
1988[3]	—/35	23	6	29	79
1989	41/44	18	8	26	69
1990	41/47	30	14	44	68
1991	41/44	28	19	47	60
1992	41/54	38	12	50	76
1993	41/54	41	11	52	79
1994	41/52	34	12	46	74
1995[3]	—/68	45	12	57	79

1 Cited quotas established by the International Whaling Commission; data on numbers of whales landed, struck but not landed, and total struck are from Suydam, R.S., R.P. Angliss, J.C. George, S.R. Braund, and D.P. DeMaster. 1995. Revised data on the subsistence harvest of bowhead whales (*Balaena mysticetus*) by Alaska Eskimos, 1973-1993. *In*: Forty-fifth report of the International Whaling Commission. 45:335-338.

2 Whaling is to cease whenever the number of whales landed or the number of strikes made reaches the specified number, whichever comes first.

3 Quotas set for strikes only.

At its 1994 meeting the IWC amended the Schedule of Regulations to authorize bowhead whale takes for subsistence and cultural purposes for the years 1995 to 1998. The amendment permits the landing of no more than 204 bowhead whales from the Bering-Chukchi-Beaufort Seas population during the four-year period. The IWC based this total on a need of 51 whales per year for Alaska Natives in 10 whaling villages, up from 41 landed per year for 1992 to 1994. In an effort to continue improving the efficiency of the hunt, the quota permits a decreasing number of strikes each year: 68, 67, 66, and 65 in 1995, 1996, 1997, and 1998, respectively. The IWC allowed any unused portion of the strike quota to be carried forward for use in subsequent years, provided that no more than ten strikes are added to the strike quota for any one year. Catch and strike totals of bowhead whales taken by Alaska Natives between 1973 and 1995 are shown in Table 8.

Bowhead Whale Recovery Plan

The National Marine Fisheries Service has lead U.S. responsibility for coordinating actions necessary to ensure that human activities do not adversely affect bowhead whales or their habitat. Development of a recovery plan specifying needed research and management actions would help the Service meet its responsibilities. The Marine Mammal Commission recommended that the Service develop and implement such a recovery plan for bowhead whales in a 5 December 1991 letter to the U.S. IWC Commissioner, and again in a letter to the Service dated 10 March 1993.

On 14 May 1993 the Service advised the Commission that it concurred that a bowhead whale recovery plan would be useful. At the same time, however, the Service indicated it would be preferable to defer plan development until 1994 when the IWC's bowhead whale population assessment would be completed. By the end of 1995 the Commission had heard nothing further from the Service regarding development of a bowhead whale recovery plan.

In 1996 the Marine Mammal Commission will continue to monitor matters related to bowhead whales and advise the National Marine Fisheries Service, the Minerals Management Service, and other involved agencies on further actions that may be necessary to protect and encourage the continued recovery of the western Arctic bowhead whale population while meeting the subsistence and cultural needs of Alaska Eskimos.

Gray Whale
(*Eschrichtius robustus*)

The gray whale is primarily a coastal species that occurs only in the North Pacific Ocean. Two separate stocks are recognized: a western North Pacific (Korean) stock and an eastern North Pacific (California) stock. A few skeletal remains and subfossil specimens, as well as some historical accounts also indicate that gray whales once occurred along the eastern and western coasts of the North Atlantic Ocean as recently as the early 1700s. Along the New England coast, there is a description from the early 1700s of "scrag" whales that are thought to have been gray whales. Also, radiocarbon data indicate that the most recent gray whale specimen, found along the coast of New Jersey, died around 1675, well into colonial times. The North Atlantic gray whale therefore may have been the first whale population subject to whaling pressure to have become extinct.

Pacific gray whales were also severely depleted by commercial whalers in the mid-1800s and again in the early 1900s. Along the eastern North Pacific, the species was probably reduced to no more than a few thousand animals by the 1940s when it was protected from commercial whaling under international law. The gray whale also was listed as endangered in 1970 under the Endangered Species Conservation Act, which preceded the Endangered Species Act of 1973.

With protection from commercial whaling, the eastern North Pacific gray whale population has made a substantial recovery. This population migrates seasonally along the coast between wintering grounds off the Baja California Peninsula in Mexico, to summer feeding grounds as far north as the Bering and Chukchi Seas between Alaska and Russia. Its current population size is estimated at about 23,000 animals and is continuing to increase. Its size is thought to be at or near pre-exploitation levels and, as described in previous annual reports, the eastern North Pacific gray whale population was removed from the U.S. endangered and threatened species list in 1994.

Because of the eastern North Pacific population's principal occurrence in nearshore waters and bays for breeding, migrating, and feeding, gray whales remain vulnerable to effects of various human activities. Gray whales are occasionally entangled in coastal gillnets and also may be affected by offshore oil and gas development, whale-watching, commercial and recreational vessel traffic, coastal development, and salt recovery operations in breeding lagoons. In addition, under subsistence whaling quotas set by the International Whaling Commission, gray whales have been taken by U.S. and Russian Natives. The vast majority have been taken in Russia, where catches between 1966 and 1991 averaged 177 animals per year. In 1994, however, only 44 gray whales were taken in Russia. The current IWC subsistence quota for gray whales is 140 animals per year for 1995, 1996, and 1997.

The western North Pacific gray whale population, which migrates annually between summer feeding grounds in the Okhotsk Sea off eastern Russia and winter breeding areas along the South China Coast, has shown no signs of recovery. It numbers perhaps a few hundred animals at most and therefore has remained listed as endangered under the Endangered Species Act.

Gray Whale Stock Assessment

Amendments to the Marine Mammal Protection Act in 1994 directed the National Marine Fisheries Service to prepare stock assessments for all marine mammal stocks occurring in U.S. waters to provide a basis for managing the incidental take of marine mammals in commercial fishing operations. Among other things, the assessments are to include estimates of population size and maximum net productivity, determine the level of potential biological removal (not including natural mortality) while still allowing a stock to increase or remain at its optimum sustainable population level, review information on incidental take levels, and determine if a stock is a "strategic," *i.e.*, one that requires special management attention.

The Service circulated draft stock assessments, including a draft assessment for eastern North Pacific gray whales, in August 1994. As described in the previous annual report, Commission comments on the draft assessment for gray whales noted that consideration should be given to the effects of habitat degrada-

tion in important gray whale breeding areas and feeding grounds.

In September 1995, the Service published final stock assessments for marine mammal stocks in Alaska, including eastern North Pacific gray whales. For the gray whale stock, the assessment cited 23,109 individuals as the best estimate of population size, and four percent per year as the best estimate of maximum net productivity. Based on this and other information, it determined the potential biological removal level to be 434 animals per year. From observer data and fishermen logbook data, the Service concluded that only a few individuals per year were killed or seriously injured in gillnets. It also concluded that human-caused mortality and serious injury does not exceed the estimated potential biological removal level and that the stock therefore should not be considered a strategic stock.

Research and Monitoring

As noted earlier, the eastern North Pacific stock of gray whales was removed from the List of Endangered and Threatened Wildlife in 1994. The Endangered Species Act requires that if a species under the Department's jurisdiction is delisted, the Secretary of Commerce must implement a system to monitor the status of the species for at least five years. The National Marine Fisheries Service prepared a draft five-year plan of research and monitoring of the eastern North Pacific gray whale stock, and forwarded the draft to the Commission for review in 1993.

The plan set forth the following priority-ranked research tasks: (1) estimate abundance from biennial surveys during the southbound migration; (2) estimate calf production by counting calves during the northbound migration; (3) determine potential biases in methods used to estimate abundance and calf production; (4) estimate the number of animals killed for subsistence purposes by Russia for its Natives; (5) determine trends in pregnancy rates of animals taken in the subsistence harvest; (6) evaluate the current status of the stock; and (7) determine the degree to which human-caused effects may compromise the viability of the stock and its habitat.

As discussed in the previous annual report, the Commission provided comments to the Service on 29 July 1994 recommending, among other things, that the plan be revised to include identification of human activities that could affect the principal calving and breeding lagoons in Baja California and summer feeding grounds in the Bering and Chukchi Seas; and indicate what will be done to determine the dependence of the eastern Pacific gray whale stock on specific feeding and breeding areas.

At the end of 1995 the final plan had not been completed and it was the Commission's understanding that the plan would be finalized and released in early or mid 1996. Early in 1996, the Commission expects to write to the Service to inquire about the status of the plan.

Although the plan has not been completed, the Service has undertaken a number of gray whale monitoring studies. Shore-based abundance surveys were done during the southbound migration at Granite Canyon, California in 1992-1993, 1993-1994, and again in 1995-1996. The abundance estimate from the 1993-1994 survey is 23,109. These surveys also revealed that proportionally more calves are being seen during the southward migration than in previous studies, some of which date back several decades. This finding indicates that for some individuals calving occurs prior to migration and suggests a trend toward successively later migrations.

In 1994 and 1995 shore-based surveys were done to estimate the number of northward migrating gray whale calves passing Piedras Blancas, California. Estimates of calf production were 4.3 percent of the population in 1994 and 2.7 percent in 1995. The reasons for the decrease in the estimated calf production for 1995 is not known. In addition, studies were done to assess and reduce potential biases in the visual abundance surveys. In 1993-1994 and 1994-1995 aerial surveys were done to determine the offshore distribution of migrating whales and thermal sensors were used to measure day/night migration rates. The thermal sensor study revealed no differences in pod size or surfacing intervals between day and night.

Budget limitations have not allowed the Service to initiate studies on other research priorities identified in the draft five-year plan.

Potential Threats to Gray Whale Habitat

As noted above gray whales spend much of their lives in nearshore waters and are therefore exposed to a variety of human activities and development. Particular concern in this regard has arisen recently with respect to potential development in lagoons along the coast of Mexico used by wintering gray whales. To help assess and avoid possible adverse impacts in these areas, the Commission contracted in 1993 for a study of ongoing and planned development in two major breeding lagoons along the west coast of Baja California, Mexico: San Ignacio Lagoon and Magdalena Bay. Results of that study were published in 1995 (see appendix B, Dedina and Young 1995).

The contract report identifies and describes potential threats to the breeding lagoons, including whale-watching, coastal development, and industrial activities; provides a summary of relevant mechanisms utilized in Mexico for resource conservation; describes efforts that have been made to limit the activities or mitigate potential impacts to gray whales and their habitat; and provides suggestions of actions that might be taken to avoid or mitigate potential adverse affects from human activities. The suggestions include increasing fees for whale-watching permits to support gray whale habitat protection and other local conservation programs, and increasing public involvement in the review of plans and environmental assessments of proposed industrial and coastal development activities near the lagoons. Early in 1996 the Commission expects to transmit the report to the Administrator of the National Oceanic and Atmospheric Administration and key scientists in the National Marine Fisheries Service.

Among the potential threats is the proposed construction of new salt production facilities at San Ignacio Lagoon, one of the principal breeding/calving lagoons. Construction of the salt processing facilities would include substantial alteration of parts of the lagoon and construction of conveyor belts and a deep-water pier for loading and transporting salt. An environmental impact assessment was prepared by the salt-works owners and submitted to the Mexican government. The assessment was turned down due to insufficient information on the project's location, size, and potential environmental consequences. Apparently, there are plans to submit a revised environmental impact assessment.

On a related point, a Commission-sponsored contract report completed in 1994 described the reaction of gray whales to noise experiments conducted in San Ignacio Lagoon in 1983 and 1984 (see Appendix B, Jones *et al.* 1994). The authors concluded that gray whales left the lagoons, at least temporarily, in response to underwater projection of noises of boats, industrial activities, and other sounds. These results suggest that noise associated with coastal development and related activities could cause whales to avoid or abandon areas that may be essential to calving, nursing, and breeding. This report was transmitted to the National Oceanic and Atmospheric Administration on 16 December 1994 with the comment that noises generated by various human activities have the potential to adversely affect gray whales using the lagoons.

IWC Consideration of Threats to Gray Whale Habitat

Potential development effects on the species' breeding lagoons also has been a recent subject of concern within the International Whaling Commission. At its May 1994 meeting, the IWC's Scientific Committee reviewed the effects of tourism and other developments in gray whale critical habitats. The Committee took special note of the Mexico's recognition of the importance of gray whale breeding lagoons and its action to conserve these critical habitats. The Committee recommended that efforts should be made to protect and maintain the integrity of the lagoon habitats by (1) evaluating and considering the effects of lost habitats elsewhere, (2) careful planning of any development to accommodate the needs of developers and wildlife, and (3) implementing an ongoing research and monitoring program to allow detection and analysis of any changes in use of the lagoon by gray whales that could be associated with development, including tourism.

At the IWC 1995 meeting, Mexico requested that the IWC help review the proposed salt-producing operation in San Ignacio Lagoon. Mexico indicated that the original proposal was rejected by Mexican authorities, but an appeal had been made and the Government decided to approach the Commission to request assistance in selecting one or two independent scientists from outside Mexico to help review the potential environmental impacts of the proposed commercial salt processing operation. The Commission agreed to the request and authorized its Secretary and chair of the Scientific Committee to consult with the Mexican government on the implementation of this request and report at the next annual meeting on the final arrangements made.

Request to Take Gray Whales for Subsistence Purposes

In May 1995 the Makah Tribal Council wrote to the Departments of Commerce and State indicating that the Council intends to ask the agencies formally to seek IWC approval of an annual ceremonial and subsistence harvest of up to five gray whales. The Council indicated that whaling has been a traditional part of the tribe's way of life. It contended that there were no legal impediments to the tribe's rights to take whales because the eastern North Pacific gray whale stock had been removed from the Endangered Species Act's list of endangered and threatened wildlife and because the enactment of the Marine Mammal Protection Act had not abrogated its rights under the 1855 Treaty of Neah Bay. Article IV of that treaty preserves the Makah's "right of taking fish and of whaling or sealing at usual and accustomed grounds...." Although not part of its current proposal, the Tribal Council also asserted a treaty right to harvest whales for commercial purposes.

When approached informally about the proposal, the government had taken the position that any whaling by the Makah would require approval by the International Whaling Commission. The Tribal Council responded that, while it believed that Whaling Commission endorsement was not legally required, it would nevertheless be willing to seek such approval. The Council also requested the National Marine Fisheries Service to enter into negotiations to develop a co-management agreement that would delineate tribal and federal management responsibilities regarding the proposed gray whale harvesting activities.

At the end of 1995 the National Marine Fisheries Service and the Department of State were reviewing the Makah's request. The agencies were expecting to receive additional documentation to support the proposed harvest from the Makah early in 1996. After reviewing that information the agencies will decide whether to seek a quota for gray whales on behalf of the Makah at the 1996 International Whaling Commission meeting.

In 1996 the Marine Mammal Commission will continue to track and, as appropriate, provide advice on the Makah Tribal Council's request to take gray whales. In addition, the Commission continues to have concerns about the impact of human activities on gray whale habitats in breeding lagoons and feeding areas. Therefore the Commission will continue to review and provide advice on measures necessary to avoid or mitigate activities that could adversely affect gray whales and their essential habitats.

Vaquita
(*Phocoena sinus*)

The vaquita, or Gulf of California harbor porpoise, is one of the rarest of all cetacean species. It is found only in the northern Gulf of California, Mexico, and has the most limited range of any cetacean.

In 1978 the Government of Mexico added the species to its list of rare and endangered wildlife. In 1979 the vaquita was listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora. The International Union for the Conservation of Nature and Natural Resources (now The World Conservation Union) listed the species as vulnerable in its Red Data Book in 1979 and changed its status to endangered in 1991. The vaquita was listed as endangered under the U.S. Endangered Species Act in 1985.

Neither the historic nor the present size of the vaquita population is well documented. However,

recent abundance estimates derived from boat and aircraft surveys done between 1986 and 1993 range from 224 to 885 individuals. These are among the first quantitative estimates of vaquita population size, and they confirm that the species is very rare. Also, the researchers making the estimates indicated that the population could be declining at a rate of about 20 percent annually.

Data obtained in recent years further emphasizes the gravity of the situation. Age and reproductive data from a sample of 56 vaquitas obtained between 1985 and 1993 suggest that the life history of the vaquita appears to be similar to that of depleted harbor porpoise populations found elsewhere. However, the potential rate of increase may be lower for the vaquita than for its congeners because the vaquita does not calve annually. The sample consisted mainly of young and old individuals, suggesting that there may be few adults of prime reproductive age. The analysis also revealed the presence of unusual ovarian pathologies in many of the females. In addition, some scientists believe that habitat alteration in the northern Gulf of California may represent a significant threat to the species. On the other hand, contaminants such as chlorinated hydrocarbons and polychlorinated biphenyls were found in low levels in the vaquita relative to small cetaceans in other parts of the world, and contaminants do not appear to pose an immediate threat to the species.

Incidental Mortality in Fisheries

The greatest threat to the vaquita is entanglement in gillnets. The species is known to have been caught incidentally in the fishery for totoaba since the mid-1940s. The fish stock itself was severely overexploited and in 1975 the Mexican Government banned the fishery to allow it to recover. Despite the closure, the fishery has continued at low levels, both illegally and as a legal experimental fishery. In 1979 the totoaba was listed as endangered under the U.S. Endangered Species Act to help stop the illegal sale of the fish in the United States.

Historic levels of vaquita incidental take are not known, and only recently have attempts been made to quantify fishery-related mortality. Between February 1985 and June 1991 the deaths of 121 vaquitas were documented in gillnet operations for totoaba, shark, ray, sierra (a mackerel-like fish) and in shrimp trawls. At least five vaquitas are known to have died in fishing operations in 1992. More recently, fishing activities involving mesh sizes less than 25 centimeters were monitored in one of the upper Gulf's primary fishing ports between January 1993 and March 1994. Fourteen vaquita deaths were documented in gillnets with mesh sizes between 7 and 15 centimeters, and one vaquita died in a shrimp trawl.

In an effort to limit vaquita incidental mortality in gillnets, the Mexican Secretary for Fisheries issued a regulation in February 1992 reiterating the ban on the totoaba fishery and prohibiting the use of large-mesh gillnets in the northern Gulf of California.

The mortality monitoring effort does not include all fishing communities and fishermen do not report all incidental takes; therefore the actual mortality is probably higher than reported and may be higher than previously believed. Given the small population size and the low potential rate of increase, it is unlikely that the population can sustain the current rate of fishery-related mortality.

International Efforts to Protect Vaquitas

At its 1991 meeting the International Whaling Commission's Scientific Committee recommended that actions be taken to fully enforce the closure of the totoaba fishery and halt illegal shipments of totoaba into the United States. It also recommended preparation of a management plan for the vaquita that includes an evaluation of incidental take of vaquita in fisheries and a program to monitor the species' status.

At its 1994 meeting the IWC's Scientific Committee concluded that the present levels of incidental catch could result in extinction of the species. The Committee recommended that fishing activity and incidental mortality be monitored throughout the species' range and that surveys be conducted to improve abundance estimates. The Committee acknowledged the recent joint research efforts by Mexican and U.S. Government agencies and commended efforts by the Mexican Government to protect the vaquita. In response to the Scientific Committee's findings, in 1994 the IWC adopted a resolution

commending the Mexican Government for creating a biosphere reserve in the upper Gulf of California (see below) and encouraging Mexico to develop a management plan for the reserve. At the 1995 meeting Mexico reported to the IWC on actions taken with regard to the reserve. In addition to enforcing existing regulations and improving measures to prevent environmental degradation, the Mexican Government is encouraging scientific research, environmental monitoring, education programs, and eco-tourism in the area.

Creation of a Biosphere Reserve

In June 1993 the Mexican Government created a biosphere reserve in the northern Gulf of California to conserve the ecosystems of the Sonoran Desert, the upper Gulf of California, and the Río Colorado delta; provide permanent protection to unique species such as the totoaba, the vaquita, the desert pupfish, and various bird species; and promote scientific investigation and environmental education in the region.

A draft management plan for the reserve has been developed. It incorporates input from local residents as well as information obtained from recent studies of the area and its ecosystems. The plan describes the physical, biological, social, and economic environments of the area and reviews activities underway to study, protect, and use the area's natural resources. The final plan, entitled "Programa de Manejo: Reserva de la Biosfera Alto Golfo de California y Delta del Río Colorado" (Management Program: Upper Gulf of California and Colorado River Delta Biosphere Reserve), is expected to be approved and released by spring 1996.

Other Conservation Efforts

As discussed in previous annual reports, in 1992 the President of Mexico established the Comite Tecnico para la Preservacion de la Totoaba y la Vaquita (Technical Committee for the Preservation of the Totoaba and the Vaquita) to plan, evaluate, and coordinate research on the totoaba and vaquita and to recommend actions to preserve both species.

Recognizing the need for a framework to coordinate international efforts to protect the vaquita, the Marine Mammal Commission consulted with the chairman of the technical committee as to whether the Commission might assist in developing a vaquita recovery plan. The offer was accepted and support was provided for the committee chairman to prepare a recovery plan. The purposes of the plan are to encourage and coordinate research and management efforts by environmental groups, research institutions, and government agencies of Mexico and the United States.

The recovery plan, which was completed in March 1993 (see Appendix B, Villa-Ramírez 1993), calls for assessments of population size and trends, distribution and range, and life history and ecology, and development of programs to educate fishermen and the general public about the vaquita and its status. In 1993 the Commission provided additional support to translate the plan into Spanish and distribute it to researchers and interested parties in Mexico.

Efforts to Strengthen Import Restrictions

In November 1991 the Marine Mammal Commission wrote to the National Marine Fisheries Service and the Fish and Wildlife Service, noting that illegal importation of totoaba into the United States appeared to be continuing. Because the species was most often imported in the form of fillets, it was impossible to visually distinguish totoaba from closely related species. Among other things, the Commission called for efforts to develop a test to distinguish totoaba fillets from other fish fillets.

In 1992 researchers the National Marine Fisheries Service developed a biochemical test to distinguish totoaba from related species. In 1993 the Service, in cooperation with the U.S. Customs Service, made intensive efforts to intercept totoaba fillets at the U.S./Mexican border. Ten fillets suspected of being totoaba were seized and analyzed using the biochemical test. In all cases, the fish were not totoaba.

During 1994 and 1995 the Service continued to work with Customs officials to make spot checks for totoaba fillets, respond to any reports of suspected

illegal fillets, and otherwise assist in stopping possible transport of totoaba fillets. No fillets were seized.

The Fisheries Service also is making efforts to educate U.S. travellers entering Mexico about the illegality of catching or transporting totoaba. In 1993 the Service developed a brochure for tourists that describes the distribution and external features of the totoaba and the vaquita and discusses the prohibitions regarding their capture or transport. Several thousand copies were distributed in 1993. The brochure was reprinted in 1994, and in 1994 and 1995 the Service distributed copies to tourists entering Mexico and other interested parties.

The Commission is encouraged by actions taken by the Government of Mexico and others to conserve the vaquita and its habitat. However, it is not clear if everything possible is being done to recover the species. The Commission, in consultation with its Committee of Scientific Advisors, will continue to track activities related to the conservation of this species.

Gulf of Maine/Bay of Fundy Harbor Porpoise (*Phocoena phocoena*)

Harbor porpoises, measuring less than two meters in length, are among the smallest cetaceans. They occur in coastal temperate and boreal waters only in the Northern Hemisphere, and feed on a variety of small schooling fishes, such as herring, silver hake, and capelin. The species is prone to becoming entangled in gillnets and, because its coastal distribution off New England overlaps major gillnet fishing grounds whose target species, groundfish, also feed on the same prey species, incidental catch of harbor porpoises in gillnets is a significant conservation problem in that area.

Harbor porpoises appear to occur in discrete stocks whose boundaries and geographic ranges generally are not well known. Along the east coasts of the United States and Canada, however, harbor porpoises have been comparatively well studied. The studies suggest a single migratory stock of animals exists from the Bay of Fundy in Canada south to North Carolina, the southern limit of the species' normal range in the western North Atlantic. It is known as the Gulf of Maine/Bay of Fundy harbor porpoise stock because it concentrates in those areas in summer. During spring and fall, this stock disperses between the Bay of Fundy and North Carolina. Its distribution in winter is mostly unknown. Harbor porpoises also occur in Canada north of the Bay of Fundy and off southern Greenland, but porpoise in those areas are not thought to part of the same stock.

Many species of marine mammals are taken incidental to commercial fishing in the United States; however, the largest cetacean bycatch in recent years has been the take of harbor porpoises in a sink gillnet fishery for groundfish off New England. Harbor porpoises from the same stock also are taken by sink gillnets in the Bay of Fundy in Canada and by coastal gillnets south of New England. A subjective analysis by Canadian scientists combining anecdotal information and very limited catch data suggested that early in the 1980s perhaps 600 porpoises a year were being taken in the Bay of Fundy, the Gulf of Maine, and more southern waters, and that take in commercial fisheries may have been affecting the regional harbor porpoise stock since the 1970s. A study comparing body lengths of porpoises collected in 1969-1973 with those taken in 1981-1986 found that, while calves tended to be larger in the latter period, the overall population was composed of smaller animals. This suggested that individuals were not surviving to older ages, that calf-bearing periods of mature females were becoming shorter, and that food was not a limiting factor.

In an effort to reduce the incidental take of marine mammals in commercial fisheries, Congress amended the Marine Mammal Protection Act in 1988. In part, the amendments require that the National Marine Fisheries Service establish an observer program to assess and monitor incidental-take levels in U.S. fisheries. Observer sampling in the New England sink gillnet fishery for groundfish began in 1990. Based on the levels of observed take of harbor porpoises in that sampling program and estimates of total fishing effort from port-based landing reports, the Service estimated that harbor porpoise incidental-take levels in the New England sink gillnet fishery was

2,900 porpoises in 1990, 2,000 porpoises in 1991, 1,200 porpoises in 1992, and 1,400 porpoises in 1993. As discussed below, the observer program was continued in 1994 and 1995 but, due to changes in the way the Service tracked fishing effort and other problems, estimates of total incidental take for the fishery in those years were not yet available at the end of 1995. Partial analyses in 1995, however, suggest that incidental take in 1994 increased substantially above the 1992 and 1993 levels.

The incidental catch of harbor porpoises in the Canadian gillnet fishery in the Bay of Fundy also has been a concern, but until recently reliable data on take levels from that area have not been available. In 1993 and 1994 the Canadian Department of Fisheries and Oceans carried out an observer program to assess harbor porpoise take in the Bay of Fundy in Canada. Based on results for those years, incidental take by gillnets in that area has been estimated at 424 porpoises in 1993 and 101 porpoises in 1994. Almost all of the porpoises were taken in two small areas in summer and early fall. Adding together the 1993 catch estimates for Canadian and New England waters suggests a total take of more than 1,800 animals in the northern end of the range of the Gulf of Maine/Bay of Fundy harbor porpoise stock in that year.

Information on incidental take of harbor porpoises between New York and North Carolina is based on stranded porpoises exhibiting marks from gillnets or attached net fragments. In 1993, 50 harbor porpoises were found stranded in this area, mostly in Virginia and North Carolina between March and May, and several animals showed signs of gillnet interactions. In 1994 the number of harbor porpoise strandings in the area increased. As of the end of 1995 information was not yet available on the number of strandings showing evidence of gillnet interactions or the number of strandings in 1995.

The source of these interactions is unclear. Coastal gillnetters fishing between New York and North Carolina target various fish species depending on location and season. In recent years many gillnet fishermen from the northeastern United States also have begun fishing in this area for dogfish and monkfish. They often operate from small boats on schedules that make observer programs difficult. Although gillnet fishery observers in this region have not yet identified the fishery responsible for harbor porpoise strandings, a coastal shad fishery that has not yet been studied may be involved.

The high number of porpoises caught in gillnets off New England prompted the National Marine Fisheries Service to conduct harbor porpoise surveys in 1991 and 1992 to estimate stock size. The surveys were carried out in the summer when the stock is concentrated in the northern part of its range, and they produced stock size estimates of 37,500 animals (95% confidence interval 26,700 to 86,400) from 1991 data, and 67,500 animals (95% confidence interval 32,900 to 104,600) from 1992 data. Pooling the results gives a weighted stock size estimate of 47,200 animals (95% confidence interval 39,500 to 70,600). Although a new survey was conducted in the summer of 1995, analyses had not yet been completed as of the end of 1995.

Given estimates of stock size, harbor porpoise reproductive biology, and other information, it seems likely that incidental-take levels from the Gulf of Maine/Bay of Fundy harbor porpoise stock have exceeded sustainable levels.

Gulf of Maine/Bay of Fundy Harbor Porpoise Stock Assessment

In 1994 the Marine Mammal Protection Act was amended to require that the National Marine Fisheries Service develop marine mammal stock assessments to help manage the incidental take of marine mammals in U.S. fisheries (see also Chapter IV). The assessments are to include estimates of stock size, maximum net productivity, and a potential biological removal level (other than natural mortality) that would allow the stock to increase to or remain within optimum population limits. The assessments also are to include a determination as to whether a stock should be considered "strategic," which could trigger the formation of an incidental-take reduction team to prepare an incidental-take reduction plan.

The Service circulated the draft stock assessments in August 1994. In its 12 December 1994 comments on the draft assessments, the Commission noted that

the Gulf of Maine/Bay of Fundy harbor porpoise stock clearly met the strategic stock criteria and that a take reduction team should be formed immediately.

By letter of 24 February 1995 the Service advised the Commission that it anticipated completing its final stock assessments by early March 1995 and that it would establish a take reduction team for the Gulf of Maine/Bay of Fundy stock of harbor porpoises by the end of March 1995. The Service, however, was unable to meet to this schedule and, as discussed below, pending formation of the incidental-take reduction team for this harbor porpoise stock and preparation of a take reduction plan, the Northeast Multispecies Fishery Management Plan prepared by the New England Fisheries Management Council continued to serve as the basis for managing incidental take of harbor porpoise in the New England sink gillnet fishery.

The Service circulated its final stock assessments in August 1995. The final assessment for the Gulf of Maine/Bay of Fundy harbor porpoise stock cited the above-noted population estimate of 47,200 animals as the best estimate of abundance and calculated a minimum abundance estimate of 40,297 animals. The assessment also determined that the best estimate of maximum net productivity for the stock was four percent per year and that its potential biological removal level was 403 porpoises per year. Noting that the above-mentioned estimates of incidental take in New England sink gillnets exceed the potential biological removal level, the Service determined that the stock should be considered a strategic stock.

On 22 November 1995 the Service invited the Commission to participate on a harbor porpoise incidental-take reduction team scheduled to meet early in 1996. The team will be charged with developing and providing the Service with a recommended take reduction plan within 6 months of its establishment. The plan is to include measures that would immediately reduce harbor seal incidental-take levels to below the potential biological removal level for the entire stock and to reach levels approaching a zero mortality and serious injury rate within five years. As the Service is required to review and take appropriate action to implement the plan within six months of receiving the team's plan, measures to meet this goal must be in effect no later than spring 1997.

Use of Acoustic Alarms To Deter Harbor Porpoises from Nets

Between 1991 and 1993 the National Marine Fisheries Service supported studies to investigate the use of acoustic deterrents to prevent harbor porpoise entanglement in nets. The work, carried out by commercial fishermen and scientists with the Memorial University of Newfoundland, Canada, the New England Aquarium, and other institutions, involved attaching acoustic alarms (pingers) to nets to divert approaching animals and thereby prevent their entanglement. Although used with some success in other fisheries to prevent baleen whales entanglement, experiments with other cetaceans had not proved useful.

Results of the initial work on harbor porpoise, however, were encouraging and early in 1994 the Service convened a scientific panel to review the harbor porpoise deterrent work and determine whether further experimentation was warranted. Based on the panel's recommendations, the New England Aquarium proposed an experimental protocol to test pingers on the nets of cooperating gillnet fishermen in an area off New Hampshire where the bycatch of harbor porpoises had been high. As described in the previous annual report, the Commission commented on the experimental protocol early in the fall of 1994.

Between October and December 1994 the study was carried out with funds provided by the Service and the National Fish and Wildlife Foundation. The study used a double-blind sampling protocol in which an equal number of gillnets were deployed with active and inactive alarms and the incidental catch of harbor porpoise was recorded by independent observers. Neither observers nor fishermen knew whether deployed nets were equipped with active or inactive alarms and the alarms were changed by a third party after each set.

On 25 July 1995 the New England Fishery Management Council provided the Commission with a draft study report, requesting comments on its find-

ings and asking for advice as to whether and how acoustic alarms might be incorporated into future management decisions for the regional sink gillnet fishery. The Commission, in consultation with its Committee of Scientific Advisors, reviewed the report and replied to the Council on 14 August 1995.

The draft report noted that during the study 421 sets were made with inactive alarms and 423 sets with active alarms. It also reported that only two porpoises were caught in nets with active alarms, while 25 porpoises (0.059 porpoise per set) were caught in nets with inactive alarms. Most of the porpoises caught were mature males. Three harbor seals were also caught — two in nets with active alarms and one in a net with inactive alarms. Among other things, the investigators noted that it was not clear why the alarms had worked so well or whether animals would habituate to the sound over time, rendering the alarms ineffective. They also cautioned that the results should not be extrapolated to other porpoise or dolphin species. They concluded, however, that acoustic alarms would be an effective means of reducing the incidental catch of harbor porpoises in the sink gillnet fishery in the Gulf of Maine.

In its 14 August letter, the Commission noted that the study design was well conceived, the statistical methods used to analyze the data were appropriate, and the results were very encouraging and highly significant. However, given uncertainties (such as potential habituation of porpoises to deterrent sound and possible differences in the effectiveness of deterrents in areas and seasons where the age-sex composition, social interactions, and behavior of porpoises could differ from those in the study) the Commission noted there was a clear need for further study of the device's effectiveness. Therefore, pending further study, the Commission cautioned against relying on the use of acoustic deterrents in normal fishing practices to reduce harbor porpoise bycatch.

With regard to incorporating use of the devices into future management actions, the Commission noted that the Service had recently adopted a system of three time-area closures recommended by the Council to reduce harbor porpoise bycatch. Based on past observer data, however, the closures covered only part of the peak bycatch areas and time periods (see below). The Commission therefore recommended that the seasonal closures be expanded to better bracket the months and areas where past observer data indicated high porpoise bycatch had occurred, and that limited fishing opportunities be allowed within those closures to further test the effectiveness of acoustic deterrents, preferably by using the same methodology as in the 1994 study.

The Northeast Multispecies Fishery

In 1986 the National Marine Fisheries Service adopted a fishery management plan prepared by New England Fishery Management Council to manage the fishery for groundfish (*e.g.*, cod, flounder, and haddock) taken off New England by trawls, longlines, and sink gillnets. Because of the large harbor porpoise bycatch, in October 1992 the Service asked the Council to develop an amendment to that plan to reduce the incidental take of porpoise in the sink gillnet component of the fishery. The Council in turn established a harbor porpoise subgroup to analyze porpoise bycatch patterns using data from the Service's fishery observer program for the 1991 and 1992 fishing seasons.

The analysis indicated that the bycatch of harbor porpoises shifted by season and area as harbor porpoise migrated along the coast. Depending on the year, about one-half to three-fourths of the bycatch occurred in a "mid-coast" area between northeast Massachusetts and southern Maine, particularly around a topographic feature called Jeffreys Ledge, from October to December, and along a "northeast" area off the central and northern coast of Maine from June to September. Lower bycatch levels also occurred in the mid-coast area in April and May, and a few porpoises also were caught in Massachusetts Bay in March and April.

Based on this information, in September 1993 the Council recommended interim take-reduction measures on which the National Marine Fisheries Service requested public comments in October. The Council proposed adding a goal to the fishery management plan to reduce harbor porpoise bycatch levels by 20 percent per year over a four-year period to reach an annual bycatch level of less than two percent of the stock's estimated size by the fifth year. Assuming a

minimum population estimate of 39,500 animals and an average annual bycatch level of 1,300 porpoises for 1992 and 1993, the goal called for reducing bycatch levels to 1,040, 780, and 520 porpoises by years two, three, and four, respectively. To achieve this goal, it proposed rules to limit seasonal fishing effort beginning in April 1994, pending the development of alternative time-area closures.

As noted in its previous annual report, the Commission commented to the Service on 15 November 1993 recommending, among other things, a more expeditious reduction of incidental-take levels and expressing support for developing time-area closures. The Service published final rules on 1 March 1994 to implement the Council's recommendations.

To allow it to respond quickly to unforeseen developments, the Council's framework management system provides for expedited rulemaking, whereby a recommended measure can be implemented as a final rule by the Service without public comments on proposed rules, provided that the Council considers the measure at two of its public meetings before recommending it to the Service. Using the expedited rulemaking process, the Council recommended and the Service adopted a system of time-area closures for the sink gillnet component of the fishery. The final rules, published by the Service on 20 May 1994, took effect before the measures to reduce fishing effort were implemented.

The closure boundaries adopted by the Service excluded some areas where bycatch rates had been high and the closure times covered only part of the high bycatch periods in different areas. For example, the "mid-coast" closure excluded most of Jeffreys Ledge, allowing fishermen to simply move from the closed area to another area where bycatch rates were high. The mid-coast closure was in effect only for November, rather than September to December when peak bycatch periods had been observed. Also, the "northeast" closure was effective from mid-August to mid-September although the peak bycatch in that area occurred from June through September.

As noted in the previous annual report, it seemed questionable whether the adopted measures would achieve the Council's goal of reducing bycatch by 20 percent in the first year of its four-year program. As noted above, the Commission's 14 August 1995 comments to the Council on the acoustic deterrent experiment recommended that the time-area provisions for the closed areas be expanded to better bracket the times and areas of observed harbor porpoise bycatch.

Information from the 1994 observer program on harbor porpoise bycatch was not available from the Service early in 1995, and the Council took no action in advance of the second year of its four-year take reduction program to strengthen bycatch control measures. On 9 August 1995, however, the Service advised the Council that, based on a partial analysis of observer program data for 1994, the harbor porpoise bycatch rate for September and December of that year in the mid-coast area was about three times higher than catch rates from 1991 to 1993, and the highest catch rates were in September and October. The tentative findings therefore indicated that there was greater year-to-year variability in the timing of peak bycatch levels than previously thought, and that the adopted closures for the area were insufficient to meet the take-reduction goal.

To develop new measures, the Council asked its harbor porpoise review team to examine the new information and recommend new bycatch reduction measures. A representative of the Marine Mammal Commission was invited to participate on the team, which met on 8 September 1995. During its meeting, the team considered preliminary analyses from the National Marine Fisheries Service's 1994 observer effort as well as analyses from earlier years of the program, preliminary results from the 1994 acoustic deterrent experiment (see above), and the Service's final stock assessment for the Gulf of Maine/Bay of Fundy harbor porpoise stock (see above).

With regard to information from the 1994 observer program, the team was advised that preliminary analyses of bycatch rates were available only for the mid-coast area, and that summary analyses had been delayed by data processing problems. It also was told that because of new methods adopted by the Service in 1994 to record fishing effort, it would no longer be possible to assess the geographic distribution of harbor porpoise bycatch within fishing areas. As a result, new information to evaluate appropriate closure

boundaries would not be available and, instead of estimating the number of harbor porpoises caught in different regions as in the past, assessments would be limited to regional catch-per-set rates based on observer data.

Based on available information, the team concluded that existing time-area closures were neither large enough nor long enough to account for year-to-year variability in harbor porpoise bycatch. It also concluded that the Council's first-year goal had not been met and that the existing closures were not sufficient to achieve the Council's stated bycatch reduction goal. Because it was too late to implement new closure rules for September 1995, the team recommended that, for the fall 1995 fishing season, the mid-coast closure should be expanded to include Jeffreys Ledge and it should cover the months October through December 1995. Noting the promising results from the 1994 acoustic deterrent study, the team also discussed further testing of fishing with acoustic devices in the closed area. No recommendations were made in this regard, however, as the team understood acoustic devices could not be manufactured in time for the fall 1995 fishing season.

Among other things, the team also noted that 1996 spring and summer closures should be expanded in time and area to better cover the periods and areas of harbor porpoise bycatch, that consideration should be given to allowing controlled fishing within portions of those areas to test the effectiveness of acoustic deterrents, and that a new closure south of Cape Cod should be considered, given new observer data showing that harbor porpoise bycatch also occurs in that area. Because further analyses from the 1994 observer program was expected before the 1996 fishing seasons, the team deferred offering specific advice on these actions.

The team also noted that the Service's stock assessment for the regional harbor porpoise stock had established a potential biological removal level of 403 porpoises, to include both bycatch in Canada and off U.S. mid-Atlantic states as well as New England. The team therefore noted that the Council should clarify its bycatch reduction goal to ensure its consistency with new provisions of the Marine Mammal Protection Act that call for incidental-take levels to be reduced below potential biological removal levels.

Considering the advice of the harbor porpoise review team and others, the Council proceeded with expedited rulemaking to revise the harbor porpoise take-reduction measures for the fall 1995 fishing season in the mid-coast area. The Council recommended that the mid-coast closure be redefined to include most of Jeffreys Ledge. At the request of fishermen, a portion of Jeffreys Ledge (*i.e.*, Tillies Bank) where porpoise bycatch rates have been low was excluded from the recommended closed area. Given the required procedural steps, the earliest the new rules could be implemented was November, and the Council therefore recommended a closure period of 1 November through 31 December. It also asked the Service to examine the possibility of further tests, particularly in the Jeffreys Ledge area, of the effectiveness of acoustic deterrents in reducing harbor porpoise bycatch.

On 30 October 1995 the Service published final rules in the *Federal Register* adopting the Council's recommendations. It also took steps to allow gillnet fishing in the Jeffreys Ledge area, provided nets were equipped with suitable acoustic devices and an opportunity was afforded to place observers aboard vessels. The Service's *Federal Register* notice also noted that changes were under consideration for other closed areas but that needed changes to regulations for these areas would be evaluated during the Council's next annual review of the harbor porpoise bycatch reduction program.

As noted above, the peak period of harbor porpoise bycatch in the mid-coast area in 1994 occurred in September and October. Because of the delay in revising provisions for this closure, it was again unclear how effective the measures would be in reducing harbor porpoise bycatch in this key area in 1995. Preliminary information on further tests of acoustic devices at Jeffreys Ledge late in 1995, however, was again encouraging. A number of gillnet fishermen were able to obtain acoustic devices and, by pooling funds, they hired a technician to carry out routine maintenance of their acoustic alarms. As of the end of 1995 apparently no harbor porpoise had

been caught in nets equipped with the alarms and monitored by the Service's observer program.

Harbor Porpoise Program Oversight

As indicated above, the bycatch of harbor porpoise in sink gillnets off New England is one of the most urgent marine mammal incidental-take problems in the United States. Actions in 1994, however, failed to prevent an increase in harbor porpoise bycatch levels and actions taken in 1995 proved to be problematic and late.

Based on information presented at the September 1995 harbor porpoise review team meeting discussed above, the Service was unable to provide to the Council timely or complete analyses of harbor porpoise bycatch from its 1994 observer program. This was due to a new computer data management system and an *ad hoc* data editing procedure. In addition, because of a change in the way fishing effort data was collected in 1994, analyses of the spatial distribution of bycatch, which had provided the basis for defining area closure boundaries, are no longer possible. As a result, even when bycatch analyses are completed, they likely will provide a poor and perhaps questionable basis for evaluating the effectiveness of individual area closures or needed changes.

Concerned that Service planning and responsiveness to management needs was not adequate, the Commission wrote to the Service on 10 October 1995. In its letter, the Commission asked to be advised as to the schedule for completing analyses of 1994 bycatch levels and the steps and schedule for ensuring more timely analyses of bycatch data in 1995 and beyond. Given the fundamental change in the way bycatch is measured, the Commission also asked to be advised how the Service plans to identify and evaluate appropriate changes in area closures to reduce harbor porpoise bycatch without the fine-scale geographic information on fishing effort and bycatch levels that was previously available for particular fishing areas.

The Commission also noted that timely action to adjust the time-area closures under the four-year harbor porpoise bycatch reduction program had not been taken even though the third year of the program would begin in a few months. In addition, the Commission noted that, while it was advised earlier in 1995 that the Service planned to establish a harbor porpoise incidental-take reduction team in March, that team had not yet been designated, and the Service also had still not announced a decision on its January 1993 proposal to designate harbor porpoises as threatened under the Endangered Species Act. The Commission therefore also asked to be advised as to the current schedule for addressing these issues and the steps the Service would take to assure that future deadlines and schedules would be met.

Following its 10 October 1995 letter, the Commission gave further thought to how it might assist in resolving data management and analysis problems related to estimating total bycatch levels. Based on its deliberations, it wrote to the Service on 31 October offering the services of a member of its Committee of Scientific Advisors, an expert statistician, as a consultant to the Service to examine and provide advice on related data management issues. By letter of 17 November 1995, the Service accepted the Commission's offer.

As of the end of 1995, the Commission had not received a response to its 10 October letter, but it expected that its Committee member would meet with Service staff responsible for harbor porpoise bycatch analyses early in 1995. As noted above, the Service also invited the Commission on 22 November 1995 to participate on a harbor porpoise incidental-take reduction team scheduled to meet early in 1996 to develop a plan for reducing harbor porpoise incidental-take levels.

Endangered Species Act Status Review

In September 1991 the Sierra Club Legal Defense Fund petitioned the National Marine Fisheries Service to list the Gulf of Maine harbor porpoise population as threatened under the Endangered Species Act. The petition was submitted in light of the large harbor porpoise bycatch in the Gulf of Maine and the Bay of Fundy, the absence at that time of any management action to reduce the take, and the possible impact of the bycatch on the regional harbor porpoise stock. As discussed in previous annual reports, the Service requested public comments on the action and on 7

January 1993 published a *Federal Register* notice proposing that the population be listed as threatened.

The analysis accompanying the Service's proposal noted that at least 2,000 harbor porpoises were being caught incidentally in regional gillnet fisheries, that the minimum bycatch was about 4.5 percent of the best population estimate, that the incidental take was exceeding sustainable levels, and that regulations necessary to reduce the level of bycatch did not exist. During 1993 and 1994 the comment period on the proposal was extended several times as new information became available on harbor porpoise incidental take and management actions. In its comments of 22 September 1994, the Commission noted that information summarized by the Service in support of its proposal justified the listing action and that more recent information on harbor porpoise bycatch levels indicated that the situation was actually worse than believed when the Service first made its proposal. Accordingly, the Commission recommended that the Service immediately proceed with its proposed action.

Although the Commission understood that the Service intended to announce a decision on the matter early in 1995, it did not do so, nor did it make a decision subsequently in 1995. As noted above, the Commission wrote to the Service on 10 October 1995 expressing concern about the timeliness of Service action on this and other harbor porpoise management actions and asking to be advised when a decision would be made on the listing proposal. As of the end of 1995, it had not received a reply from the Service.

Beluga Whale (*Delphinapterus leucas*)

The beluga whale (also known as the belukha or white whale) is distributed widely throughout Arctic and sub-Arctic seas. The size and discreteness of individual populations is uncertain. Total abundance is estimated to be 50,000 to 70,000 animals worldwide. Five relatively discrete beluga whale populations are thought to exist in U.S. waters. The largest is the Beaufort Sea stock, shared with Canada. Other populations are found in the eastern Chukchi Sea, Norton Sound, Bristol Bay and Cook Inlet.

Beluga whales have been a traditional source of food and oil for northern Natives for centuries. Subsistence hunting may have begun as early as the ninth century. Commercial exploitation of the species began in the mid-1800s and continued until the end of the century when whaling fleets turned their attention to more profitable species. However, a commercial take by land-based trading companies continued, in some cases into the 1960s. Some stocks thought to have been reduced to 10 to 20 percent of their initial size. Today almost all catches of beluga whales are by local peoples for subsistence use, including a take by Alaska Natives. In a few cases, beluga whales are captured for public display. The species is listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Alaska Beluga Whale Committee

Beluga whales are an important subsistence resource in several Alaska Native villages. In the 1980s beluga whales became a focus of attention by conservation groups, which were concerned that the numbers of beluga whales in Alaska waters might be declining. At the same time, there were discussions within the International Whaling Commission on possible management of small cetaceans. In March 1988 the Alaska Beluga Whale Committee was formed by concerned Natives and representatives of local, state and Federal agencies to promote the wise conservation, management, and use of beluga whales. Since 1992 Congressionally appropriated funds passed through the National Marine Fisheries Service have allowed the committee to take an active role in beluga whale management and research.

The Alaska Beluga Whale Committee held a workshop on the beluga whale in Anchorage, Alaska, on 5-7 April 1995 to review available information on the status and conservation of beluga whales. The workshop included Native hunters from 16 Alaska coastal communities and representatives of local, state and Federal agencies. Also participating were government representatives from Canada and Denmark (for Greenland). The workshop reviewed current information about beluga whales, reports of studies being supported by the Alaska Beluga Whale Committee, harvest information from Alaska, Canada, and Greenland, and research needed to resolve uncertainties

concerning the status and trends of beluga whales in Alaska.

Since its creation in 1988, the Alaska Beluga Whale Committee has been collecting harvest data from Native hunters. Information presented at the April 1995 workshop indicated that the total average annual harvest for the years 1987 to 1994 from all beluga whale stocks in Alaska was 274 whales. The Beaufort Sea stock, which is shared with Canada, has also been subject to an annual take by Canadian Natives. The average annual Canadian harvest from this stock for this period was 118 whales. As noted earlier, there are believed to be five relatively discrete stocks of beluga whales in Alaska. The annual take from all but the Cook Inlet stock is believed to be less than two percent of the estimated stock size.

During 1995 the Alaska Beluga Whale Committee, working with the North Slope Borough and with support from the National Oceanic and Atmospheric Administration, completed a data and sample collecting manual for use by Native hunters. The 22-page manual includes instructions on how different biological samples should be collected and handled, as well as a discussion of what biologists can learn from the samples.

Beluga Whale Stock Assessments

Section 117 of the 1994 amendments to the Marine Mammal Protection Act requires that the National Marine Fisheries Service and the Fish and Wildlife Service prepare stock assessments for each stock of marine mammal that occurs in waters under U.S. jurisdiction. As discussed in Chapter IV, each stock assessment report is to estimate the minimum size and maximum productivity rate of the stock, calculate a potential biological removal level (not including natural mortality) that can be safely taken without causing the population to fall below its optimum sustainable population level, and assess the level of incidental take by commercial fisheries. In cases where the estimated level of mortality and serious injury exceeds the estimated potential biological removal level, the stock is to be classified as a "strategic" stock.

Draft stock assessment reports for species under the jurisdiction of the National Marine Fisheries Service were prepared and distributed for review on 9 August 1994. With respect to beluga whales, the Service identified five presumed discrete stocks in Alaska: the Beaufort Sea stock (shared with Canada), the eastern Chukchi Sea stock, the Norton Sound/Yukon Delta stock, the Bristol Bay stock, and the Cook Inlet stock.

The Beaufort Sea stock was estimated at 21,000 animals and stable. Data were insufficient to estimate the maximum net productivity rate for this as well as the other four beluga whale stocks. Therefore, a 4 percent default rate applicable to cetaceans generally was used in all cases to calculate the potential biological removal level. The potential biological removal level for the Beaufort Sea stock was calculated at 420 whales a year. There was no reported incidental take in commercial fisheries, and the subsistence take by Alaska Natives was estimated at fewer than three whales a year.

The Bristol Bay stock was also considered to be stable with an estimated minimum population level of 1,800 animals. The potential biological removal level was calculated to be 36 whales per year, and the annual subsistence take was estimated to be 8 whales.

The draft assessments classified the three remaining beluga whale stocks as strategic stocks. These are the eastern Chukchi Sea stock, with a minimum population estimate of 2,500 animals, a potential biological removal level of 50 whales, and an annual subsistence take of 92 whales; the Norton Sound/Yukon Delta stock with a minimum population estimate of 4,000 animals, a potential biological removal level of 51, and an annual subsistence take of 168; and the Cook Inlet stock with a minimum population estimate of 332 whales, a potential biological removal level of 6.6, and an annual subsistence take of 13 whales.

As discussed in the previous annual report, the Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, provided comments on the draft assessments to the Service on 1 December 1994. In its comments, the Commission noted that because the Beaufort Sea stock is shared with Canada, the stock assessment should include information on

levels of incidental take in commercial fisheries and subsistence hunting in Canada as well as in Alaska. The Commission also noted that the draft assessment was based on subsistence harvest information from Alaska that was neither complete nor accurate. For instance, the Commission cited harvest data showing that the known retrieved harvest from the stock by Alaska natives ranged from 25 to 83 during the period 1987-1993 and, at the same time, the Canadian Native take ranged from 106 to 171. The Commission concluded that, although not based on the best available information, the statement that the current level of take is below the potential biological removal level appears correct. It suggested that the final stock assessment should provide more up-to-date information on population size as well as levels of subsistence take in both Alaska and Canada.

With regard to the Chukchi Sea stock, the Commission noted that the draft assessment did not clearly identify the range of the stock. Also, it appeared that the estimate of population size was not based on the most up-to-date information, and the estimated average annual Native subsistence harvest appeared to be based on data for a single year, and was not a multiple-year average. The Commission also noted that the assessment appeared to be inconsistent in some conclusions. On one hand, the draft indicated that, given the uncertainty concerning the minimum population estimate, it was not possible to predict the impact of human-related removals from the stock. On the other hand, the draft concluded that the stock should be considered stable. The Commission recommended that the Service obtain more up-to-date information on Native subsistence harvest and that the assessment be expanded to identify the uncertainties concerning the status and management of the stock and what would be needed to resolve them.

With respect to the Norton Sound/Yukon Delta stock and the Bristol Bay stock, the Commission similarly noted that there was not sufficient evidence to judge the validity of the Service's conclusions and, again, the estimate of Native take appeared to be based on one year, not an average. It suggested that the final stock assessment be expanded to identify any uncertainties, and the measures needed to resolve uncertainties, concerning the status and management of the stock.

With respect to the Cook Inlet stock, the Commission suggested that the final assessment provide more detailed descriptions of fisheries and the incidental take of beluga whales in those fisheries, and also identify uncertainties concerning the stock size, stock productivity, and the numbers of animals being and killed or injured incidental to the various fisheries.

Finally, the Commission recommended that, if it had not already done so, the Service consider developing a conservation plan for the stocks of beluga whales in Alaska as well as the development of a cooperative agreement with the Alaska Beluga Whale Committee to help implement the plan.

Subsequently, a number of Alaska Native organizations raised concerns about the Service's final stock assessment reports for some Alaska marine mammal species subject to subsistence harvests but not to significant interactions with commercial fisheries. They expressed concern that, for stocks with no known significant fishery-related mortality or with uncertain stock status, classification as a strategic stock focused undue attention on Native subsistence harvests as a primary cause of the strategic determination.

The Service wrote to the Commission on 28 March, relating the concerns expressed by Alaska Native groups. In its letter, the Service noted that it interpreted the primary intent of the 1994 amendments and the guidelines for determining potential biological removal levels as addressing marine mammal mortality and injury incidental to commercial fisheries. The Service expressed the view that it would be more appropriate to develop a management program to address subsistence harvests and the status of stocks subject to subsistence harvests through a co-management process. Thus, for certain stocks subject to subsistence harvests in Alaska, the Service planned to defer determinations as to their status and their potential biological removal level pending analyses of sustainable harvest levels using information gathered through the co-management program and further research on the affected stocks. The Service indicated that the stocks to be addressed in this manner would include those that (1) are not listed as endangered or threatened under the Endangered Species Act or depleted under the Marine Mammal Protection Act;

(2) are subject to an Alaska Native subsistence take and also have a low level of mortality and serious injury incidental to commercial fishing; and (3) are identified in the draft report as having a total estimated human-related mortality that may not be sustainable over the long term. Some beluga whale stocks were to be so addressed.

Final stock assessments for Alaska marine mammal populations under the jurisdiction of the National Marine Fisheries Service were distributed in September 1995. With respect to beluga whale populations, the Service increased its estimate for the Beaufort Sea population size to 38,194 animals with a potential biological removal level of 764 whales. Annual subsistence take was estimated at 160 whales. The estimate for the Bristol Bay stock size and the potential biological removal level were reduced to 1,526 animals and 31 whales per year, respectively. Incidental take in commercial fisheries was estimated at 0.3 animal per year with an annual subsistence take of 22 whales. The estimated population size for the eastern Chukchi Sea stock was increased to 3,710 whales with a potential biological removal level of 74 whales. The annual subsistence take from this stock averages about 65 whales.

For the remaining two beluga whale stocks — the Norton Sound and Cook Inlet stocks — the Service concluded that it was not possible to provide a minimum population level or a potential biological removal level. Accordingly, the final stock assessments for these stocks noted that estimates of potential biological removal and status under the Marine Mammal Protection Act have not been determined because they are (1) not listed under the Endangered Species Act or the Marine Mammal Protection Act, (2) subject to Alaska Native subsistence harvests, and (3) fisheries-related mortality and serious injury incidental to commercial fisheries is absent or a relatively minor contribution to total human-related mortality and injury. The final assessments noted that sustainable harvest levels and status determinations for these stocks will be determined from the analysis of information gathered through the co-management process and will reflect the degree of uncertainty associated with the information obtained.

Polar Bear
(*Ursus maritimus*)

Polar bears occur in most ice-covered areas of the Arctic and adjacent coastal lands. Their distribution, although not continuous, overlaps the national boundaries of the United States, Canada, Greenland, Norway and Russia. The worldwide population of polar bears is estimated at 21,000 to 28,000 animals divided among six relatively discrete populations. Parts of two of these populations occur in Alaska: the western Alaska (Chukchi/Bering Seas) population shared with Russia and the northern Alaska (Beaufort Sea) population shared with Canada. The total number of polar bears off Alaska is estimated at 3,000 to 5,000 animals and appears to be stable.

Historically polar bears were taken primarily by Natives for subsistence purposes and for the sale of hides. Beginning late in the 1940s a sport hunt developed which involved trophy hunters using professional guides to hunt animals with the use of aircraft. As a result, hunting pressure on the Alaska polar bear populations increased substantially. Recognizing this, the State of Alaska adopted regulations in 1961 to restrict the sport hunting season and require hunters to present all polar bear skins for tagging and examination. At the same time, preference was provided to subsistence hunters and a prohibition was adopted on shooting cubs and females with cubs. Between 1961 and 1972 in Alaska an average of 260 polar bears was taken annually, 75 percent of which were males. In 1972 the State of Alaska banned hunting with the use of aircraft.

Also in 1972, enactment of the Marine Mammal Protection Act established a moratorium on the take of polar bears and other marine mammals and transferred management responsibility from the states to the Federal Government. Under the Act, Alaska Natives are allowed to take polar bears and other marine mammals for subsistence purposes and for purposes of creating and selling traditional handicrafts and clothing. The Act does not restrict the number of animals that can be taken or prohibit the take of cubs or females with cubs by Alaska Natives, provided the take is not wasteful and the population is not listed as depleted.

Because of the species' circumpolar distribution, efforts to protect and conserve polar bears require the cooperation of all range states. Concern over the dramatic increase in the polar bear harvest levels in the 1950s and 1960s led to negotiation of the international Agreement for the Conservation of Polar Bears. The agreement was concluded in 1973 by the Governments of Canada, Denmark (for Greenland), Norway, the Soviet Union, and the United States.

In 1994 Congress enacted extensive amendments of the Marine Mammal Protection Act, including a number of measures related to polar bears. Among these was a provision that allows for the issuance of permits to import sport-hunted polar bear trophies legally taken by U.S. citizens hunting in Canada. Efforts by the Fish and Wildlife Service to promulgate regulations for imports are discussed in Chapter VI. The 1994 amendments also called on the Secretary of the Interior to initiate two reviews relative to implementation of the 1973 Agreement for the Conservation of Polar Bears. Activities in this regard are discussed in Chapter VI, along with efforts related to other international agreements regarding polar bears. Chapter VI also includes a discussion of ongoing efforts to develop a cooperative U.S.-Russian research and management agreement.

As discussed in Chapter VI, in 1992 the Marine Mammal Commission contracted for a comprehensive legal assessment of steps undertaken by the United States to implement the 1973 polar bear agreement. The contractor's report was submitted in 1993 and distributed to the Fish and Wildlife Service and other interested groups. During 1995 the contract report was updated to take into account the 1994 amendments to the Marine Mammal Protection Act (see Appendix B, Baur 1995).

Polar Bear Conservation Plan

In 1988 Congress amended the Marine Mammal Protection Act to direct the Secretaries of the Interior and Commerce to develop conservation plans for depleted and, when appropriate, non-depleted marine mammal species and populations. In January 1989 the Marine Mammal Commission recommended to the Fish and Wildlife Service that it prepare conservation plans for polar bears, walruses, and sea otters in Alaska. To help in this task, the Commission developed and provided preliminary draft conservation plans for the three species. The preliminary draft conservation plan for polar bears was forwarded to the Service on 28 June 1992.

As discussed in previous annual reports, from 1992 through 1994 the Commission worked closely with the Service to ensure that the polar bear conservation plan accurately identified research and management actions necessary to determine and maintain populations in Alaska within their optimum sustainable population range, as required by the Marine Mammal Protection Act. In September 1994 the Service forwarded to the Commission and others the final conservation plan for the polar bear in Alaska, as well as conservation plans for walruses and sea otters in Alaska. The Service noted that the plans would be reviewed annually and considered for rewriting and updating in three to five years.

Marking, Tagging and Reporting Program

In 1981 the Marine Mammal Protection Act was amended to give the Fish and Wildlife Service and the National Marine Fisheries Service authority to promulgate regulations requiring the marking, tagging, and reporting of marine mammals taken by Alaska Natives. The purpose of the amendments was to obtain better information on the numbers and species of marine mammals taken for subsistence and handicraft purposes and to help control illegal trade in products from those species.

Marking, tagging, and reporting regulations were issued by the Fish and Wildlife Service on 28 June 1988. They require that within 30 days of taking a polar bear, walrus, or sea otter, Native hunters must report the take to the Service and present specified parts of animals, including polar bear hides, to be marked and tagged. Since promulgating its regulations, the Service has worked closely with Native groups and the State of Alaska to implement the marking, tagging, and reporting program. Data obtained from the program are maintained by the Service in a computerized database. During the harvest year running from 1 July 1994 to 30 June 1995, 80 polar bears were presented for marking and

tagging by Alaska Natives. The number of polar bears tagged from 1990 through 1994 were 99, 76, 59, 65, and 120, respectively.

Stock Assessments

As discussed in Chapter IV and elsewhere in this report, the 1994 amendments to the Marine Mammal Protection Act directed the Secretaries of Commerce and the Interior to prepare marine mammal stock assessments of all marine mammal stocks in U.S. waters to serve as the scientific basis for a new regime governing the taking of marine mammals incidental to commercial fisheries. In August 1994 the Fish and Wildlife Service distributed to the Marine Mammal Commission and others draft stock assessments for marine mammal populations under its jurisdiction, including polar bear stocks in the Beaufort Sea and the Chukchi and Bering Seas. The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, reviewed the drafts and, by letter of 1 December 1994, provided comments to the Service. These are discussed in detail in the previous annual report.

On 4 October 1995 the Fish and Wildlife Service published final stock assessments for the two polar bear populations in Alaska. With regard to the Chukchi/Bering Sea stock shared with Russia, the assessment concluded that a reliable estimate of stock size was not possible because of uncertainty of the data. Therefore, a potential biological removal level could not be calculated. However, the assessment concluded that the stock appears to have increased during the past 20 years despite an average subsistence take of 86 bears a year, and currently appears to be increasing slightly or stabilizing at a relatively high level. As a result, the Chukchi/Bering Sea stock was classified as a non-strategic stock.

With respect to the Beaufort Sea polar bear stock shared with Canada, the Service's assessment set a minimum population estimate of 1,579 and a potential biological removal level of 72 bears a year. The annual subsistence take by both U.S. and Canadian Natives is estimated at 63 animals, and the stock appears to be growing at a rate of 2.4 percent. Therefore, the Beaufort Sea stock also was classified as a non-strategic stock.

Habitat Conservation Strategy

Section 101(a)(5) of the Marine Mammal Protection Act directs the Secretaries of the Interior and Commerce to authorize, in certain instances, the unintentional taking of small numbers of marine mammals by U.S. citizens incidental to activities other than commercial fishing operations. As noted in previous annual reports, in 1993 the Fish and Wildlife Service issued regulations to authorize and govern the take of small numbers of polar bears and walruses by U.S. citizens engaged in offshore oil and gas activities in Alaska. In issuing the regulations, the Secretary of the Interior directed the Fish and Wildlife Service to develop and begin implementing a polar bear habitat conservation strategy to further the goals of Article II of the 1973 Agreement on the Conservation of Polar Bears. This is discussed in the small-take section in Chapter XI.

Chapter IV

MARINE MAMMAL–FISHERIES INTERACTIONS

Marine mammals may be disturbed, harassed, injured, or killed either accidentally or deliberately during fishing operations. They also may take or damage bait and fish caught on lines, in traps, and in nets, damage or destroy fishing gear, or injure fishermen trying to remove them from fishing gear. Marine mammals also compete with fishermen for the same fish and shellfish resources. In 1994 the Marine Mammal Protection Act was amended to establish a new regime to govern fisheries-related incidental take. As in the past, however, the incidental take of dolphins in the eastern tropical Pacific tuna fishery continues to be regulated under separate provisions of the Act. Amendments related to the tuna fishery were also considered by Congress in 1995.

Actions taken to implement the new incidental-take regime and to minimize the take of dolphins in the eastern tropical Pacific tuna fishery are discussed below. Also discussed are efforts to assess the causes of recent changes in the structure of the Bering Sea, the Gulf of Alaska, and the Gulf of Maine ecosystems. This chapter also provides information on the establishment of pinniped-fishery interaction task forces, as required under the 1994 amendments. Fishery interactions affecting Hawaiian monk seals, Steller sea lions, harbor seals in Alaska, harbor porpoises, vaquitas, right whales, and sea otters are discussed in Chapter III.

Implementation of the New Incidental-Take Regime for Commercial Fisheries

In 1994 two new sections were added to the Marine Mammal Protection Act to manage the incidental take of marine mammals in commercial fishing operations. New section 117 requires the preparation of stock assessments for all marine mammal stocks in U.S. waters. The purpose of the assessments is to provide a scientific basis for implementing marine mammals take-reduction measures. New section 118 sets forth requirements for a new incidental-take regime that replaced the interim exemption provisions previously in effect. Specific provisions of both sections and efforts to date to implement them are discussed below. (A more complete summary of the incidental-take provisions and other Marine Mammal Protection Act amendments enacted in 1994 can be found in Appendix D of the annual report for 1994.)

Stock Assessments

Section 117 of the Marine Mammal Protection Act as amended in 1994 requires the Secretaries of Commerce and the Interior to establish three regional scientific review groups to help prepare assessments for each marine mammal stock in U.S. waters. These groups were established in 1994 for Alaska, the Pacific Coast, including Hawaii, and the Atlantic Coast, including the Gulf of Mexico. They included experts in marine mammal biology, commercial fishing technology and practices, and Alaska Native subsistence needs. Among other things, the regional groups were to advise the Secretaries on (1) the estimated size, status, and trends of marine mammal stocks, (2) uncertainties and research needs regarding stock separation, abundance, and trends; (3) research on modifications in fishing gear and practices to reduce the incidental mortality and serious injury of marine mammals, and (4) potential impacts of habitat destruction on marine mammals and, for strategic stocks, conservation measures to reduce such impacts.

By 1 August 1994 the Secretary of Commerce and the Secretary of the Interior, depending on the marine mammal species, were to prepare a draft stock assessment for each stock following consultation with the regional review groups. The draft stock assessments were to be made available for a 90-day public com-

ment period. Preparation of draft stock assessments and the Commission's comments on them are discussed in the previous annual report.

Within 90 days of the close of the public comment period on the draft stock assessments, the Secretary was to issue final stock assessments. Each assessment was to (1) describe the geographic range of the stock, (2) provide a minimum population estimate, the stock's current and maximum net productivity rates, and current population trend, including the basis for those findings, (3) estimate the annual human-caused mortality and serious injury, by source, and, for stocks determined to be strategic stocks, describe other factors that may be causing a decline or impeding recovery, (4) describe the commercial fisheries that interact with the stock, including estimates of fishery-specific mortality and serious injury levels and rates, a description of seasonal or area differences in incidental take, and an analysis of whether incidental-take levels are approaching a zero mortality and serious injury rate, (5) assess whether the level of human-caused mortality and serious injury would cause the stock to be reduced below its optimum sustainable population or, alternatively, whether the stock should be categorized as a strategic stock, and (6) estimate the potential biological removal level for the stock.

As defined in the Act, a stock's potential biological removal level is the maximum number of animals, not including natural mortality, that can be removed from the stock while allowing the stock to reach or remain at its optimum sustainable population level. The potential biological removal level is calculated by multiplying three variables — the minimum population estimate for the stock, one-half of the theoretical or estimated maximum net productivity rate of the stock at a small population size, and a recovery factor of between 0.1 and 1.0. Strategic stocks are those that (a) have a level of direct human-caused mortality exceeding the calculated potential biological removal level, (b) are designated as depleted under the Marine Mammal Protection Act, (c) are listed as endangered or threatened under the Endangered Species Act, or (d) are likely to be listed as endangered or threatened in the foreseeable future.

On 25 August 1995 the National Marine Fisheries Service published a notice in the *Federal Register* announcing the availability of the final stock assessments for species under its jurisdiction. The stock assessments were released as three National Oceanic and Atmospheric Administration technical memoranda covering, respectively, stocks occurring in Alaska, the Pacific, and the Atlantic and Gulf of Mexico. The Service also published a separate report describing the guidelines used in preparing the stock assessments and summarizing the information in the assessments.

Assessments were prepared for 34 stocks of cetaceans and pinnipeds along the U.S. Atlantic coast. Sixteen of those were determined to be strategic because the estimated annual mortality incidental to commercial fisheries exceeds the stock's potential biological removal level. As discussed in Chapter III, the Gulf of Maine stock of harbor porpoise is being hit particularly hard by fisheries-related mortality, with incidental mortality in the sink gillnet fishery exceeding the potential biological removal level by more than a factor of four. The Service found the Atlantic drift gillnet fishery for swordfish, shark, and tuna to be primarily responsible for 13 of the stocks being classified as strategic but noted that frequent mortality also occurs in the pair-trawl fishery for swordfish, shark, and tuna, the longline fishery for swordfish, tuna, and billfish, the New England groundfish trawl fishery, and perhaps the mid-water trawl fisheries for mackerel and squid. The Service cautioned, however, that some of the stocks may have been determined to be strategic because of difficulty in differentiating certain species, such as beaked whales and pilot whales. None of the 26 cetacean stocks occurring in the Gulf of Mexico was determined to be a strategic stock due to fisheries-related mortality.

The National Marine Fisheries Service also prepared assessments for 34 cetacean and pinniped stocks off California, Oregon, and Washington. For seven of those stocks, estimated mortality incidental to commercial fisheries exceeds the potential biological removal level. Incidental mortality involving these stocks results almost exclusively from the drift gillnet fishery for swordfish and shark. Of the 20 stocks of marine mammals that occur in Hawaiian waters and the 31 marine mammal stocks under National Marine

Fisheries Service jurisdiction that occur in Alaska, none has an estimated incidental fisheries mortality that exceeds its calculated potential biological removal level.

In addition to those stocks determined to be strategic because of take by commercial fisheries, 21 stocks, primarily large whales, are also considered strategic stocks by virtue of being listed as endangered or threatened under the Endangered Species Act or designated as depleted under the Marine Mammal Protection Act. The only pinniped stocks determined to be strategic are the endangered Hawaiian monk seal, two Alaskan stocks of Steller sea lions and the Guadalupe fur seal, which are listed as threatened, and the Alaskan stock of northern fur seals, which is depleted.

Six other stocks of cetaceans were designated by the National Marine Fisheries Service as strategic stocks even though the estimated annual incidental mortality in fisheries does not exceed potential biological removal levels. The stocks of dwarf sperm whale and pygmy sperm whale that occur in the western North Atlantic and in the northern Gulf of Mexico were designated as strategic because difficulty distinguishing between the two species prevented the Service from calculating separate potential biological removal levels for the stocks and because of suspected mortality from ingesting plastic bags. The Service also designated 33 localized stocks of bottlenose dolphin that inhabit bays, sounds, and estuaries in the Gulf of Mexico as strategic after concluding that the take of a single animal in most of those areas would exceed the stock's potential biological removal level. The Gulf of Mexico stock of short-finned pilot whale was also determined to be a strategic stock because of its low population size and a relatively high mortality level observed in the longline fishery for swordfish, tuna, and billfish compared to the estimated potential biological removal level.

The National Marine Fisheries Service did not calculate a potential biological removal level or make a strategic stock determination for Alaska marine mammals that met three criteria: (1) the stock is not listed as threatened, endangered, or depleted, (2) the stock is subject to taking by Alaska Natives for subsistence purposes but fisheries-related mortality is absent or relatively minor, and (3) the estimated human-caused mortality may not be sustainable on a long-term basis. The Service identified three stocks meeting these criteria — harbor seals in the Gulf of Alaska and the Cook Inlet and Norton Sound stocks of beluga whales. The Service believes that developing co-management agreements with Alaska Natives is the appropriate mechanism to address such removals from these stocks and it intends to calculate potential biological removal levels and make status determinations in the course of developing those agreements.

On 4 October 1995 the Fish and Wildlife Service published assessments for the eight stocks of marine mammals under its jurisdiction. Three stocks, the Florida and Antillean stocks of the endangered West Indian manatee and the threatened California stock of sea otter, were determined to be strategic stocks.

The assessments for strategic stocks are to be reviewed at least annually. For other stocks, assessments must be reviewed at least once every three years. As a first step in the review, the National Marine Fisheries Service plans to re-examine the its guidelines for preparing the initial stock assessments. Among other things, the Service intends to look at the guidelines pertaining to migratory stocks and the appropriateness of recovery factors used for certain stocks.

The New Incidental-Take Regime

Section 118 of the Marine Mammal Protection Act establishes the new regime governing the take of marine mammals incidental to commercial fishing operations. Replacing the interim exemption that had regulated fisheries-related incidental taking since 1988, the new regime became effective on 1 September 1995. Responsibility for the new regime rests with the Secretary of Commerce. The amendments require, however, that the Secretary consult with the Secretary of the Interior before taking any action that affects or relates to marine mammal stocks under jurisdiction of the Department of the Interior — *i.e.*, manatees, dugongs, sea otters, polar bears, and walruses.

Requirements of the Act — The new fisheries regime shares certain elements with the interim

exemption. These similarities include classification of fisheries according to the frequency with which marine mammals are taken, registration requirements for fishermen participating in fisheries that frequently or occasionally take marine mammals, monitoring and reporting requirements, and the goal of reducing incidental mortality and serious injury of marine mammals to insignificant levels approaching zero.

The most significant difference between the interim exemption and the new regime is the greater focus now placed on those stocks most affected by commercial fisheries. As discussed above, the National Marine Fisheries Service and the Fish and Wildlife Service, through preparation of stock assessments, have identified strategic stocks of marine mammals. A take reduction plan is to be developed for each strategic stock that sustains frequent or occasional mortality or serious injury due to fishing operations. Take reduction plans, among other things, are to include recommended regulatory or voluntary measures to reduce incidental mortality and serious injury and to recommend dates for achieving specific objectives. The immediate goal of these plans is to reduce, within six months, incidental mortality and serious injury to levels less than the potential biological removal level calculated in the stock assessment. The long-term goal of the plans is to reduce incidental mortality and serious injury to insignificant levels approaching a zero rate within five years, taking into account the economics of the fishery, existing technology, and applicable state or regional fishery management plans.

Another difference between the interim exemption and the new fisheries regime is in the treatment of species listed as endangered or threatened under the Endangered Species Act. Under the interim exemption, there was no mechanism to authorize the incidental take of listed species. The 1994 amendments added section 101(a)(5)(E) to the Marine Mammal Protection Act to allow incidental taking of listed species under certain circumstances. Before issuing an authorization under this provision, the Service must determine, after notice and opportunity for public comment, that (1) the incidental mortality and serious injury from commercial fisheries will have a negligible impact on the species or stock, (2) a recovery plan has been, or is being, developed, and (3) where required under section 118, a monitoring program has been established, the vessels are registered, and a take reduction plan has been or is being developed. No taking of California sea otters may be authorized under the new provision. Such takings are subject to the requirements of public Law 99-625.

Proposed Implementing Regulations — On 16 June 1995 the National Marine Fisheries Service published proposed regulations to implement the new incidental-take regime. Among other things, the proposal sets forth procedures for vessel owners to register for an authorization certificate, observer and reporting requirements, and proposed criteria for classifying fisheries. Along with these proposed regulations, the Service published proposed changes to the list of fisheries, which classifies each commercial fishery into one of three categories depending on the level of incidental take.

The Marine Mammal Commission commented of the proposed regulations on 15 August 1995. The Commission noted that several provisions of section 118, such as the registration requirement, vary among fisheries depending upon the frequency with which marine mammals are killed or seriously injured. Thus, a key issue is how the Service classifies fisheries under the new regime. The Service proposed a two-tiered system that looks at total fishery-related impacts to each affected marine mammal stock and then at the impacts of each fishery on the stock. If annual mortality and serious injury of an affected stock from all fisheries combined is less than 10 percent of the calculated potential biological removal level or if the number of mortalities or serious injuries resulting from a specific fishery is equal to or less than one percent of the potential biological removal level, the fishery would be placed in category III. A category II fishery would be one that annually takes between 1 and 50 percent of a stock's potential biological removal level and for which the total annual mortality and serious injury level from commercial fisheries exceeds 10 percent of a stock's potential biological removal level. A category I fishery would be one that, by itself, is responsible for the annual mortality or serious injury of 50 percent or more of a stock's potential biological removal level.

The Commission agreed that the system for categorizing fisheries should reflect the impact that a fishery or a combination of fisheries is having on marine mammal stocks. However, the Commission cautioned that the regulations must track the statutory provision, which seems to anticipate that fisheries will be classified based on take rates rather than on absolute numbers of marine mammals taken. The Commission also expressed concern that the rigid, numerically based categorization system proposed by the Service would not provide the flexibility needed to categorize fisheries appropriately in all instances. This would pose particular problems when the potential biological removal level for an affected stock was either very large or relatively small. Depending on the species taken, a fishery could be placed in category I if it took only one or two individuals per year. At the other extreme, a fishery with only a small number of vessels and a limited season could annually take hundreds or even thousands of marine mammals from a large stock and not be placed in category I.

To address these problems, the Commission recommended that the categorization system be made more flexible by looking not only at the number of mortalities and serious injuries relative to a stock's potential biological removal level, but also by including some elements of the categorization system under the interim exemption that consider the number of mortalities and serious injuries per vessel-day. In the Commission's view, looking at overall take rates as well as the impacts to individual stocks would be more in keeping with the statutory criteria for classifying fisheries.

The Commission also noted that the proposed rule did not include a reliable means of estimating fishing effort. The Commission noted that if its recommendation to consider take rates as well as numbers were adopted, and if reliable effort data were not otherwise available, the proposed rule would need to be revised so that the Service could obtain the information necessary to estimate take rates from fishermen's reports and other data-gathering programs under the incidental-take regime. In the Commission's view, reliable effort data also seems necessary in order to extrapolate the total number of mortalities and serious injuries in a fishery from take rates observed in its monitoring program even if the selected categorization option is based entirely on the number of marine mammals killed and seriously injured in a fishery. The Commission therefore recommended that the Service explain in the final rule how it will obtain reliable effort data for the covered fisheries.

The Commission also questioned the proposed demarcation between category I and category II fisheries (50 percent of a stock's potential biological removal level). The analysis of the various alternatives in the proposed rule and the accompanying environmental assessment considered only the number of fisheries that would be placed in each category under each alternative, not the possible impacts to marine mammal stocks under the various options. Thus, it was not possible to determine the relative advantages and disadvantages of the various alternatives. Absent such an analysis and a more thorough rationale for adopting the 50 percent threshold, the Commission suggested that a more conservative break point be adopted.

Another potential problem identified by the Commission was how fisheries would be defined. Because the proposed classification system looked at the number of marine mammals taken relative to the potential biological removal level for a stock rather than the rate of taking, a fishery could be downgraded merely by subdividing it into two or more fisheries. That is, a category I fishery could be downgraded simply by redefining it into two or more category II fisheries. The Commission therefore cautioned that the classification of fisheries should be based on an objective and logical system that looks at the target species, gear type, affected marine mammal stocks, and the region involved. The effect on marine mammal stocks should be the guiding principle, not other non-biological criteria.

The Service proposed excluding any intentional lethal taking when classifying fisheries, inasmuch as such taking is prohibited by the 1994 amendments. The Commission agreed with this proposal but recommended that, where exclusion of previously documented levels of intentional lethal taking resulted in placing a fishery in a lower category than under the interim exemption, the Service should monitor the fishery sufficiently to detect and respond to any illegal intentional taking until such time as there is justifica-

tion for concluding that little, if any, illegal taking is occurring.

Under the interim exemption, fisheries were classified based on all incidental take of marine mammals, including animals that were harassed, caught, and released unharmed and animals that were entangled and able to free themselves. In contrast, under section 118, only the frequency of incidental mortality and serious injury is considered. Recognizing that it may be imprudent to allow individual fishermen to determine which marine mammal injuries are or are not serious, Congress adopted provisions requiring fishermen to report all mortalities and injuries, leaving it to the Service to determine which injuries are serious. The requirement that fishermen report all injuries was accurately reflected in the proposed rule. Missing, however, was discussion of how the Service would determine whether a reported injury was serious. The Commission noted that distinguishing between serious and other injuries is important, not only for classification purposes but for determining whether a stock's potential biological removal level has been exceeded. The Commission therefore recommended that the Service either expand the reporting provisions to require the submission of information sufficient to enable it to determine whether an injury is serious or otherwise adopt a mechanism (*e.g.*, generic or fishery-specific formulae) to determine what proportion of reported injuries will be considered to be serious.

The Service proposed to exclude treaty Indian tribes from coverage under section 118. Tribal fisheries would not be included in the list of fisheries, and participants in those fisheries would not be required to register, report mortalities and serious injuries, or comply with take reduction plans.

The Commission expressed the view that this proposal, at least in part, was based on a misinterpretation of the 1994 amendments. While the Commission generally concurred with the Service's determination that the Marine Mammal Protection Act does not provide clear evidence that Congress "intended to abrogate the [Makah] Tribe's treaty right of sealing at usual and accustomed grounds and stations," the Commission suggested that additional analyses were needed before excluding tribal fisheries from the incidental-take regime. Noting that the Service believed treaty tribes to be subject to the provisions of the interim exemption, and that the intent of the 1994 amendments was to preserve the *status quo*, the Commission maintained that a clear explanation was needed as to why the Service does not believe section 118 to be similarly applicable.

The Commission also noted the unique features of the 1855 treaty between the United States and the Makah. It is the only such treaty that explicitly recognizes the "right of taking fish and of whaling or sealing at usual and accustomed grounds and stations...." As such, the Commission suggested that the Service explain why findings based on that treaty were considered to be generally applicable to other tribes.

By proposing to exclude tribal fisheries from all provisions of section 118, the Service would make it difficult to administer the incidental-take regime with respect to non-Indian fishermen that take marine mammals from the same stocks. Unless there is some mechanism to determine the species and numbers of marine mammals taken by tribal fisheries, the Service will be unable to determine whether the total take from the affected stocks exceeds potential biological removal levels. In cases where there is any doubt, the precautionary principle built into the Marine Mammal Protection Act could preclude the Service from allowing other fisheries to take any marine mammals from those stocks. Therefore, the Commission recommended that, if the Service concludes that tribal fisheries are exempt from all requirements of section 118, including the reporting and monitoring provisions, the Service pursue cooperative agreements with tribal representatives to obtain reliable incidental-take data from those fisheries so as to be able to regulate incidental take in other fisheries.

A key feature of the new incidental-take regime is a directive that incidental mortality and serious injury of marine mammals resulting from commercial fishing operations be reduced to insignificant levels approaching a zero mortality and serious injury rate by 2001. The proposed rule explained that this "zero mortality rate goal" will have been achieved when "total incidental mortality and serious injury from fisheries has no biological impact." The Service proposed that the zero mortality rate goal be considered to have

been met when fisheries collectively are responsible for killing or seriously injuring no more than 10 percent of a marine mammal stock's potential biological removal level.

The Commission pointed out that, at least conceptually, removals from a marine mammal stock would have an insignificant biological impact if they are at or below the stock's potential biological removal level. Thus, it was not entirely clear how the Service determined that biological insignificance would be achieved at 10 percent of potential biological removal levels. To clarify the issue, the Commission suggested a two-part analysis looking initially at the requirement that mortalities and serious injuries be reduced to insignificant levels and secondly at the requirement that the rate of incidental mortality and serious injury approach zero. Under this approach, the Service could assert that a take rate would have approached zero when it is 10 percent or less of a stock's potential biological removal level. The Commission noted, however, that for stocks with a large potential biological removal level, it may be difficult to find that the take rate is approaching zero when the 10 percent threshold has been achieved. Thus, the Commission suggested that the Service consider adopting a tiered approach that establishes lower thresholds (*e.g.*, 5 percent or 1 percent) for different ranges of potential biological removal levels.

The Commission also noted that merely looking at the numbers of marine mammals killed or seriously injured may be inadequate to determine if the zero mortality rate goal has been achieved. It is also important to consider the significance of those animals to the population. The Commission noted, for example, that removals consisting mostly or entirely of reproductive females may not be insignificant to the population, even at the proposed 10 percent threshold. The Commission therefore recommended that the Service consider ways in which it can tailor its monitoring and reporting programs to obtain data on the age, sex, and reproductive condition, as well as the numbers of marine mammals that are killed or injured incidental to commercial fishing operations.

The discussion accompanying the proposed rule created the false impression that participating in a category I or category II fishery without registering would not constitute a violation of the Marine Mammal Protection Act so long as no taking of a marine mammal resulted. The Commission suggested language to clarify that it is unlawful to engage in a category I or II fishery without obtaining and maintaining a current authorization.

Section 101(a)(5)(E) of the Marine Mammal Protection Act directs the Service to authorize, for a period of up to three years, the incidental taking of endangered and threatened marine mammals if, after notice and opportunity for public comment, the Service determines that (1) the incidental mortality and serious injury from commercial fisheries will have a negligible impact on the species or stock, (2) a recovery plan has been or is being developed, and (3) where required under section 118, a monitoring program has been established, vessels in such fisheries have registered, and a take reduction plan has been or is being developed. The Service stated that the proposed list of fisheries identified those fisheries having interactions with listed species and that the associated environmental assessment provided the data necessary to make negligible impact determinations. The Service therefore solicited public comment on proposed findings for listed species.

The Commission expressed concern that it and others had not been given a reasonable opportunity to comment on the Service's proposed determinations regarding the take of endangered and threatened species. The Commission noted that it was not clear whether all of the necessary information to make the findings had been provided. In addition, the information that was provided was not presented in a way to facilitate informed comment. More importantly, the Service had not explained its rationale for believing that such takes would have a negligible impact. The Commission therefore recommended that, before authorizing the take of endangered or threatened marine mammals incidental to commercial fishing operations, the Service publish for public review and comment a separate *Federal Register* notice clearly describing the stocks and fisheries for which it proposed to make negligibility findings and clearly explaining the basis for the proposed determinations.

Based on the information provided by the Service, the Commission made some general observations with

respect to authorizing the take of listed species. For some highly endangered species — *e.g.*, right whales, Hawaiian monk seals, and manatees — the Commission expressed the view that no level of mortality or serious injury likely could be considered negligible. Thus, it would be difficult to make a negligible impact determination for such species in the face of any fishery-related mortality or serious injury. The Commission noted that it also would be difficult to make a negligible impact determination for Steller sea lions, which continue to decline despite considerable reductions in taking incidental to commercial fisheries. With respect to the western North Atlantic stock of humpback whale, the Commission noted that the Service identified 13 different Atlantic fisheries that interact with the stock. Therefore, the Commission suggested that the Service examine the cumulative impacts of these fisheries before concluding that mortalities and serious injuries from these fisheries are negligible. With respect to the California-Washington stock of sperm whale, the Commission noted that the environmental assessment prepared by the Service concluded that the drift gillnet fishery for thresher shark, swordfish, and blue shark takes 15 times the potential biological removal level calculated for that stock. Absent further information on the nature of the take or other justification, the Commission believed that it would be difficult for the Service to conclude that this take is negligible.

The Commission also offered several drafting suggestions to clarify various provisions of the proposed rule. The Commission did not suggest any changes to the proposed list of fisheries.

Final Implementing Regulations — The National Marine Fisheries Service published a final rule implementing section 118 on 30 August 1995. To meet the statutorily imposed deadline, that rule became effective on 1 September. Some, but not all, of the Commission's recommendations were adopted.

For instance, the Service did not incorporate any of the suggested changes to the proposed criteria for classifying fisheries. The Service declined to adopt an approach that considered incidental take rates rather than absolute numbers of marine mammals killed or seriously injured because of its mandate under the 1994 amendments to focus limited agency resources on those fisheries that have biologically significant levels of take. Also, the Service indicated that it did not have the capability to collect the requisite effort data for determining take rates.

The Service also dismissed the risk that a fishery would be downlisted as a result of splitting it into multiple fisheries. While acknowledging that some category I fisheries could be split into two or more category II fisheries, the Service noted that this would have only minimal practical effect — vessels participating in either category of fishery must register, carry observers as requested, and comply with take reduction plans. The Service believed it unlikely that any fishery could be placed in category III by splitting a category I or II fishery.

As to how it will determine whether reported injuries are "serious," the Service stated that it was developing guidelines for making such determinations. As noted in its final rule, the Service will require vessel owners to describe the nature of the injury on the reporting form. It expects to use that information to judge which injuries are serious on a fishery-by-fishery and case-by-case basis.

As under the proposed rule, the final rule excludes treaty Indian tribes from coverage under the incidental-take regime. Indians covered by such treaties who fish in their usual and accustomed fishing grounds need not register or comply with any other provision of the regulations. As to the potential effect that such an exclusion may have on other fishermen, the Service noted that it had in place or was working on establishing cooperative arrangements with the tribes to secure data on marine mammal-fishery interactions.

Despite a clear statement in section 118(c)(3)(C) of the Marine Mammal Protection Act that it is in violation of the Act to engage in a category I or II fishery without obtaining and maintaining a current incidental-take authorization, the Service declined to incorporate this requirement as a prohibition in the final rule. Instead, the Service opted to include a regulatory requirement that fishermen participating in such fisheries "must register for and receive an authorization certificate." Presumably fishing in a category I or category II fishery without such a certificate would constitute a violation of the regulations.

Take of Endangered and Threatened Species — The Service agreed with the Commission that the information provided in the proposed rule and accompanying environmental assessment was insufficient to promote informed comment on the proposed findings for endangered and threatened species. Therefore, the Service indicated that it would publish a separate notice that lists those fisheries that meet the criteria for such incidental-take authorizations and explains the process by which negligible impact determinations have been made.

On 31 August 1995 the Service published a notice in the *Federal Register* announcing negligibility findings under section 101(a)(5)(E) of the Marine Mammal Protection Act for three stocks of listed marine mammals — the central North Pacific stock of humpback whale and the eastern and western stocks of Steller sea lion. Based on these findings, the Service issued an interim permit authorizing the taking of marine mammals from these stocks incidental to 22 commercial fisheries in Alaska and 2 along the west coast. This authorization, originally set to expire at the end of 1995, was extended until 1 March 1996 to coincide with the effective date of the new list of fisheries.

The Service also noted that it was unable to make negligible impact findings for seven other stocks of endangered marine mammals known to interact with commercial fisheries — the western North Atlantic stocks of right, fin, sperm, and humpback whales, the eastern North Pacific stocks of sperm and humpback whales, and the Hawaiian monk seal. For 15 other stocks of endangered or threatened marine mammals, the Service noted that it had no documented evidence of fishery-related interactions.

List of Fisheries — The Service published its final list of fisheries for 1996 on 28 December 1995. Because it had taken longer than expected to complete the list, the Service announced that the 1995 list would remain in effect until 1 March 1996. This extension will allow fishermen in reclassified fisheries time to register for an authorization under the new section 118 requirements.

Under the revised list of fisheries, two Pacific and four Atlantic fisheries are placed in category I. Category II includes 16 Pacific fisheries, primarily in Alaska, and 6 Atlantic fisheries. The remaining fisheries all have been placed in category III.

Take Reduction Teams — As noted above, section 118 requires the National Marine Fisheries Service to develop a take reduction plan for each strategic stock that interacts with a fishery that frequently or occasionally kills or seriously injures marine mammals. Take reduction plans, among other things, are to include recommended regulatory or voluntary measures designed to reduce incidental mortality and serious injury and recommended dates for achieving specific objectives. The immediate goal of a take reduction plan for a strategic stock is to reduce, within six months, incidental mortality and serious injury to levels less than the potential biological removal level calculated in the stock assessment. The long-term goal of the plan is to reduce incidental mortality and serious injury to insignificant levels approaching a zero rate within five years, taking into account the economics of the fishery, existing technology, and applicable state or regional fishery management plans.

As a first step toward preparing take reduction plans, the Service contracted for a study to examine how best to undertake the process. A report provided to the Service in April 1995 proposed a model for convening take reduction teams and specifically considered the establishment of teams for the Gulf of Maine/Bay of Fundy stock of harbor porpoise and the Atlantic coastal stock of bottlenose dolphin.

Although required to establish take reduction teams for certain strategic stocks within 30 days of completing the final stock assessments (*i.e.*, by 25 September 1995), no team was established during 1995. However, the Service expects to establish four take reduction teams early in 1996. The teams would address the incidental take of Gulf of Maine/Bay of Fundy harbor porpoise, offshore cetaceans taken in Pacific gillnet fisheries, offshore small cetaceans taken in Atlantic gillnet fisheries, and Atlantic baleen whales, focusing on right and humpback whales. The Service has decided to defer the establishment of take reduction teams for the Atlantic coastal stock of bottlenose dolphin and for marine mammals in Alaska, in part because of insufficient funding.

Reporting Forms — Section 118(e) requires each owner or operator of a commercial fishing vessel to report all incidental mortality and injury of marine mammals within 48 hours of the end of the fishing trip on which the incident occurred. The reports are to be submitted on a standard form to be developed by the National Marine Fisheries Service. On 28 September 1995 the Service published its draft reporting form for public review and comment.

By letter of 12 December 1995, the Commission provided comments on the form. In general, the Commission believed the proposed form accurately reflected the reporting requirements set forth in the Act. The Commission did, however, suggest several technical changes to make the form easier to understand and use. The Service expects to have the final form available to fishermen early in 1996.

Intentional Taking — As discussed in the previous annual report, section 118 of the Act also established a prohibition on the intentional lethal take of marine mammals in commercial fishing operations. The only exception to this prohibition is set forth in new section 101(c), which allows lethal taking if imminently necessary in self-defense or to save the life of another person in immediate danger. The National Marine Fisheries Service determined that there was no reason to delay implementation of the lethal-take prohibition pending the development of implementing regulations for other provisions of section 118. Therefore, on 8 December 1994 the Service published a proposed rule to amend the regulations promulgated under the interim exemption to prohibit intentional lethal taking except in self-defense or defense of others. A final rule instituting the prohibition was published on 1 February 1995.

Deterrence Regulations

While not restricted to commercial fisheries, a related provision of the Marine Mammal Protection Act, section 101(a)(4), authorizes the taking of marine mammals for deterrence purposes in certain instances. Under this exception, an owner of fishing gear or catch or an employee of the owner may deter a marine mammal from damaging the gear or catch. Similarly, an owner of other private property or the owner's agent may take steps to deter a marine mammal from damaging that property. Also, deterrence actions may be taken by any person to prevent a marine mammal from endangering personal safety or by a government employee to prevent damage to public property. In each case, such measures are authorized only if death or serious injury does not result.

The statutory provision directs the National Marine Fisheries Service to publish in the *Federal Register* a list of guidelines for use in safely deterring marine mammals. In the case of marine mammals listed as endangered or threatened, the Service is to recommend specific measures that can be used to deter the animals non-lethally. If the Service determines that certain types of deterrence measures have a significant adverse effect, it may prohibit their use.

The National Marine Fisheries Service published proposed regulations under this provision on 5 May 1995. The Service offered guidance on passive, preventative, and reactive measures that could be taken to deter marine mammals. The Service set forth four general principles regarding acceptable deterrence measures. In addition to the statutory directive that such measures not result in the death or serious injury of the animal, the measures should not (1) result in the separation of a female marine mammal from its unweaned offspring, (2) break the skin of a marine mammal, (3) be directed at a marine mammal's head or eyes, or (4) be used to deter pinnipeds hauled out on unimproved private property.

In addition, the Service proposed to prohibit certain types of deterrence activities. Under the proposed regulations, the following deterrence measures would be prohibited: the use of any firearm or other devise to propel an object that could injure a marine mammal, the use of any explosive device to deter cetaceans or the use of explosives more powerful than seal bombs to deter seals or sea lions, translocation of any marine mammal, or the use of tainted food or bait or any other substance intended for consumption by the marine mammal.

As noted by the Service in the proposed rule, deterrence of marine mammals listed as endangered or threatened under the Endangered Species Act would not be authorized by the proposed regulations.

Measures for deterring listed species are to be the subject of a separate rulemaking.

The Marine Mammal Commission commented on the proposed guidelines and regulations by letter of 30 August 1995. The Commission noted that, for the most part, the proposed rule accurately reflected the provisions of section 101(a)(4). However, the Commission believed that the regulations did little to clarify some of the uncertainties inherent in the statute. For example, the regulations did not explain how imminent the perceived damage to fishing gear or catch or private property must be before deterrence actions could be taken. Similarly, there was no discussion as to how severe the damage to property must be before deterrence measures could be taken.

The Commission also noted that the proposed rule did not appear to give consideration to well-established haul-out or rookery sites. Under the proposed rule, it would appear that a property owner could construct a structure at such a site, knowing full well that the area is frequented by marine mammals, and then use deterrence measures to prevent the mammals from returning to the area or to deter the animals from approaching and damaging the structure. The Commission suggested that adequate protection to important marine mammal habitat be provided to prevent conflicts between marine mammals and property owners. Also, the Commission suggested that the rule consider the potential adverse effects that driving marine mammals away from haul-out sites and rookeries could have on populations (*e.g.*, decreased survival or productivity) even if there were no direct mortality or serious injury of a marine mammal.

The Commission expressed concern about the unrestricted use of noisemakers as deterrence measures. Without any specifications as to the types and intensities of noises that may be used, the Commission was unable to agree that noisemakers, in all cases, would be a safe means of deterring marine mammals. The Commission also expressed concern that certain types of noises might have significant adverse effects on marine mammals by causing them to abandon important habitats.

The Commission agreed that the use of explosives to deter cetaceans is not warranted. However, the Commission questioned the Service's proposal to allow the unrestricted use of certain types of explosives for deterring pinnipeds. The Commission noted the possibility that such "light" explosives may cause injury if detonated close to a marine mammal or if they blast sand or other particles into a marine mammal's eyes. The Commission therefore suggested that the Service consider prohibiting their use entirely. Alternatively, the Commission suggested that the Service consider setting a distance limit for using seal bombs and prohibiting their use on land.

As of the end of 1995 a final rule was undergoing review within the National Marine Fisheries Service. Publication of a final rule is expected early in 1996. The Fish and Wildlife Service has yet to publish guidelines or proposed regulations with respect to deterrence of marine mammals under its jurisdiction.

The Tuna-Dolphin Issue

For reasons not fully understood, schools of large yellowfin tuna (those greater than 25 kilograms) tend to associate with dolphin schools in the eastern tropical Pacific Ocean. This area covers more than five million square miles stretching from southern California to Chile and westward to Hawaii. Late in the 1950s U.S. fishermen began to exploit this association by deploying large purse seine nets around observed dolphin schools to catch the tuna swimming below. Despite efforts by the fishermen to release the encircled dolphins, some become trapped in the nets and drown. Efforts to reduce the incidental mortality of dolphins in this fishery have been a primary focus of the Marine Mammal Protection Act since it was enacted in 1972.

Background

The eastern tropical Pacific tuna fishery was dominated by U.S. vessels during the 1960s and early 1970s. In the late 1970s and early 1980s the U.S. fleet declined and the number of foreign vessels participating in the fishery grew. Along with these shifts in the fishery came changes in the associated dolphin mortality. As reflected by mortality data presented in Table 9, progress made by the United

States in reducing dolphin mortality under the Marine Mammal Protection Act was offset by increasing mortality from foreign operations. This prompted Congress to amend the Marine Mammal Protection Act in 1984 and again in 1988 to establish comparability requirements for nations seeking to export tuna to the United States. In an effort to reduce dolphin mortality further, provisions were also added to the general permit under which U.S. tuna fishermen operate.

Table 9. Estimated incidental kill of dolphins in the tuna purse seine fishery in the eastern tropical Pacific Ocean, 1972-1995[1]

Year	U.S. Vessels	Non-U.S. Vessels
1972	368,600	55,078
1973	206,697	58,276
1974	147,437	27,245
1975	166,645	27,812
1976	108,740	19,482
1977	25,452	25,901
1978	19,366	11,147
1979	17,938	3,488
1980	15,305	16,665
1981	18,780	17,199
1982	23,267	5,837
1983	8,513	4,980
1984	17,732	22,980
1985	19,205	39,642
1986	20,692	112,482
1987	13,992	85,185
1988	19,712	61,881
1989	12,643	84,403
1990	5,083	47,448
1991	1,002	26,290
1992	439	15,111
1993	115	3,601
1994	106	4,095
1995	0	3,274[2]

[1] These estimates, based on kill per set and fishing effort data, are provided by the National Marine Fisheries Service and the Inter-American Tropical Tuna Commission. They include some, but not all, seriously injured animals released alive.
[2] Preliminary estimate.

As shown in Table 10, the requirements enacted in 1988 and the threat of tuna embargoes resulted in substantially reduced dolphin mortality by foreign fleets. There has been more than a 95 percent reduction in dolphin mortality since 1988 and 1989. While there has been some decline in the number of sets made on dolphins in recent years, reduced mortality has, by and large, been the result of drastic reductions in the average number of dolphins killed per set. While the number of dolphin sets per year has declined by about 30 percent over the past eight years, dolphin mortality per set is only one-twentieth of what it was in 1988. These factors led to record low dolphin mortality in 1995.

Subsequent to enactment of the 1988 amendments, some environmental organizations began to push for a consumer boycott of tuna caught by encircling dolphins. In response, the three largest U.S. tuna canners announced in April 1990 that they would no longer purchase tuna caught in association with dolphins. This announcement led to further shifts in the eastern tropical Pacific tuna fishery as more U.S. vessels relocated to the western Pacific. It also prompted Congress to pass the Dolphin Protection Consumer Information Act, which set standards for labeling tuna as being "dolphin-safe."

Efforts to reduce dolphin mortality began to take on a more international flavor beginning in 1990. At a special meeting of the Inter-American Tropical Tuna Commission, participants from all nations with a significant interest in the eastern tropical Pacific tuna fishery, whether or not members of the Commission, met and adopted a resolution calling for an expanded dolphin conservation program. The program was to include limits on dolphin mortality, 100 percent observer coverage, research to improve fishing gear and techniques and to investigate possible alternative fishing methods that might eliminate dolphin mortality, and a training program to improve operator performance throughout the international fleet.

Also in 1990 Mexico challenged the imposition of an embargo of its tuna under the Marine Mammal Protection Act as being inconsistent with U.S. obligations under the General Agreement on Tariffs and Trade (GATT). As discussed in previous annual reports, the dispute resolution panel found the unilat-

erally imposed U.S. embargo provisions to be inconsistent with the Agreement. The panel suggested, however, that such trade sanctions may be permissible if designed to ensure compliance with a multilateral agreement. It should be noted that the panel decision and a decision in a related challenge of the Marine Mammal Protection Act intermediary nation embargo provisions have yet to be formally adopted by the GATT Council.

An international agreement was concluded among the eastern tropical Pacific fishing nations at a special meeting of the Inter-American Tropical Tuna Commission in 1992. This non-binding agreement, called the "La Jolla Agreement" after the site of the negotiations, established the International Dolphin Conservation Program (IDCP) under the auspices of the Tuna Commission. The specifics of the agreement and actions taken to implement it are discussed below.

The Marine Mammal Protection Act's tuna-dolphin provisions were amended further by the International Dolphin Conservation Act of 1992. The amendments focused on ways to eliminate, rather than merely reduce, incidental dolphin mortality and established a framework for a global moratorium on the practice of setting on dolphins to catch tuna. Although no fishing nation agreed to the moratorium and certain provisions of the Act never went into effect, other provisions were not contingent on concluding a moratorium agreement. Significant changes included (1) revising the quotas applicable to the U.S. fleet, (2) modifying the American Tunaboat Association's general permit to proscribe setting on eastern spinner or coastal spotted dolphins, and (3) prohibiting effective 1 June 1994 the sale, purchase, transport, or shipment in the United States of any tuna that is not dolphin-safe. As discussed in the previous annual report, a U.S. district court also ruled in 1994 that the general permit did not authorize U.S. fishermen to encircle any dolphins from a depleted stock, including the northeastern offshore spotted dolphin, which was declared depleted in 1993.

Prohibited from making sets on three of the ten stocks of eastern tropical Pacific dolphins, faced with a quota of 105 dolphins, and foreclosed from marketing in the United States any tuna caught by setting on dolphins, none of the five U.S. vessels remaining in the eastern tropical Pacific fishery initially requested a dolphin mortality quota for 1995 under the international program. Although the five vessels each requested and received a quota for the second half of 1995, no sets on dolphins were made and no dolphins were killed by the U.S. fleet in 1995.

1992 La Jolla Agreement

As noted above, the governments of all nations participating in the eastern tropical Pacific tuna fishery adopted the La Jolla Agreement at a special meeting of the Inter-American Tropical Tuna Commission in 1992. The countries resolved to establish a multilateral program to reduce incidental dolphin mortality in the eastern tropical Pacific to levels approaching zero by setting annual limits. The annual limits on total incidental dolphin mortality established by that resolution were 19,500 in 1993, 15,500 in 1994, 12,000 in 1995, 9,000 in 1996, 7,500 in 1997, 6,500 in 1998, and less than 5,000 in 1999. Other aspects of the program adopted under the resolution were (1) the continuation of the international observer program with the additional requirement that at least 50 percent of the observers deployed by a nation each year be placed by the Tuna Commission; (2) the establishment of a review panel to monitor compliance by the international fleet with the annual dolphin mortality limits; (3) expansion of the existing research and education programs, including an increase in efforts to find methods of catching large yellowfin tuna that do not involve encircling dolphins; and (4) establishment of a scientific advisory board to assist the Tuna Commission in efforts to coordinate, facilitate, and guide research directed at reducing dolphin mortality.

The parties subsequently agreed to a system whereby each vessel participating in the fishery would be given an individual dolphin mortality limit. Under that agreement, any vessel that leaves the fishery or that does not use any of its quota by 1 June forfeits its quota for the remainder of the year. Unused quotas may be allocated to other vessels for the second half of the year. Any vessel that exceeds its dolphin limit will have the amount of the excess deducted from its limit for the following year.

Table 10. Estimated U.S. and foreign dolphin mortality, kills per set, sets on dolphins, and percent observer coverage, 1988-1995[1]

	1988	1989	1990	1991	1992	1993	1994	1995[2]
Dolphin Mortality								
U.S.	19,712	12,643	5,083	1,002	439	115	106	0
Foreign	61,881	85,403	47,448	26,290	15,111	3,487	3,990	3,274
Total[3]	78,927	96,979	52,531	27,292	15,539	3,601	4,096	3,274
Kills per Set								
U.S.	5.28	3.60	2.75	2.49	0.66	0.58	2.12	0
Foreign	9.17	9.34	5.41	2.90	1.56	0.52	0.51	0.46
Combined	7.51	7.71	4.97	2.88	1.50	0.52	0.52	0.46
Sets on Dolphins								
U.S.	3,766	3,435	1,801	430	654	201	50	0
Foreign	6,749	9,145	8,770	9,052	9,672	6,752	7,754	7,185
Total	10,515	12,580	10,571	9,482	10,326	6,953	7,804	7,185
Observer Coverage[4]								
U.S.	53.2%	99.0%	100.0%	100.0%	100.0%	97.3%	100.0%	100.0%
Foreign	35.3%	35.5%	40.1%	56.4%	97.3%	100.0%	99.8%	100.0%
Combined	38.2%	49.2%	49.0%	61.9%	98.1%	99.8%	99.8%	100.0%
Number of Vessels[5]								
U.S.	39	29	28	13	8	8	6	5
Foreign	93	93	95	91	88	89	93	95
Combined	132	122	123	104	96	97	99	100

1 Data provided by the National Marine Fisheries Service and the Inter-American Tropical Tuna Commission.
2 1995 figures for the foreign fleet are preliminary estimates.
3 Estimates of total and foreign dolphin mortality are provided by the Inter-American Tropical Tuna Commission. It and the National Marine Fisheries Service use different methodologies to estimate dolphin mortalities and, as a result, estimated total mortality may not equal the sum of the estimated mortalities for the U.S. and foreign fleets.
4 Observer coverage levels are given for the percentage of trips observed. Figures provided include observers placed under the United States, the Inter-American Tropical Tuna Commission, and the Mexican national observer programs.
5 Includes all purse seine vessels with a carrying capacity of 400 short tons or greater.

The parties adopted resolutions in 1993 and 1994 to modify the overall dolphin mortality limits for 1994 and 1995, respectively. The limit was reduced to 9,300 for each year. In 1994, 73 vessels, including three from the United States, received individual dolphin mortality limits. For 1995, 81 vessels requested individual dolphin mortality limits. Of these, 42 vessels were from Mexico, 19 from Venezuela, 13 from Vanuatu, 6 from Colombia, and 1 from Panama. As stated above, five U.S. vessels requested dolphin mortality limits for the second half of 1995 but did not make any sets on dolphins.

Under the schedule adopted in 1992, the dolphin mortality quota for 1996 is 9,000. There has been no agreement to reduce the quota further even though it is more than twice the mortality levels achieved each of the past three years.

As noted above, the 1992 La Jolla Agreement called for expansion of existing research and education programs and establishment of a scientific advisory board to assist the Tuna Commission. Due to a lack of funds, however, the scientific advisory board has met only once since its establishment. Nevertheless, the Inter-American Tropical Tuna Commission has continued to pursue research into improved and alternative fishing methods.

During 1995, the Tuna Commission continued to study the feeding habits of dolphins, tuna, and other large pelagic predators in an attempt to determine why these species associate in the eastern tropical Pacific and under what circumstances large yellowfin tuna might be found without dolphins. Preliminary analyses indicate that yellowfin tuna feed primarily during the day while spotted and spinner dolphins are mainly nocturnal or twilight feeders. The study suggests that feeding habits may contribute to the formation of the tuna-dolphin association, but they are probably not the major factor.

The National Marine Fisheries Service has also continued its research program to develop dolphin-safe fishing techniques. As discussed in the previous annual report, the Service held a workshop in March 1994 to consider the direction this program should take. During 1995 three of the highest priority projects identified by workshop participants were completed. These studies looked at alternative ways of locating large yellowfin tuna, including acoustic, optical, and radar detection. The studies identified acoustic systems (sonar) as the most promising option for long-range detection of large yellowfin tuna not associated with dolphins. Based on these results, the Service plans to conduct additional research on acoustic detection devices in 1996, including an examination of the potential physiological effects of these devices on tuna and dolphins.

At the 13-15 June 1995 meeting of the Inter-American Tropical Tuna Commission, six parties to the La Jolla Agreement issued a joint statement urging the United States to lift the primary and intermediary tuna embargoes currently in effect. Those nations — Colombia, Costa Rica, Ecuador, Mexico, Panama, and Venezuela — reiterated their commitment to conserve the living marine resources of the eastern tropical Pacific and to abide by the provisions of the La Jolla Agreement. The statement expressed the view that increased use of dolphin-safe fishing methods would harm biodiversity by increasing the discard of juvenile tuna and the bycatch of non-target species.

The nations therefore endorsed fishing for tuna by setting on dolphins as the most effective method for protecting the tuna stocks and other resources of the eastern tropical Pacific. The six nations alleged that U.S. embargoes of tuna that is not dolphin-safe are contrary to international law, lack a scientific basis, are counterproductive to broader conservation goals, and are incompatible with the United States signing the La Jolla Agreement. Expressing concern that the current situation endangers the continued viability of the La Jolla Agreement, the tuna fishing nations called on the United States to allow importation of tuna caught in association with dolphin and to redefine the term dolphin-safe to include all tuna caught in compliance with the regulatory measures adopted pursuant to the La Jolla Agreement.

Oversight Hearing

Since 1992 the signatories of the La Jolla Agreement have operated under its provisions. As noted above, some nations have considered withdrawing from the agreement because, despite significant reductions in dolphin mortality, the United States

continues to embargo tuna harvested by their fleets. Dissatisfaction with existing law has also been expressed by some U.S. tuna fishermen, who have been all but eliminated from the eastern tropical Pacific purse seine fishery. These concerns prompted the Subcommittee on Fisheries, Wildlife, and Oceans of the House of Representatives Committee on Resources to convene an oversight hearing on 21 June 1995 on the tuna-dolphin issue with particular emphasis on the provisions of the International Dolphin Conservation Act. Participants at the hearing included representatives of the Department of State, the Inter-American Tropical Tuna Commission, the American Tunaboat Owners Coalition, the National Fisheries Institute, Earth Island Institute, and the Center for Marine Conservation.

The State Department expressed its view that the threat and imposition of U.S. trade embargoes under the Marine Mammal Protection Act were useful tools in reducing dolphin mortality and bringing about negotiation of a responsible international dolphin protection program under the auspices of the Inter-American Tropical Tuna Commission. The State Department noted, however, that the factual underpinning for the embargoes no longer existed and that participants in the international program remain subject to embargoes with no prospect for relief. The Department witness also expressed concern that tuna fishing nations were re-evaluating their participation in the international program, placing its future in jeopardy.

Based on these views, the State Department advocated amending the Marine Mammal Protection Act to conform to the Inter-American Tropical Tuna Commission standards. That is, a nation that participated effectively in the international program would no longer be subject to a U.S. embargo of its tuna and tuna products. The Department of State believed that such an amendment would preserve the progress made to date in reducing dolphin mortality and would ensure further progress under the La Jolla Agreement.

The Department of State also advocated amending the Act to allow U.S. fishermen to participate in the eastern tropical Pacific tuna fishery on an equal footing with foreign fishermen. The Department noted that allowing U.S. fishermen to fish in accordance with the terms of the La Jolla Agreement would not result in an increase in overall dolphin mortality but would merely reallocate the existing quota. The Department also noted the need to amend U.S. law to allow a U.S. citizen to serve as the captain or a crew member on a foreign purse seine vessel so as to provide the expertise needed to further the goal of reducing dolphin mortality throughout the fishery.

The Department of State also addressed the provisions of the Marine Mammal Protection Act concerning dolphin-safe tuna, which exclude from the U.S. market any tuna caught in the eastern tropical Pacific by vessels encircling dolphins. The Department discussed several alternatives for addressing the issue, ranging from maintaining the current restrictions to abandoning the labeling standard entirely, but took no position pending further examination.

The Inter-American Tropical Tuna Commission also advocated amending the Marine Mammal Protection Act to reflect the standards established under the La Jolla Agreement. In support of this position the Tuna Commission noted the progress that had been made under the international program, the potential for some nations to withdraw from the program if U.S. embargoes of their tuna continued, the fact that the number of sets on dolphins in the eastern tropical Pacific had not declined appreciably despite the U.S. embargoes, and the adverse effect that abandoning the practice of setting on dolphins would have on tuna stocks. The Tuna Commission representative presented data showing that switching to school sets and log sets, the two principal alternatives to setting on dolphins, would result in greatly increased catch of immature tuna and the bycatch of other marine species, including billfish, sharks, mahi-mahi, and sea turtles. The Inter-American Tropical Tuna Commission estimated that, if sets on dolphins were replaced by school and log sets, between 10 to 25 million undersized yellowfin tuna with no commercial value would be discarded each year. This represents between 13 and 32 percent of the total recruitment for the species and, in the view of the Tuna Commission, would have a drastic effect on the fishery.

In further support of its position that dolphin sets are an environmentally sound practice, the Tuna Commission argued that dolphin stocks in the eastern

tropical Pacific were generally healthy; that the two depleted stocks, northeastern offshore spotted dolphins and eastern spinner dolphins, would rebound to optimal levels in the next few years; and that the present quotas were biologically insignificant. With respect to the latter point, the Tuna Commission noted that if incidental take in the eastern tropical Pacific tuna fishery were treated under a potential biological removal level standard, as are other fisheries under the Marine Mammal Protection Act, the annual allowable mortality and serious injury of dolphins would exceed 50,000.

The American Tunaboat Owners Coalition proposed the broadest amendments to the Marine Mammal Protection Act that, in its view, would allow U.S. tuna fishermen to return to the eastern tropical Pacific on an equal footing with foreign fishermen. The Coalition advocated an amendment to substitute the provisions of the Inter-American Tropical Tuna Commission dolphin conservation program for the provisions currently set forth in the Act. This would include repealing the ban on U.S. fishermen encircling dolphins, including those stocks designated as depleted, as well as the ban on importing and selling tuna caught by encircling dolphins. Existing quotas would be replaced by those established under the international program and would reflect the dolphin mortality limits assigned to individual vessels under that program. The Coalition further proposed limiting the international quotas to reflect stock-specific potential biological removal levels applicable to marine mammals taken incidental to domestic fisheries. The Coalition supported replacing the current embargo provisions with an embargo of tuna harvested by vessels of any country that does not participate in the international program. The Coalition also backed an amendment to repeal the dolphin-safe labeling standards, deferring instead to general Federal Trade Commission labeling standards and consumer choice. The Coalition emphasized that the existing labeling standards were based on an unsupported premise that encirclement of dolphins is in itself harmful.

The testimony of the National Fisheries Institute, whose membership consists of about 1,000 fishery-related businesses, focused not specifically on the eastern tropical Pacific tuna fishery but on the broader ramifications of U.S. tuna embargoes on the seafood industry. The crux of the Institute's testimony was that imposition of unilateral trade sanctions and refusal by the United States to recognize the primacy of the International Dolphin Conservation Program undermine the cooperation needed to conserve other fishery resources upon which U.S. fishermen and processors depend. In particular, the Institute noted the need for cooperation by Mexico, Venezuela, and other western hemisphere nations in managing fish stocks under the auspices of the International Commission for Conservation of Atlantic Tunas and in reducing the take of sea turtles incidental to shrimp fisheries. The Institute also argued that the nations subject to U.S. embargoes had found alternative markets for their tuna and those suffering most were U.S. firms and customers that historically relied on the banned products. The Institute also expressed fear that U.S. fishery products could be subject to retaliatory trade sanctions if the rulings of the GATT dispute resolution panel are ever adopted.

Earth Island Institute, representing 16 environmental and animal welfare organizations including Defenders of Wildlife and the Humane Society of the United States, opposed amending the tuna-dolphin provisions of the Marine Mammal Protection Act. Earth Island Institute remained committed to a complete elimination of dolphin mortality, to the establishment of a global moratorium on the practice of encircling dolphins, and to retaining the current definition of dolphin-safe tuna. To do otherwise, it argued, would be contrary to the Marine Mammal Protection Act's goal of achieving a zero mortality and serious injury rate incidental to commercial fishing operations. Earth Island Institute further asserted that, even if no encircled dolphins are killed in purse seine nets, the stress resulting from repeated chase and capture likely causes numerous physiological problems. Earth Island Institute pointed to the experience of those U.S. fishermen who have continued to fish in the eastern tropical Pacific as evidence that a commercially viable fishery can be maintained without setting on dolphins.

Earth Island Institute maintained that the current U.S. prohibition on the sale of tuna caught in association with dolphins was working and should not be modified. It contended that allowing access to the U.S. market would unnecessarily harm dolphins by allowing the number of dolphins killed to double from

current levels to allowable quotas under the La Jolla Agreement, would hurt U.S. canners who remain committed to selling only dolphin-safe tuna, and would be detrimental to the majority of the U.S. tuna fleet, which has relocated to the western Pacific where tuna are harvested using dolphin-safe methods.

Earth Island Institute also opposed ceding management authority for dolphin conservation programs to the Inter-American Tropical Tuna Commission. Earth Island Institute noted that the Tuna Commission is a fisheries organization whose primary mission is to ensure sustainable tuna production. Only secondarily, it contended, does the Tuna Commission attempt to minimize dolphin mortality. Earth Island Institute also noted that the La Jolla Agreement, which forms the basis for the international program, is not a binding international agreement and has not been formally adopted by the Inter-American Tropical Tuna Commission. Other criticisms of placing management authority in the Tuna Commission leveled by Earth Island Institute were that some tuna-fishing nations, including Mexico, Colombia, and Ecuador, are not members and that the Commission operates by consensus, allowing any member to veto proposed conservation measures.

Earth Island Institute further contended that backing away from tuna embargoes, in part because of GATT considerations, set a dangerous precedent for other U.S. environmental laws. Earth Island Institute asserted that imposition of trade sanctions is often the only effective means of securing environmentally responsible behavior on the part of other nations.

The Center for Marine Conservation presented testimony on behalf of itself, the Environmental Defense Fund, Greenpeace, the National Audubon Society, the National Wildlife Federation, the Whale and Dolphin Conservation Society, and World Wildlife Fund. These organizations noted the success of the Marine Mammal Protection Act and the La Jolla Agreement in reducing dolphin mortality, but stated that it was time to examine the unintended consequences of current conservation efforts. The Center for Marine Conservation recognized that the 1992 amendments to the Marine Mammal Protection Act had not brought about an international moratorium on setting on dolphins as hoped and that, absent such a moratorium, some provisions of the amendments had not been effective. In addition, the Center questioned the durability of the unilateral approach to dolphin conservation embodied in the Act and noted early evidence suggesting that the dolphin-safe policy advanced by current U.S. law may create other bycatch problems in the fishery if there were a widespread shift to such fishing methods.

Although the Center for Marine Conservation believed there to be problems with existing tuna-dolphin legislation, it recommended against amending the Marine Mammal Protection Act at that time. Rather, the Center supported initiation of a multilateral process, involving all stakeholders in the fishery, to address the outstanding issues through establishment of a binding international agreement. In the Center's view, such an agreement, at a minimum, must address the conservation of the ecosystem and biological diversity of the eastern tropical Pacific, establishment of international conservation and management of tuna and dolphin stocks, and maintenance of consumer confidence. While acknowledging the success of the La Jolla Agreement, the Center noted that the agreement was a non-binding resolution and needed to be strengthened to provide effective long-term conservation and management under the auspices of the Inter-American Tropical Tuna Commission.

Representatives of Colombia, Costa Rica, Ecuador, Mexico, Panama, and Venezuela met in San Jose, Costa Rica, on 14 July 1995 to review the tuna-dolphin situation. The nations issued a joint declaration in light of the House Resource Committee oversight hearing. While reiterating many of the concerns expressed in the 15 June statement, the nations were heartened by the statements that had been made by the State Department, Congressional representatives, and various non-governmental organizations. The six nations expressed concern, however, that the U.S. Administration and most other witnesses did not call for Congress to amend the definition of dolphin-safe tuna. They stated that lifting the tuna embargoes without also addressing the dolphin-safe definition would not be acceptable and expressed the view that promoting such fishing practices would be detrimental to the eastern tropical Pacific ecosystem and the tuna resource. The nations reiterated their concern that the continued stability of the La Jolla Agreement was in

jeopardy unless the United States, during the 1995 session of Congress, enacted legislation lifting the primary and secondary tuna embargoes, codifying the La Jolla Agreement, and redefining dolphin-safe to include all tuna and tuna products harvested in accordance with the regulatory measures adopted under the La Jolla Agreement.

Declaration of Panama

Dissatisfied with the pace at which international negotiations to resolve the tuna-dolphin issue were being pursued by the United States, the Center for Marine Conservation, the Environmental Defense Fund, Greenpeace, the National Wildlife Federation, and World Wildlife Fund undertook discussions in September 1995 with representatives of Mexico to explore the possibility of reaching a multilateral agreement among the tuna-fishing nations to provide a framework for strengthening the international conservation program and lifting U.S. tuna embargoes. These discussions led to a compromise approach supported by the tuna-fishing nations, this segment of the environmental community, and the U.S. Administration.

The compromise developed by Mexico and the five environmental organizations ultimately formed the basis for the Declaration of Panama, signed by representatives of 12 nations on 4 October 1995. Signatories to the declaration included Belize, Colombia, Costa Rica, Ecuador, France, Honduras, Mexico, Panama, Spain, the United States, Vanuatu, and Venezuela. Those nations reaffirmed the commitments and objectives of the La Jolla Agreement to reduce dolphin mortality in the eastern tropical Pacific tuna fishery to levels approaching zero through the setting of annual mortality limits, with the goal of eliminating dolphin mortality by seeking a means of capturing large yellowfin tuna not in association with dolphins. Moreover, the nations declared their intention, contingent on the enactment to changes in U.S. law, to formalize by 31 January 1996 the La Jolla Agreement as a binding Inter-American Tropical Tuna Commission resolution or other binding legal instrument. The envisioned changes to U.S. law include lifting the primary and secondary embargoes for tuna caught in compliance with the La Jolla Agreement as it would be modified under the Declaration of Panama, allowing access to the U.S. market for all tuna, whether dolphin-safe or not, caught in compliance with the agreement by nations that are members of the Inter-American Tropical Tuna Commission or that have initiated steps to become members, and redefining the term dolphin-safe to include any tuna caught in the eastern tropical Pacific by a purse seine vessel in a set in which no observed dolphin mortality occurred.

The signatories to the Declaration of Panama specified several provisions that would be included in the binding international instrument once the requisite changes to U.S. law had been enacted. These would include commitments to (1) adopt conservation and management measures that ensure the long-term sustainability of tuna stocks and other living marine resources in the eastern tropical Pacific, (2) assess the catch and bycatch of juvenile yellowfin tuna and other living marine resources of the eastern tropical Pacific and adopt measures to reduce or eliminate such catch, (3) implement the international agreement through enactment of domestic legislation and/or adoption of regulations, (4) enhance existing mechanisms for reviewing compliance with the international program, (5) establish annual stock-specific quotas on dolphin mortality based on minimum population estimates, (6) limit overall dolphin mortality to no more than 5,000 per year, (7) establish a system that provides incentives to vessel captains to continue to reduce dolphin mortality, and (8) establish or strengthen national scientific advisory committees to advise their respective governments on research needs.

As provided for in the Declaration of Panama, until the year 2001 an annual quota for each stock would be set at between 0.1 and 0.2 percent of the minimum population estimate for the stock. Beginning in the year 2001, the annual per-stock quota would be set at 0.1 percent of the stock's minimum population estimate. If the annual quota for any stock were exceeded, all sets on that stock and any mixed schools containing individuals from that stock would cease for the remainder of the year. In addition, should the annual mortality for the eastern spinner or the northeastern spotted dolphin exceed 0.1 percent of the minimum population estimate, the governments would conduct a scientific review to consider whether further action to reduce mortality is needed.

Proposed Legislation

During 1995 four bills to amend the tuna-dolphin provisions of the Marine Mammal Protection Act were introduced in Congress. Representative Randy Cunningham and three co-sponsors introduced H.R. 2179 on 3 August 1995, prior to the negotiations that culminated in the Declaration of Panama. The second bill, S. 1420, was introduced by Senator Ted Stevens and four co-sponsors on 17 November to give effect to the Declaration of Panama and provide relief for U.S. tuna fishermen. Senators Barbara Boxer and Joseph Biden introduced S. 1460 on 7 December as an alternative to the Stevens bill. The fourth bill, H.R. 2823, was introduced on 21 December by Representative Wayne Gilchrest and 26 co-sponsors, including the four sponsors of H.R. 2179, as a companion bill to S. 1420. A companion bill to S. 1460 is expected to be introduced in the House of Representatives early in 1996.

The Cunningham bill proposes the broadest changes to existing tuna-dolphin legislation. The existing comparability requirements for nations seeking to import tuna into the United States would be repealed. Instead, comparability would be based on a requirement that the nation participates in the international program established under the La Jolla Agreement, provided that (1) dolphin mortality under the program is within the potential biological removal level for each affected dolphin stock, (2) all vessels of the nation participate in the program and are subject to 100 percent observer coverage, (3) the nation authorizes the release of information sufficient to demonstrate participation in the program, and (4) the nation complies with all reasonable requests to participate in cooperative scientific research. Also, the provisions regarding the general permit issued to the American Tunaboat Association would be deleted and replaced with a requirement that U.S. purse seine vessels in the eastern tropical Pacific be subject to regulation by the Secretary of Commerce, provided the regulations were consistent with the International Dolphin Conservation Program. In addition, the Dolphin Protection Consumer Information Act would be repealed, as would the definition of dolphin-safe tuna and the existing provision that limits imports to dolphin-safe tuna. More generally, there would be a shift in U.S. policy from seeking the elimination of marine mammal mortality in the eastern tropical Pacific tuna fishery to seeking the continued reduction of dolphin mortality. Another policy goal of the bill is to put U.S. tuna fishermen who fish in or wish to return to the eastern tropical Pacific on a equal footing with foreign fishermen.

The Stevens bill would institute the changes to U.S. law necessary to trigger implementation of the Declaration of Panama. The bill would lift the tuna embargoes now in place and allow imports of all tuna harvested in compliance with the La Jolla Agreement, as it would be modified under the declaration, by vessels from countries that are members of the Inter-American Tropical Tuna Commission or that have taken steps to become members. An exporting nation must also show that the tuna was not banned from import by a pre-existing embargo, *e.g.* by showing that the tuna was harvested after the effective date of the amendment. The Stevens bill would allow all tuna caught in the eastern tropical Pacific to be labeled as dolphin-safe if no dolphins were killed during the set in which the tuna was caught. Regulations to be issued by the National Marine Fisheries Service would include provisions addressing weight calculations and well location of a vessel's catch as a means of tracking what tuna is dolphin-safe.

As under the Cunningham bill, the Stevens bill would rescind the American Tunaboat Association general permit. In its place, the Stevens bill would require promulgation of new regulations to govern U.S. participation in the fishery and issuance of annual permits to those U.S. vessels participating in the International Dolphin Conservation Program. Under regulations to be issued by the National Marine Fisheries Service, U.S. vessels would be allowed to take marine mammals, including those designated as depleted, incidental to their fishing operations. The taking of species listed as threatened or endangered under the Endangered Species Act, however, would not be permitted.

The Stevens bill would also direct the National Marine Fisheries Service, in cooperation with other nations participating in the international program, to undertake research aimed at reducing dolphin mortality and developing cost-effective methods of catching large yellowfin tuna without setting on dolphins.

Research on the status of dolphin stocks and on the effects of chase and encirclement of dolphins would also be required.

In many respects, the Boxer bill tracks the Stevens bill. There are, however, several key differences. The most significant differences concern what tuna may be imported into the United States and how that tuna may be labeled. The Boxer bill would retain the current provisions of the Marine Mammal Protection Act that effectively prohibit the import of tuna that is not dolphin-safe. It would also preserve the existing definition of dolphin-safe tuna as tuna harvested on a trip during which no dolphins sets were made. Data from the past two years suggest that about 20 to 30 percent of the yellowfin tuna from the eastern tropical Pacific is harvested using dolphin-safe fishing techniques. Thus, the Boxer bill offers only limited relief to those nations currently subject to embargoes. Further, the Boxer bill's import provisions would apply only to those nations that are members of the Inter-American Tropical Tuna Commission; it would not include those nations that had initiated steps to become members.

The Boxer bill also takes a more aggressive approach to pursuing the zero mortality rate goal of the Marine Mammal Protection Act than does the Stevens bill or the Declaration of Panama. While the mortality cap of 5,000 dolphins would be adopted for 1996, there would be an accompanying requirement that the quota be reduced by a statistically significant amount in each successive year until the goal of zero mortality is reached. The Boxer bill would also limit the annual stock-specific quotas for depleted dolphins to the levels achieved in 1994.

The Boxer bill, like the Stevens bill, tries to put U.S. and foreign tuna fishermen operating in the eastern tropical Pacific on an equal footing. The current prohibition on encircling dolphins would be lifted and U.S. fishermen allowed to operate under the International Dolphin Conservation Program, subject to an assigned vessel dolphin mortality limit. However, U.S. fishermen would be subject to the same import limitations as would foreign fishermen. Any tuna they caught during a trip on which dolphins were encircled would be excluded from the U.S. market.

A further limitation on U.S. fishermen would continue in place under the Boxer bill. They would not be allowed to set on any depleted stock of dolphins, including northeastern offshore spotted dolphins, the most commonly encircled stock in the northern part of the fishery.

Behind some of the more restrictive provisions of the Boxer bill is a belief that the practice of setting on dolphins, whether or not they are killed, may be harmful. Some supporters of the bill have postulated that stress caused by chase and encirclement may be retarding the recovery of eastern tropical Pacific dolphin stocks. They believe that additional research into the effects of this practice is needed before changes to U.S. law are made. Consistent with this view, the Boxer bill would authorize $1 million for research on the effects of chase and encirclement of dolphins and on the bycatch associated with dolphin-safe fishing practices.

Neither the Stevens bill nor the Boxer bill, if enacted, would become effective until a binding international agreement establishing the International Dolphin Conservation Program had been adopted and entered into effect.

At the end of 1995 no Congressional action had been taken on any of the bills. It is expected that hearings will be held early in 1996.

Pinniped-Fishery Interactions

The 1994 amendments added several new provisions to the Marine Mammal Protection Act relating specifically to pinniped-fishery interactions. Section 120(a-e) allows states to request and the Secretary of Commerce to grant authority for the lethal removal of individual pinnipeds affecting certain salmonid stocks without obtaining a waiver of the Act's moratorium on taking, provided certain conditions are met. Section 120(f) directs the Secretary of Commerce to investigate and to submit a report by 1 October 1995 indicating whether California sea lions and Pacific harbor seals are having a significant negative impact on recovery of salmonid fishery stocks or other components of the coastal ecosystems of Washington,

Oregon, and California. Section 120(h) directs the Secretary of Commerce to establish a pinniped-fishery interaction task force to advise on possible measures for minimizing interactions between pinnipeds and aquaculture operations in the Gulf of Maine.

Actions generated by these new provisions are described below.

Request from the Washington Department of Fish and Wildlife for Lethal Taking Authority

The number of winter-run steelhead trout returning through the Chittenden, or Ballard, Locks in Seattle to spawn in streams emptying into Lake Washington declined from nearly 3,000 in the early 1980s to fewer than 100 in the 1993-1994 run. At the same time, there was a substantial increase in the number of California sea lions congregating near the locks and preying on steelhead. As described in the Commission's previous annual report, measures taken by the National Marine Fisheries Service and the Washington Department of Fish and Wildlife to reduce sea lion depredation of the winter-run steelhead have been largely ineffective (see Appendix B, Fraker 1994, for a more complete description of the problem).

As noted above, under the 1994 Marine Mammal Protection Act amendments, states may request authority to lethally take individually identifiable pinnipeds causing or contributing to declines of salmonid stocks. On 30 June 1994 the Washington Department of Fish and Wildlife applied to the National Marine Fisheries Service for authority to lethally take individually identifiable California sea lions preying on winter-run steelhead migrating through the Ballard Locks. The application also asked that a pinniped-fishery interaction task force be established as required under section 120(c).

The Ballard Locks Pinniped-Fishery Interaction Task Force was established by the Service on 30 September 1994. Members included representatives of the National Marine Fisheries Service, the State of Washington, concerned Indian tribes, the academic community, recreational fishermen, and public interest groups. The task force met several times in October and November 1994 and forwarded its recommendations to the National Marine Fisheries Service on 22 November 1994.

The task force recommended that sea lions preying on steelhead trout in the vicinity of Ballard Locks be removed, preferably by non-lethal means, to reduce predation during the 1994-1995 winter run. The task force further recommended that, if facilities were not or could not be made available to hold depredating sea lions in captivity during the winter run, the state or National Marine Fisheries Service be authorized to kill depredating sea lions provided that (a) predation exceeds 10 percent of the returning steelhead trout in any consecutive seven-day period after 1 January 1995, (b) depredating sea lions are captured and euthanized humanely, (c) the Army Corps of Engineers provide a report to the National Marine Fisheries Service describing its response to task force recommendations for improving fish passage at Ballard Locks, and (d) the Service and the Washington Department of Fish and Wildlife further investigate the possible benefits of using acoustic deterrence devices to keep sea lions away from the lock area.

Not all members of the task force supported the recommendations put forth in the 22 November report. On 5 December 1994 a minority report signed by 8 of the 21 task force members was provided to the Service. The report noted the minority view that (1) the available data did not support the premise that removing sea lions would produce an increase in the winter-run steelhead population, (2) if sea lions observed repeatedly eating steelhead in the vicinity of the locks were removed, they likely would be replaced by other nearby animals, (3) lethal removal would constitute a significant precedent with broad implications for future management of marine mammal-fishery interactions under the Marine Mammal Protection Act, and (4) the State of Washington had failed to make the required showing that there were no feasible and prudent alternatives to lethal removal. The minority group also expressed concern that the Army Corps of Engineers had been unresponsive to the National Marine Fisheries Service regarding the need to improve fish passage at the locks.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, reviewed and by letter of 19 December 1994 provided com-

ments to the National Marine Fisheries Service on both the majority and minority reports. The Commission noted the importance of responding to the State's request in time to take measures to reduce depredation of the 1995-1996 winter steelhead run. The Commission recommended that the Service make its decision and be ready to implement appropriate actions by 1 January 1995. These and other comments and recommendations made by the Commission are described in the previous annual report.

The National Marine Fisheries Service adopted the task force's recommendations and by letter of 4 January 1995 authorized the Washington Department of Fish and Wildlife to lethally remove individually identifiable California sea lions observed preying on winter-run steelhead migrating through the Lake Washington ship canal in the vicinity of the locks. The authorization specified that only "predatory" sea lions could be lethally removed, that non-lethal deterrents had to be tried first and found ineffective, and that lethal removals could not be done unless the sea lion predation rate exceeded 10 percent of the steelhead migrating through the ship canal in any seven-day period after 1 January 1995. The authorization also specified that the State convene an animal care committee to provide recommendations on the handling of sea lions and that predatory sea lions identified for lethal removal be captured and euthanized using protocols developed by the animal care committee.

The authorization, valid until 31 June 1997, also specifies that the State must submit a report on its authorized activities by 1 September each year. After receiving the report, the Service will ask the task force to evaluate the effectiveness of the actions taken and compliance with the conditions of the lethal taking authorization. In its 4 January 1995 transmittal letter, the National Marine Fisheries Service also requested that the State take the lead in responding to the task force's recommendations regarding changes in the locks and lock operations to improve fish passage, assessing the feasibility of constructing sea lion barriers and/or refugia where steelhead can escape from sea lions, and developing a comprehensive winter-run steelhead recovery plan.

The Washington Department of Fish and Wildlife submitted the required report to the National Marine Fisheries Service on 31 August 1995, describing actions taken to reduce California sea lion predation on the 1994-1995 winter run of steelhead in the Lake Washington ship canal. The report indicated that no sea lions had been killed during the run; that a large male sea lion, which had been observed eating steelhead in the vicinity of the locks in preceding years, as well as during the 1994-1995 winter run, had been captured on 25 January 1995 and held until 8 June when it was released in the Strait of Juan de Fuca west of Port Angeles; and that two additional sea lions observed preying on steelhead in the vicinity of the locks had been captured, marked, transported, and released in the Strait of Juan de Fuca. The letter transmitting the report to the National Marine Fisheries Service indicated that the State did not have sufficient funding to continue predation monitoring at the locks or to provide for the care and feeding of any sea lions taken into captivity during the 1995-1996 season. It expressed the State's hope that the Service would again be able to provide financial assistance for the monitoring and captive holding programs, as well as to continue its sea lion capture and tagging program and experiments with acoustic deterrents.

The State's report was provided to the Ballard Locks Pinniped-Fishery Interaction Task Force for review. The task force met in Seattle on 6-8 September 1995 to review the report and provide advice on follow-up actions to the National Marine Fisheries Service. The task force report was completed on 8 November 1995. By the end of the year, it had not yet been forwarded to the Commission for review.

Gulf of Maine Task Force on Aquaculture-Pinniped Interactions

Both the salmon aquaculture industry and populations of harbor seals and gray seals in the northeastern United States have grown substantially in recent years. Seals can kill and eat many salmon if they are able to get into the salmon pens. Seals also can kill and injure penned salmon by biting through the netting. If nets are torn, the penned salmon may escape, causing substantial economic loss and possible threats to the genetic integrity of local wild salmon stocks.

As noted earlier, the 1994 amendments to the Marine Mammal Protection Act called on the Secretary of Commerce to establish a task force to assess possible means for minimizing the impacts of the pinniped populations on the salmon aquaculture industry in the Gulf of Maine. The amendments directed the Secretary to report to Congress no later than 30 April 1996 describing recommended alternatives for mitigating damaging interactions.

Following consultations with the Commission and others, the National Marine Fisheries Service in January 1995 established a seven-member task force made up of scientists and representatives of the aquaculture industry and the environmental community. The task force met three times in 1995, visited representative aquaculture sites, and met with aquaculture operators in the region. The task force report is expected to be completed and made available for public comment early in 1996.

The growing populations of harbor and gray seals in the Gulf of Maine also could affect and be affected by other fisheries in the area. As noted in the previous annual report, the Commission wrote to the National Marine Fisheries Service on 19 December 1994 to call attention to this possibility. The Commission pointed out the many uncertainties concerning the diets, feeding habits, and foraging ranges of harbor seals and gray seals and uncertainties as to how pinniped predation may affect the recovery and maintenance of important finfish stocks in the New England area. As a first step toward anticipating possible pinniped-fishery conflicts and ensuring that they are addressed in ecologically and economically sound ways, the Commission recommended that the Service assess available information to determine (1) the types of conflicts likely to arise from the continuing growth of gray seal and harbor seal populations in the region, (2) when and where such conflicts are apt to arise, (3) additional information needed to make sound judgments concerning probable cause-effect relationships, (4) the research and monitoring programs that would be required to obtain the needed information, and (5) how potential conflicts might best be avoided.

The Service responded by letter of 13 February 1995, noting that the 1994 Marine Mammal Protection Act amendments had directed the Service to convene workshops or task forces to examine possible conflicts on both coasts and to report the findings to Congress. It indicated that the Service had initiated the congressionally mandated assessments and that it believed these assessments would address the Commission's concerns.

On a related matter, the New England Aquarium convened a forum on 14-15 June 1995 to discuss issues concerning interactions between commercial fisheries and the growing pinniped populations in the Gulf of Maine. Participants included representatives of the Commission, the National Marine Fisheries Service, other Federal agencies, the academic community, the fishing industry, and environmental groups. The forum proceedings, published by the New England Aquarium in September 1995, provide a thorough assessment of the various issues and how they might be approached.

[The forum proceedings, titled "Pinniped Populations in [the] Gulf of Maine: Status, Issues, and Management," can be obtained from the New England Aquarium, Central Wharf, Boston, Massachusetts 02110].

Investigation of Possible Pinniped Impacts on Endangered West Coast Salmonid Stocks

The 1994 Marine Mammal Protection Act amendments directed the Secretary of Commerce to investigate whether California sea lions and Pacific harbor seals are having significant negative impacts on the recovery of salmonid stocks that are listed or are candidates for listing under the Endangered Species Act. In addition, the Secretary is to determine whether these pinnipeds are having broad impacts on the coastal ecosystems of Washington, Oregon, and California. A report on the results of the investigation was to be completed by 1 October 1995.

As a first step in the required investigation, the Service constituted a working group to compile and evaluate existing data. At the end of 1995 it was the Commission's understanding that the working group had prepared a draft report, but that the report would not be completed until sometime early in 1996.

The Gulf of Maine Ecosystem

The 1994 amendments to the Marine Mammal Protection Act added a new section 110(c) requiring the Secretary of Commerce to convene a workshop by 30 April 1995 to assess human-caused factors affecting the health and stability of the Gulf of Maine ecosystem of which marine mammals are a part. Organization and planning of the workshop was to be done in consultation with the Marine Mammal Commission, the adjacent coastal states, individuals with expertise in marine mammal biology and ecology, representatives of environmental organizations and the fishing industry, and other appropriate persons. The Secretary was directed to report to Congress on or before 31 December 1995 describing the results of the workshop and measures proposed or recommended to restore or maintain the health and stability of the Gulf of Maine marine ecosystem and its key components.

Responsibility for the workshop was assigned to the National Marine Fisheries Service's Northeast Fisheries Science Center, which in September 1994 established a steering committee to help plan the workshop. The steering committee was composed of relevant experts, including a Marine Mammal Commission representative. The Regional Association for Research on the Gulf of Maine, headquartered at Dartmouth College, Hanover, New Hampshire, was contracted to convene the workshop.

Because of the broad range and complexity of relevant topics, it was not possible to complete the preparatory work and hold the workshop by 30 April 1995, as specified in the amendments. On 3 May 1995 a planning meeting was held at the Woods Hole Oceanographic Institution, Woods Hole, Massachusetts. Participants included representatives of the Service, the Commission, the Environmental Protection Agency, the New England coastal states, the fishing industry, the academic community, and the environmental community. Following the meeting, the Northeast Fisheries Science Center drafted a workshop prospectus based on input from the steering committee and the planning meeting participants.

The draft prospectus was forwarded to the Marine Mammal Commission on 13 July 1995. The Commission, in consultation with its Committee of Scientific Advisors, reviewed the draft and forwarded its comments to the National Marine Fisheries Service on 1 August 1995. The Commission noted that there appeared to be inconsistencies between the workshop objective and the terms of reference described in the prospectus. The prospectus indicated that the workshop objective was to assess human-caused factors affecting the Gulf of Maine and to recommend a program of research and management to restore or maintain the health and stability of the Gulf. However, the proposed workshop terms of reference indicated that the principal objective was to "develop a conceptual model of the Gulf of Maine that would provide a way forward to a longer term ecosystem-based management regime."

In its comments the Commission noted that a conceptual ecosystem model could be used to help structure and focus the workshop. It suggested that at least a first iteration of a conceptual model, showing the key components and factors affecting the Gulf of Maine ecosystem, be developed and provided to participants in advance of the workshop. The Commission also suggested ways that the workshop terms of reference could be reformulated to make them more useful for structuring the workshop.

The draft prospectus indicated that much of the first day of the workshop would be devoted to presentation of background papers or issue papers. However, the draft provided no indication of the expected content of the papers. To enable it to comment substantively on this aspect of the workshop, the Commission asked to be advised of at least the principal points expected to be addressed in the papers.

The Commission also noted that the second day of the workshop would be devoted to meetings of three small working groups, but that the draft prospectus did not provide the terms of reference for the working groups. Likewise, the prospectus did not indicate the individuals expected to make up the working groups. The Commission recommended that, if it had not already done so, the Service (1) develop specific terms of reference for each working group, (2) determine the desired composition of the working groups, (3) prepare outlines of the principal points expected to be addressed in each working group

report, and (4) provide the terms of reference, report outlines, and expected membership to the prospective working group members in advance of the workshop. The Commission requested that it be advised of the terms of reference and expected composition of the three working groups as soon as possible. To help in this regard, the Commission provided a brief synopsis of the marine mammal species and issues of particular relevance to the workshop.

The workshop, formally titled "The Health of the Gulf of Maine Ecosystem: Cumulative Impacts of Multiple Stressors," was held at Dartmouth College on 18-20 September 1995. Participants represented a broad range of interests and expertise. They considered and identified priority research and management needs relative to three broad subject areas: sources and effects of anthropogenic contaminants; fisheries and related impacts; and protected species and marine mammals.

Because the workshop was not held until 18-20 September, the workshop report could not be completed in time to be included in the report that the Secretary was to submit to Congress by 31 December 1995. To provide the basic information needed to prepare the report, the workshop organizers focused initial efforts on drafting an executive summary of the workshop report. The draft executive summary and a draft federal response to it were forwarded to the Commission on 1 December 1995.

The Commission provided comments to the National Marine Fisheries Service's Northeast Fisheries Science Center by letter of 12 December 1995. The Commission noted that both draft documents provided general overviews of the factors affecting or potentially affecting the health and stability of the Gulf of Maine ecosystem. However, neither document identified the key system components, the current status and trends of the key components, the specific anthropogenic factors impacting or likely to impact the key system components, critical uncertainties and research required to resolve them, or specific deficiencies in local, state, or Federal regulatory and management programs and how those deficiencies might be corrected. The Commission offered to work with the Service to identify specific research and management actions necessary to ensure the welfare of marine mammals and their habitat in the Gulf of Maine.

At the end of 1995 it was the Commission's understanding that the workshop executive summary and report to Congress were being finalized by the National Marine Fisheries Service and would be transmitted to Congress early in 1996.

Chapter V

INTERNATIONAL ASPECTS OF MARINE MAMMAL PROTECTION AND CONSERVATION

Section 108 of the Marine Mammal Protection Act directs the Departments of Commerce, the Interior, and State, in consultation with the Marine Mammal Commission, to take such actions as may be appropriate or necessary to protect and conserve marine mammals under existing international agreements. It also directs them to negotiate additional agreements required to achieve the purposes of the Act. In addition, section 202 of the Act directs that the Marine Mammal Commission recommend to the Secretary of State and other Federal officials appropriate policies regarding international arrangements for protecting and conserving marine mammals.

During 1995 the Commission took steps to update the compendium of international treaties and agreements bearing on the conservation of marine wildlife. The Commission also continued to devote attention to providing advice on U.S. positions regarding efforts to improve fisheries management worldwide, the International Whaling Commission, conservation of marine mammals and marine ecosystems in the Southern Ocean, and regulation of international trade in marine mammals under the Convention on International Trade in Endangered Species of Wild Fauna and Flora. These activities are discussed below.

The Compendium of Treaties and International Agreements

In 1994 the Marine Mammal Commission published the *Compendium of Selected Treaties, International Agreements, and other Relevant Documents on Marine Resources, Wildlife, and the Environment.* The three-volume, 3,500-page *Compendium*, current through 1992, contains the complete texts of more than 400 international agreements, including more than 100 multilateral and 90 bilateral treaties, agreements, accords, and memoranda of understanding. Also included are numerous amendments and protocols to these documents, several non-binding international documents, and a number of significant documents to which the United States is not a party. Many of the bilateral and non-binding documents are available for the first time in the *Compendium.*

The *Compendium* is divided into two sections comprising multilateral and bilateral documents. Subject areas include Antarctica, environment and natural resources, fisheries, marine mammals, marine pollution, marine science and exploration, and others. The *Compendium* also contains background information for each document, including primary source citations, the depositary nation or organization, the city in which the document was concluded, the date it was concluded, and, where applicable, the date it entered into force.

In the fall of 1995 the Commission took steps to begin an update of the *Compendium.* The updated edition will include multilateral and bilateral documents that were concluded between 1 January 1993 and 31 December 1995, as well as a number of older documents not included in the original *Compendium.* It will contain more than 25 additional multilateral and 50 additional bilateral documents in the above subject areas, many of which will be available publicly for the first time. As of the end of 1995 the new material was being typeset. The revised edition is expected to be published by the middle of 1996.

Improving Management of Marine Living Resources

As discussed elsewhere in this report, many species and populations of marine mammals have been severely depleted by unregulated or poorly regulated commercial hunting. Some species and population stocks also have been affected adversely by incidental take in commercial fisheries and by habitat degradation and destruction. Many species and stocks of fish and other marine living resources also have been severely depleted by unregulated or poorly regulated harvesting, by incidental take in fisheries, and by habitat degradation and destruction. Summary data provided in the National Marine Fisheries Service's 1993 Report on the Status of U.S. Living Marine Resources indicate, for example, that 40 percent of the exploited fishery stocks in U.S. waters are overutilized and 42 percent are below the level necessary to support the long-term potential yield.

Actions taken by the Marine Mammal Commission to identify the principal causes of ineffective management and how they might be avoided are described below.

Basic Principles for the Conservation of Wild Living Resources

In 1974 and 1975 the Council on Environmental Quality, the World Wildlife Fund-U.S., the Ecological Society of America, the Smithsonian Institution, and the International Union for the Conservation of Nature and Natural Resources cooperatively sponsored a series of workshops to develop basic guiding principles for the conservation of wild living resources. The workshop participants concluded that traditional single-species, maximum sustainable yield management principles were outdated and recommended adoption of new ecosystem-oriented principles. The workshop results were published in a 1978 monograph by S.J. Holt and L.M. Talbot entitled "New Principles for the Conservation of Wild Living Resources."

Over the next 15 years, the "new" principles were not fully integrated into either domestic or international fisheries and wildlife conservation programs. The reason for this was not evident. Therefore, the Commission contracted in 1992 for a global review of wildlife conservation practices and in 1994 held an international workshop to review and revise the principles set forth in the 1978 monograph to make them more useful.

The following were the principal findings and conclusions of the consultations and workshop:

- maintenance of healthy populations of wild living resources in perpetuity is inconsistent with growing human consumption of and demand for those resources;
- the goal of conservation should be to maintain present and future options by maintaining biological diversity at genetic, species, population, and ecosystem levels, and as a general rule neither the resources nor the other components of the ecosystems of which they are a part should be perturbed beyond natural boundaries of variation;
- assessment of the possible ecological and socioeconomic effects of resource use should precede both proposed use and proposed restriction of ongoing use of a resource;
- regulation of living resource uses must be based on an understanding of the structure and dynamics of the ecological system of which the resource is a part and take into account economic and sociological influences affecting resource use, both directly and indirectly;
- the full range of knowledge and skills from the natural and social sciences must be brought to bear on conservation problems;
- effective conservation requires understanding and taking account of the motives, interests, and values of all users and stakeholders but not by simply averaging their positions; and
- effective conservation requires communication that is interactive, reciprocal, and continuous.

The workshop report and the report of the international consultations are expected to be published in the first half of 1996.

Analysis of Fishery Conservation Agreements

Most international agreements governing taking of marine living resources were concluded decades ago when commercial landings of fish and shellfish were

rising steadily. In the past decade, total commercial landings have generally declined. Further, the landings of many of the most valuable species, such as cod and bluefin tuna, have declined dramatically.

Government subsidies and development of markets for previously unexploited species have spurred extraordinary growth of fisheries throughout much of the world. Advancements in technology also have made it possible to profitably harvest previously unexploited and inaccessible stocks. In most cases, the growth has been spurred and regulated largely by market demand alone.

Because of the possible direct and indirect impacts of expanding world fisheries on marine mammals and other marine organisms, the Marine Mammal Commission initiated a study in 1994 to identify (1) deficiencies and the causes of deficiencies in international fisheries agreements and other marine-related conservation regimes to which the United States is a party, (2) provisions that should and should not be included in such regimes if they are to effective, and (3) the types of decision-making and scientific advisory bodies best suited to effectively guide implementation of ecologically sound fisheries management regimes. A draft of the study report was provided in 1994 to knowledgeable fishery scientists and managers, fishery regulatory agencies, and representatives of the fishing industry and environmental groups for review and comment. The final report was published in October 1995 (see Appendix B, Weber and Spivy-Weber 1995).

The report recommends adoption of seven basic principles for conserving living marine resources. They are:

- **Ecosystem Perspective**: The harvesting of living marine resources should be managed to ensure that it does not reduce target, dependent, or associated species below the lower limit of their natural equilibrium range or alter the basic structure and resilience of the ecosystem of which they are a part;
- **Integrative Perspective**: The development of management measures should consider ecological, economic, social, demographic, and behavioral aspects of fishing;
- **Independent Scientific Advice**: International regimes for the conservation of living marine resources should provide means for obtaining independent, peer-reviewed scientific advice that includes majority and minority views as well as clear statements regarding uncertainty and the possible consequences of harvesting without resolving the uncertainty;
- **Responsive Management**: The exploitation of living marine resources should be structured to ensure that monitoring and reporting mechanisms are sufficient to develop information necessary to meet management objectives and to change in response to anticipated and unanticipated outcomes;
- **Anticipatory Management**: The needs of management for information and effective control of harvest rates should prevail over expanded exploitation;
- **Conservative Management**: When faced with uncertainty, managers should favor the long-term over the short-term and should place the burden of proof on proponents for increasing direct and indirect resource exploitation or for delaying measures to rebuild depleted stocks; and
- **Accountability**: International regimes for the conservation of marine living resources should include the means for analyzing the effectiveness of management measures, for ensuring accountability by all stakeholders, including government representatives and fishermen, and for addressing any failures to meet responsibilities.

The report assesses the degree to which these operational principles are reflected in the texts and operation of 15 existing or pending international regimes for the conservation of living marine resources. Most of the regimes reviewed lacked specific provisions for implementing a precautionary ecosystem-oriented approach to management. Neither did they explicitly preclude such an approach, however.

Several recently concluded agreements, such as the United Nations agreement relating to the conservation and management of straddling and highly migratory fish stocks (see below), suggest that there is growing awareness of the need for more effective ecosystem-oriented fishery management.

Retrospective Analysis of High Seas Driftnet Fisheries in the North Pacific

Late in the 1970s and early in the 1980s large-scale driftnet fisheries for squid and tuna began to develop in parts of the North Pacific not subject to national jurisdiction (*i.e.*, high seas areas). Nets used in these fisheries were constructed of lightweight monofilament, and individual vessels were able to deploy as much as 60 km of net each night. By the mid-1980s more than 800 vessels from Japan, Taiwan, and the Republic of Korea were engaged in these fisheries. Together they deployed as much as 40,000 km of net nightly. The catch included millions of non-target species, including finfish, sharks, seabirds, turtles, and marine mammals.

Because of the concerns and uncertainty regarding the magnitude and possible effects of the bycatch, the U.S. Congress passed the Driftnet Impact Monitoring, Assessment, and Control Act in 1987. This Act required the Department of Commerce, through the Department of State, to negotiate monitoring and enforcement agreements with nations whose high seas driftnet fishing fleets were taking marine resources belonging to the United States. Agreements were subsequently negotiated with Japan, the Republic of Korea, and Taiwan, and observer programs instituted pursuant to these agreements substantiated that large numbers of finfish, sharks, sea turtles, and marine mammals were being caught incidentally in these fisheries. Programs to monitor compliance with these agreements also documented illegal fishing in areas closed to fishing.

The concerns and uncertainties regarding the effects of high seas driftnet fisheries on marine mammals and other marine organisms led the United States to co-sponsor Resolution 44/225 adopted by the United Nations General Assembly in December 1989. This resolution called for a moratorium on large-scale driftnet fishing — *i.e.*, fishing with drift gillnets longer than 2.5 km — on the high seas of all oceans beginning on 30 June 1992. In December 1991 the General Assembly adopted Resolution 44/215, which changed the effective date of the moratorium from 30 June to 31 December 1992. The moratorium became effective on 31 December 1992.

Anticipating adoption of Resolution 44/215, the United States enacted the High Seas Driftnet Fisheries Enforcement Act in November 1992. Among other things, this Act denied U.S. port privileges to any vessel known to engage in large-scale driftnet fishing after 31 December 1992. It directed the Secretary of the Treasury to prohibit imports of fish, fish products, and sport fishing equipment from any nation whose nationals engage in driftnet fishing in violation of the United Nations moratorium or which fails to take appropriate action to terminate such fishing.

The Marine Mammal Commission believed that a retrospective analysis of the squid and tuna driftnet fisheries in the North Pacific might help to identify factors responsible for ineffective management of high seas fisheries. The Commission therefore funded a study to compile and analyze available information concerning development of these fisheries. The study report was completed and published in 1995 (see Appendix B, Northridge 1995).

The report indicated that development of the North Pacific high seas squid driftnet fishery apparently was precipitated by at least three things: (1) the high market value of squid, (2) declining catches, probably caused by overfishing, in coastal squid fisheries, and (3) the lower cost of driftnet fishing compared to other methods for catching squid. It also indicated that Japanese success late in the 1970s led to the development of Taiwanese and Korean fisheries with total catches by the three nations exceeding 300,000 tons by the late 1980s.

The report indicated that there apparently was no effort to determine the standing stock biomass or productivity of the principal target species or to prevent catch levels from exceeding the annual replacement yield. It points out that more than 100 vertebrate and squid species are known to have been caught, including at least 15 species of marine mammals, 23 species of seabirds, and 60 species of fish. In most cases available information was insufficient to assess either population- or ecosystem-level effects. The level and taxonomic diversity of catches suggest that the fisheries may have affected basic ecosystem structure as well as the size and productivity of the stocks directly affected.

The report concluded that the high seas driftnet fisheries in the North Pacific lacked any management based on the biology of the target stocks and that the lack of management was due largely to (1) a tradition of managing fishing fleets rather than the targeted fishery resource, and (2) the lack of an appropriate management authority for this high seas region. It recommended that environmental impact assessments, including species inventories, be done early in the process of fisheries development and that monitoring of both target and a representative set of non-target species accompany fishery development. With regard to the latter point, it noted that fisheries should not be allowed to develop faster than the information base necessary to assess both the direct and indirect effects of the fishery. It also noted that successful conservation of marine living resources will be contingent on the establishment, among other things, of management authorities empowered to make and enforce appropriate conservation measures.

Fisheries Bycatch

The incidental bycatch of marine mammals, sea turtles, seabirds, and non-target fish species in some commercial fisheries may have serious economic as well as biological and ecological impacts. The magnitude and possible consequences of the bycatch problem worldwide has not been fully assessed. Therefore in 1993 the Marine Mammal Commission, along with a number of other organizations and businesses, provided support for a global assessment of fisheries bycatch and discards.

A report describing the results of this study was published in 1994 by the Food and Agriculture Organization of the United Nations (see Appendix C, Alverson *et. al.* 1994). The report, based upon a review of over 800 papers, estimated that between 17.9 and 39.5 million tons (average 27.0 million tons) of fish are discarded each year in commercial fisheries worldwide. Total landings of marine living resources worldwide are approximately 90 million tons. Therefore, on the average, approximately 30 percent of total catches are discarded.

Tropical shrimp trawl fisheries have the highest proportion of discards, accounting for one-third of the global total. Bottom trawl, long-line, and pot fisheries as a group rank second in terms of total bycatch. The lowest levels of bycatch are in pelagic trawl fisheries, small pelagic purse seine fisheries, and some high seas driftnet fisheries. The available data were insufficient to accurately estimate the biological, ecological, economic, and cultural impacts of the bycatch problem. Economic losses were judged likely to be in the billions of dollars.

The report identified a number of possible means for reducing bycatch. Effort reduction, incentive programs, and individual transferrable quotas (that make vessel operators responsible for bycatch reduction) were seen as the most promising long-term possibilities. The report cautioned that much more information is needed and that quick solutions to the problem are unlikely.

Conservation of Straddling and Highly Migratory Fish Stocks

Straddling fish stocks are stocks whose normal ranges include areas both within and beyond the exclusive economic zones of individual coastal nations. Migratory fish stocks are stocks of fish that migrate annually through areas within and beyond the exclusive economic zones of individual coastal nations. Effective conservation of such stocks requires cooperative management by two or more nations.

Recognizing the need for cooperative management, the 1992 United Nations Conference on Environment and Development called for an intergovernmental conference to consider means for elaborating and implementing the provisions of the 1982 Convention on the Law of the Sea regarding straddling and highly migratory fish stocks. In response the United Nations General Assembly adopted a resolution on 22 December 1992 establishing the Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks. Beginning in July 1993 the United Nations sponsored a series of five negotiating sessions to develop an international consensus on how to conserve straddling and highly migratory fish stocks. The United States was an active participant in these negotiations and at the third session supported negotiation of a legally binding agreement.

On 1 November 1994 the Marine Mammal Commission provided comments to the Department of State on a draft agreement prepared by the conference chairman following the third negotiating session held in New York on 15-26 August 1994. The Commission noted that the draft agreement appeared conceptually sound and had many laudable provisions but that some of the provisions should be clarified and strengthened. The Commission pointed out that, while the draft agreement included basic principles reflecting the precautionary approach and the ecosystem perspective to fishery management, it did not include specific provisions for implementing these principles.

The Commission also pointed out that some of the terms used in the text could be subject to different interpretations. For example, the term "best scientific evidence available" could be interpreted with respect to abundance estimates to mean either the average or mid-point of a series of estimates or the lower limit of the 95 percent or some other confidence interval around the mean. In this context, the Commission pointed out that, if mid-point estimates are used to make management decisions and the estimates are not accurate, there will be a high risk of overharvesting and depleting both target and non-target species.

The Commission's comments on the chairman's draft were considered and used by the Department of State in developing U.S. positions for the forth and fifth negotiating sessions. On 4 August 1995, at the conclusion of the fifth negotiating session, the conference delegates adopted by consensus a comprehensive binding agreement, entitled "The Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks." Among its notable features are a precautionary approach to the management of high seas fisheries and a seven-step process for implementing this approach. The agreement requires states to collect and share data on highly migratory and straddling fish stocks and allows boarding and inspection of vessels that may be fishing in violation of conservation measures adopted by a regional or sub-regional management authority. This latter provision increases the effectiveness of regional fishery management organizations by identifying circumstances under which member states may board and inspect the vessels of another country to ensure compliance with conservation measures adopted by the organization.

The agreement was open for signature on 4 December 1995 and by the end of the year had been signed by 28 countries, including the United States. It will become effective 30 days after the 30th instrument of ratification is deposited.

Code of Conduct for Responsible Fishing

The need for more effective ecosystem-oriented fisheries management has become obvious in the past decade. In 1991 the United Nations Food and Agriculture Organization's Committee on Fisheries called for development of a code of conduct for responsible fishing. The potential benefits of a broadly agreed code were confirmed by the International Conference on Responsible Fisheries held in Cancun, Mexico, in May 1992 and the United Nations Conference on Environment and Development held later in 1992.

In 1994 the Food and Agriculture Organization prepared and circulated a draft code of conduct. The draft was revised in September 1995 to reflect the provisions of the previously described agreement for the conservation and management of straddling fish stocks and highly migratory fish stocks. The Code of Conduct for Responsible Fisheries was finalized and adopted at the Food and Agriculture Organization's Conference of Parties in October 1995. The code provides non-binding guidelines to be used by national and international fisheries management organizations to ensure that fisheries, including aquaculture operations, do not have adverse social, economic, biological, or ecological impacts.

International Whaling Commission

The failure of the International Whaling Commission (IWC) prior to the 1970s to effectively regulate commercial whaling allowed many whale stocks to be reduced to levels approaching biological extinction. This was one of the factors leading to passage of the Marine Mammal Protection Act and the establishment

of the Marine Mammal Commission. Since it was established, the Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, has continued to provide advice to the Department of Commerce and the Department of State on measures necessary to restore depleted whale stocks and to ensure that commercial whaling does not cause any whale stock to be reduced or to be maintained below its optimum sustainable level. Activities related to the 1995 annual meeting of the IWC are described below.

Preparations for the 1995 IWC Meeting

The principal issues facing the IWC and its Scientific Committee at their May-June 1995 meetings were several:

- whether to partially lift the IWC's current moratorium on commercial whaling at the behest of some whaling nations;
- developing an adequate system to supervise and control commercial whaling operations that would ensure compliance with catch quotas calculated under the IWC's Revised Management Scheme;
- the revision of stock size estimates for the North Atlantic minke whale taken by Norwegian commercial whalers;
- developing humane methods for killing whales;
- whether to recognize and authorize "small-type coastal whaling" as a separate form of whaling, as proposed by Japan;
- the killing of whales for purposes of scientific research;
- aboriginal subsistence whaling needs;
- the killing of whales in the IWC's Southern Ocean Whale Sanctuary; and
- the conservation of small cetaceans.

The U.S. commissioner to the IWC, presently the Undersecretary of Commerce for Oceans and Atmosphere, has lead responsibility for developing and negotiating U.S. positions on all matters related to the IWC. To assist in formulating policies that are both scientifically sound and supported by the American public, the National Oceanic and Atmospheric Administration holds a series of public/interagency meetings each year to seek the views of government agencies, members of the public, and non-governmental organizations. Any U.S. citizens with identifiable interests in U.S. whale conservation policy may participate in these meetings. Foreign nationals and persons representing foreign governments are not permitted to attend.

Meetings of the public/interagency committee were held on 2 March and 8 May 1995 to review U.S. positions for the 1995 meetings of the IWC and its Scientific Committee and subsidiary bodies. Representatives of the Marine Mammal Commission attended these meetings and worked with officials of the National Oceanic and Atmospheric Administration to develop agreed positions.

As noted in previous annual reports, the Marine Mammal Commission wrote to the U.S. IWC commissioner in December 1991 and June 1992 on issues related to the IWC. Among other things, the Commission pointed out that whale stocks throughout the world may be affected by environmental pollution and a variety of other factors in addition to commercial exploitation. The IWC recognized this possibility and at its 1992 meeting asked its Scientific Committee to undertake a continuing review of the possible impacts of environmental change on whale stocks. At its 1993 meeting the IWC adopted a resolution calling for more research on the subject.

At its 1994 meeting the Scientific Committee advised the IWC that whale stocks could be affected directly and indirectly by a broad array of factors including global warming, ozone depletion, chemical, metal, and noise pollution, entanglement in fishing gear, and overharvesting of key prey species. The Scientific Committee proposed to hold two intersessional workshops, one in 1995 to assess the possible effects of pollution and the second in 1996 on the effects of global climate change on cetaceans. The IWC endorsed the Scientific Committee's proposals and the workshop on chemical pollution was held in Bergen, Norway, on 27-29 March 1995. U.S. scientists participated in that workshop.

An intersessional working meeting also was held in Lofoten, Norway, in January 1995 to recommend means of ensuring compliance with allowable catch limits and other applicable conservation measures. The working group first met during the 1994 IWC meeting, and representatives of the United States

participated in both sessions. As a separate matter, a third intersessional meeting in which U.S. representatives participated was held to assess the abundance of minke whales in the North Atlantic Ocean. As discussed below, reports of both these meetings were also considered during the course of the 1995 IWC meeting.

The 1995 Meetings of the IWC and its Scientific Committee

The 47th annual meeting of the IWC was held in Dublin, Ireland, on 29 May - 2 June 1995. Working groups and subcommittees met on 22-27 May. The Scientific Committee met on 8-20 May. The principal issues considered were noted earlier. The results are summarized below.

The Moratorium on Taking — In 1982 the IWC agreed to a moratorium on commercial whaling, which entered into effect during the 1985 pelagic and 1986 coastal whaling seasons. As it has done at each of its meetings since 1982, the IWC decided to take no action at its 1995 meeting to lift the moratorium. It adopted a resolution calling on Norway to withdraw its objection to the moratorium and to halt commercial whaling, which it had resumed in 1993. (Norway objected to the moratorium when it was adopted in 1982 and, under the terms of the Whaling Convention, is not required to comply with it.)

Assessments of Whale Stocks — Norway's commercial whalers concentrate their efforts on the North Atlantic minke whale stock. In this regard, the Scientific Committee's assessment of the size of that stock was one of the most significant matters considered at the 1995 IWC meeting. The Scientific Committee concluded that the 1992 estimate of abundance, which had been used by Norway to estimate an allowable take level, was no longer valid. Furthermore, the Scientific Committee indicated that it currently was unable to provide an acceptable abundance estimate and therefore could not use the IWC's Revised Management Procedure to calculate catch limits for that stock.

To try to resolve the scientific uncertainties and develop an acceptable abundance estimate for minke whales in the North Atlantic. the IWC agreed to hold two workshops before its 1996 meetings. In addition, Norway offered to host a separate intersessional meeting of the Scientific Committee to ensure that an acceptable abundance estimate would be produced prior to the 1996 commercial hunt, which was scheduled to begin before the 1996 IWC meeting. Finally, the Commission also authorized the chairman of the Scientific Committee to decide whether to hold an intersessional meeting of the Scientific Committee after the first intersessional workshop.

With regard to other whale stocks, the Scientific Committee reviewed additional data on the structure of the North Pacific minke whale stock, which is one of the stocks subject to Japanese research whaling, and it began a comprehensive assessment of North Pacific Bryde's whales, which is another stock of whaling interest to Japan. The Scientific Committee also received the report of the intersessional workshop, hosted by the United States, on the potential use of genetic data to resolve problems of stock identity. During the Scientific Committee meeting, scientists from the Russian Federation also provided additional details on the former Soviet Union's massive underreporting of whale catches in the southern hemisphere since the end of World War II.

The Revised Management Scheme — As noted in the Marine Mammal Commission's previous annual reports, the IWC's Scientific Committee was asked in 1986 to develop a scientifically based method for determining commercial whaling catch levels that would have a low probability of adversely affecting harvested whale stocks. At its 1994 meeting the IWC accepted a Revised Management Procedure recommended by the Scientific Committee to achieve this purpose. The IWC also endorsed guidelines suggested by the Scientific Committee to conduct and analyze the results of abundance surveys and to collect and analyze related information not required as direct input to use the Revised Management Procedure.

False reporting of the number and species of whales taken and the failure of some IWC members to enforce compliance with conservation measures adopted by the IWC were important factors that led to overexploitation and severe depletion of many whale stocks. Therefore, the United States and most other

IWC members have taken the position that conditions for lifting the moratorium on commercial whaling should include not only the previously agreed revised procedure for calculating safe catch limits but also an effective system for monitoring and enforcing compliance with catch limits.

During their 1995 meetings the IWC and its Scientific Committee reviewed the results of the intersessional working group meeting noted earlier to examine ways of ensuring compliance with catch limits. Although the need for better supervision and control is widely recognized, there were differing views on who should pay for supervision and control programs and whether IWC observers have boarding preference over national inspectors when there is room aboard a whaling vessel for only one observer. Whereas Japan and Norway expressed the view that all IWC members should share the financial burden, the United States and many other countries took the position that cost burdens should be borne by commercial whaling nations as a cost of doing business.

There also were differing views on whether whaling vessels should be required to carry vessel tracking devices that automatically transmit location data and whether means for monitoring or regulating trade in whale products should be part of the supervision and control system.

Illegal Trade in Whale Products — DNA analysis of whale meat samples from markets in several IWC member nations suggest that several protected whale species are being hunted and sold illegally. In addition, there is growing evidence of smuggling of whale meat. Recognizing that such illegal activities were compromising the effectiveness of its conservation program and its resolutions prohibiting imports of whale products from non-member countries, the IWC adopted a resolution in 1994. The resolution calls on IWC member nations to strictly meet their obligations under the Whaling Convention and the Convention on International Trade in Endangered Species of Wild Fauna and Flora. At its 1995 meeting the IWC adopted another resolution calling on its members to dispose of or monitor stockpiles of whale meat that make it difficult to detect illegal trade. The 1995 resolution also calls for (a) developing programs to randomly sample and test marketed whale meat using DNA and isozyme analyses to ensure that meat from protected whale stocks is not being sold, and (2) prohibiting the sale of whale meat that could not have been taken or acquired in accordance with the provisions of the Whaling Convention or the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Research Whaling — The International Convention for Regulation of Whaling allows member nations to issue permits to its nationals to kill whales for scientific research purposes, provided that research plans are submitted to the IWC's Scientific Committee for review and comment before the permits are issued. Following adoption of the moratorium on commercial whaling in 1982, Japan and Norway issued permits for research whaling with questionable scientific merits. In 1986 and 1987 the IWC adopted guidelines for judging whether proposed takes of whales for purported scientific purposes would contribute to making determinations necessary to further the IWC's conservation program.

At the 1995 IWC meeting, Japan submitted plans to continue scientific research whaling in the North Pacific and the Antarctic later in 1995 and 1996. The plans called for taking up to 100 minke whales in the western North Pacific to clarify questions of stock structure. The plans also called for expanding Japan's whale research program in the Antarctic to look for evidence of effects associated with pollution and environmental change and for taking an additional 90-110 minke whales from an area west of the primary research area. Specific questions to be addressed by the additional research whaling involved stock structure and movement patterns that had come to light when examining data from work in previous years. The total take authorized by Japan in the Antarctic in 1995-1996 was to increase from 270-330 to 360-440.

The research whaling planned by Japan would be done in the Southern Ocean Whale Sanctuary (see below). As a related matter, the IWC adopted a resolution calling on its members to refrain from issuing permits for lethal research in such sanctuaries. It also adopted a resolution recommending that the collection of data necessary for comprehensive assessments of whale stocks be done by non-lethal means whenever possible and that research requiring the

killing of whales be permitted only in exceptional circumstances.

The Japanese research whaling program in the Antarctic is a 16-year program of which eight years have been completed. The Scientific Committee proposed that an intersessional meeting be held before the regular 1996 meeting to review Japan's research program, but, for financial reasons, the intersessional meeting had to be delayed to at least 1997.

Small-Type Coastal Whaling — Since 1986 Japan has argued that many of its small coastal communities depend on whales and whaling in ways that differ little from aboriginal subsistence whaling, which is not prohibited under the IWC's moratorium on commercial whaling. At the 1995 IWC meeting Japan again requested an interim allocation of 50 minke whales for its small coastal whaling communities, pending steps necessary to lift the IWC's whaling moratorium. In support of its request, Japan submitted a three-part plan describing actions it would take to regulate the catch and processing of whales and the distribution and sale of whale meat. As in past years, Japan was unable to satisfy concerns that meat and other products from whales taken by coastal villages would not be sold commercially in contravention of the moratorium on commercial whaling. Consequently, the request did not receive the level of support necessary for approval (*i.e.*, three-quarters of IWC members).

Aboriginal Subsistence Whaling — The IWC Schedule of Regulations includes catch limits for aboriginal subsistence whaling. As noted in the previous report, the IWC amended its schedule in 1994 to allow Alaska Natives to land up to 51 bowhead whales annually in 1995-1998; to allow the Russian Government to take up to 140 gray whales in each of the years 1995-1997 for Native use; and to allow Greenland Natives to take up to 19 whales from the West Greenland fin whale stock, up to 12 whales from the central North Atlantic minke whale stock, and up to 165 whales from the East Greenland minke whale stock in each of the years 1995-1997. (Additional information concerning the taking of bowhead whales by Alaska Natives for subsistence and cultural purposes is provided in Chapter III.)

The IWC also adopted a resolution at its 1994 meeting calling for the Scientific Committee to undertake a review of the procedures used to manage aboriginal subsistence whaling. During its 1995 meeting the Scientific Committee reviewed the existing scheme and recommended that a steering group be established to examine related issues, such as data and information needs, generic versus case-specific approaches, the criteria for evaluating the risks and performance of whaling operations, and analyses of subsistence needs. The Scientific Committee recommended and the IWC agreed that a three-day workshop should be held immediately prior to the 1996 annual meeting to review and make recommendations on necessary changes in the existing scheme.

The United States also advised the IWC that the Makah Indian Tribe in the State of Washington had expressed an interest in taking up to five gray whales annually for ceremonial and subsistence purposes and that the United States could request authorization of this requested take at a future date. The Russian Federation also indicated that it would request an annual aboriginal subsistence quota of five bowhead whales at the 1996 IWC meeting.

Humane Killing — A workshop on whale killing methods was held on 23-25 May 1995. The main focus of the workshop was evaluating an electric lance used by Japanese whalers to kill whales that do not die instantaneously when harpooned. Based on their tests of the lance on carcasses of stranded animals, representatives from New Zealand concluded that the electric lance, as presently used, was not capable of immediate suspension of consciousness nor could it cause cardiac fibrillation, except in a small minority of cases.

The delegations from Norway and Japan argued that the New Zealand studies were invalid because the conductivity of a carcass decreases rapidly after death. The workshop noted that alternative secondary killing methods are available, such as using a second harpoon or a rifle. Japan informed the workshop that the use of a rifle to kill whales was prohibited by its domestic laws. No conclusion could be reached as to the best alternative to assure a humane kill in all cases.

The IWC adopted a resolution recognizing that information presented to the workshop indicates that the electric lance does not cause instantaneous unconsciousness. It agreed to consider banning the electric lance at the 1996 meeting and urged Japan to suspend use of the electric lance as a secondary killing method. Concern also was expressed about the humaneness of the pilot whale drive fishery in the Faeroe Islands, and a resolution was passed encouraging the Faeroe Islands home-rule government to continue efforts to train Faeroese whalers in humane killing techniques and to develop more humane alternatives to the sharp-pointed gaff now used to tow whales to shore.

The Southern Ocean Whale Sanctuary — At its 1994 meeting the IWC designated much of the Southern Ocean, the seas surrounding Antarctica, as a sanctuary in which commercial whaling is prohibited. On 12 August 1994 Japan lodged a formal objection and is therefore not obligated to comply with the sanctuary provisions. No other county lodged an objection, and the sanctuary entered into force in December 1994.

During the 1995 IWC meeting representatives of Japan and Norway questioned whether the sanctuary was justified legally or scientifically. Japanese participants questioned the official status of the unreported catches by Soviet whalers in the Antarctic and suggested that, if these data were used as part of the sanctuary justification, the sanctuary may not have been justified on scientific grounds. Japan also introduced a resolution calling for "relevant international legal institutions" to be consulted regarding the legality of the sanctuary designation. Further discussion of this matter was deferred until the next meeting because of time constraints. As noted earlier, however, a resolution was adopted urging members not to conduct lethal research in sanctuaries established by the IWC.

Small Cetaceans — Many species and populations of small cetaceans (dolphins and porpoises) have been seriously depleted by directed taking and other human activities. Whether the IWC has authority to set catch limits for small cetaceans has been a subject of contention since the late 1970s. Although the IWC has been unable to reach agreement on the issue of authority, it has recognized that many species and populations of small cetaceans have been and are being affected adversely by directed taking, incidental take in commercial fisheries, and habitat degradation.

Notwithstanding the questions of IWC authority over small cetaceans, the IWC's Scientific Committee has constituted a Subcommittee on Small Cetaceans to identify measures that could be taken by member nations to more effectively conserve small cetacean populations worldwide. Harbor porpoise populations in the North Atlantic were the major topic of consideration in 1995. The subcommittee recommended actions that should be taken by both coastal states and the Scientific Committee to more effectively conserve North Atlantic harbor porpoise populations. It also recommended topic areas that should be afforded priority over the next three years. The IWC did not endorse the committee's recommended three-year work plan, but it did agree that the Scientific Committee should continue its work on North Atlantic harbor porpoises next year.

Post-Meeting Activities

Japanese Research Whaling — As noted earlier, Japan announced at the 1995 IWC meeting that it intended to issue permits to authorize the lethal take of up to 100 minke whales in the North Pacific and up to 440 minke whales in the Antarctic later in 1995 and in 1996 for purposes of scientific research. Among other things, the research does not meet IWC criteria for information necessary to conduct comprehensive assessments of whale stocks. By proceeding with its plans, the Government of Japan is therefore diminishing the effectiveness of the IWC's conservation program.

Under the Pelly Amendment to the Fishermen's Protective Act, the Secretary of Commerce is required to certify to the President whenever it is determined that a foreign country is acting in a manner that diminishes the effectiveness of an international fishery conservation program. The IWC's conservation program falls within the scope of this provision, and on 11 December 1995 the Secretary of Commerce certified to the President that the Government of Japan's actions to authorize the proposed research whaling program was diminishing the effectiveness of

the IWC's program. He also advised the President that, during discussions with Japanese officials, U.S. officials had been assured that Japan had no further plans to increase the sampling effort during the eight years remaining in its 16-year research program.

In cases where foreign nations are so certified and show no progress towards addressing the offending action, the President may direct that a ban be placed on the import of all or some fishery products from the offending nation. In this regard, the President is required to report to Congress within 60 days of any action that is taken regarding the certification. As of the end of 1995, the President had not yet submitted his report to Congress and no steps had been taken implement sanctions against Japan.

Minke whale assessment — Norway carried out a sighting survey in the North Atlantic Ocean from 15 July to 7 August 1995 to obtain better data on the distribution, density, and sighting patterns of minke whales in the area where it has authorized resumption of commercial whaling. A U.S. scientist participated in the cruise. A workshop is to be held in Oslo in mid-January 1996 to determine whether available data are sufficient to generate an acceptable estimate of minke whale abundance in the North Atlantic.

Conservation and Protection of Marine Mammals in the Southern Ocean

More than a dozen of species of seals, whales, dolphins, and porpoises inhabit or occur seasonally in the Southern Ocean, the seas surrounding Antarctica. Regional populations of humpback, blue, fin, sei, and sperm whales were severely depleted and, in some cases, brought to the verge of extinction by commercial hunting. The blue whale population in the Antarctic, for example, is estimated to have been reduced from more than 150,000 to fewer than 1,000 individuals. Two of the six resident seal species also were severely depleted by commercial hunting.

There has been no commercial sealing in the Antarctic since the 1950s. Concerned that depletion of harp seal stocks in the North Atlantic in the 1960s would lead to a resumption of sealing, the Antarctic Treaty Consultative Parties negotiated the Convention for the Conservation for Antarctic Seals. This Convention, which entered into force in 1977, provides a mechanism for regulating commercial sealing in the Antarctic, should it ever be resumed.

As noted earlier in this chapter, the International Whaling Commission established a moratorium on commercial whaling, beginning in 1986. Also as noted, in 1994 the International Whaling Commission designated much of the Southern Ocean as a whale sanctuary. Further, when it enters into force, the Antarctic Treaty Protocol on Environmental Protection, discussed below, will prohibit oil and gas development and other mineral resource activities in Antarctica for at least 50 years. Consequently, commercial sealing, commercial whaling, and mineral exploration and development do not currently pose threats to populations of seals and cetaceans in the Southern Ocean. However, it is possible that commercial sealing and whaling could be resumed and that mineral exploration and development could be permitted in the future. If not regulated effectively, such activities could adversely affect Southern Ocean populations of seals and cetaceans. Also, expansion of fisheries, particularly the fishery for Antarctic krill (*Euphasia superba*), could adversely affect seals, whales, and other species dependent on the fish and krill as their primary food source. In some areas, increasing numbers of tourists and construction and operation of scientific stations may also pose threats.

The Marine Mammal Commission conducts a continuing review of fisheries and other activities in the Antarctic that could affect marine mammals directly or indirectly. It has made numerous recommendations to the Department of State, the National Science Foundation, and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service on the need for research and international agreements to effectively regulate sealing, whaling, fisheries, mineral development, and other activities that could directly or indirectly affect marine mammals in the Southern Ocean.

Commission representatives participate in interagency meetings to develop U.S. policies regarding activities in Antarctica and the surrounding seas.

Commission representatives have served as advisors on many delegations to Antarctic Treaty Consultative Meetings and meetings of the Commission and Scientific Committee for the Conservation of Antarctic Marine Living Resources.

Activities and background information concerning activities carried out in 1995 are described below.

Protocol on Environmental Protection to the Antarctic Treaty

As noted in previous Marine Mammal Commission reports, a Protocol on Environmental Protection to the Antarctic Treaty was concluded by the Antarctic Treaty Consultative Parties in October 1991. The protocol includes five annexes. These annexes specify requirements regarding (1) assessment in the planning stages of the possible environmental impacts of activities conducted in the Antarctic Treaty area, (2) conservation of Antarctic fauna and flora, (3) waste disposal and management, (4) prevention of marine pollution, and (5) protection and management of areas of particular historic, scientific, or environmental importance.

The basic intent of the protocol is to improve the effectiveness of the Antarctic Treaty as a mechanism for protecting the Antarctic environment and for ensuring that the Antarctic does not become the scene or object of international discord. It will enter into force when it has been ratified by all 26 of the current Antarctic Treaty Consultative Parties. When it enters into force, it will establish general principles and legally binding obligations to protect the Antarctic environment. It will prohibit any activities relating to mineral exploration and development for at least 50 years.

By the end of 1995, 19 consultative parties had ratified the protocol (Argentina, Australia, Brazil, Chile, China, Ecuador, France, Germany, Italy, Netherlands, New Zealand, Norway, Peru, Poland, Spain, South Africa, Sweden, United Kingdom and Uruguay). The U.S. Senate provided its advice and consent on ratification in October 1992. However, as a matter of general practice, the United States will not deposit its instrument of ratification until legislation has been enacted providing the statutory authority necessary to implement its provisions. By the end of 1995 Congress had not yet enacted implementing legislation.

Environmental Impact Monitoring — When it enters into force, the Protocol on Environmental Protection will require that parties carrying out activities in Antarctica design and conduct programs to verify that the activities do not have unacceptable environmental impacts as defined in the protocol. As noted in the Marine Mammal Commission's annual report for 1992, a meeting of experts on environmental monitoring was held in Buenos Aires, Argentina, on 1-4 June 1992 to determine the types of environmental impacts that could result from research and other activities in Antarctica and the kinds of monitoring programs that would be required to detect possible impacts. Meeting participants included representatives of the Scientific Committee on Antarctic Research, the Council of Managers of National Antarctic Programs, the World Conservation Union, and 20 of the 26 Antarctic Treaty Consultative Parties. A Marine Mammal Commission representative was a member of the U.S. delegation.

The participants concluded that the activities most likely to have impacts relative to the Antarctic Treaty Protocol on Environmental Protection were (1) station and airstrip construction and logistic operations, (2) wastewater and sewage disposal, (3) incineration of waste, (4) power and heat generation, (5) activities involving taking or affecting the habitat of native fauna and flora, (6) scientific research, and (7) accidents resulting in fuel spills or other types of environmental contamination. They recommended that research programs be established at a representative subset of facilities of different types and sizes in different Antarctic environments (*e.g.*, at one or more inland stations built on ice or ice shelves and one or more coastal stations built on rock or earth) to assess their impacts on the surrounding environment.

The meeting report was provided to the XVIIth Antarctic Treaty Consultative Meeting held in Venice on 11-28 November 1992. Following consideration of the report, the representatives of the treaty parties asked that the Scientific Committee on Antarctic Research (SCAR) provide advice on the types of long-

term monitoring programs that would be necessary to verify that Antarctic flora and fauna are not affected adversely by research and other activities in Antarctica and that the Council of Managers of National Antarctic Programs (COMNAP), in consultation with SCAR, establish monitoring programs to determine the environmental "footprint" of different types and sizes of stations in different Antarctic environments.

At the XVIIIth Antarctic Treaty Consultative Meeting held in Kyoto, Japan, on 11-22 April 1994, SCAR and COMNAP jointly reported on steps that they had taken to respond to the requests. They proposed convening a series of technical workshops to consider and provide advice on specific methods and equipment for monitoring selected indicator variables.

This proposal was endorsed by the XVIIIth Consultative Meeting. Because of the complexity of the subject, it was agreed to hold two workshops. The first, held in Oslo, Norway, on 17-20 October 1995, was designed to assess the relative significance of possible impacts from different activities and identify possible monitoring options. The second workshop, to be held at Texas A&M University on 26-29 March 1996, is to provide advice on the design and implementation of an environmental monitoring program in Antarctica, taking into account financial and logistical constraints and the limitations of present technologies. A member of the Commission staff helped develop the terms of reference for both workshops and will participate in the March 1996 workshop.

Waste Disposal and Management — When it becomes effective, Annex III to the Protocol on Environmental Protection will obligate Antarctic Treaty Consultative Parties to reduce, as far as practicable, the amount of waste produced and disposed of in the Antarctic Treaty area. In addition, the annex will obligate parties to clean up both abandoned and current waste disposal sites in Antarctica.

Following conclusion of the protocol in 1991, the National Science Foundation's Office of Polar Programs, the organization responsible for the U.S. Antarctic program, initiated steps to comply with these and other provisions of the protocol. Many of the steps taken to minimize introduction and production of waste at U.S. stations and field camps might be used by other treaty parties. It also might be useful to reduce waste production and disposal problems in remote areas of the Arctic as well as the Antarctic. Therefore, the Marine Mammal Commission will recommend early in 1996 that the National Science Foundation prepare a report describing the steps taken to comply with Annex III and make that report available both to the Antarctic Treaty Consultative Parties and to the eight countries involved in developing and implementing the Arctic Environmental Protection Strategy, described in Chapter VI.

XIXth Antarctic Treaty Consultative Meeting

Article 9 of the Antarctic Treaty specifies that representatives of the treaty parties shall meet periodically to exchange information, consult with each other, and recommend to their governments measures to further the principles and objectives of the treaty. Since the treaty entered into force in 1961, there have been 19 regular consultative meetings and 11 special consultative meetings. Regular consultative meetings provide a mechanism for determining measures needed to better implement the treaty and other components of the treaty system. Special consultative meetings provide a mechanism for dealing with resource and other issues not covered by the treaty. For example, the Convention on the Conservation of Antarctic Marine Living Resources, the Convention on Regulation of Antarctic Mineral Resource Activities, and the previously mentioned Protocol on Environmental Protection to the Antarctic Treaty were negotiated at special consultative meetings.

The XIXth Antarctic Treaty Consultative Meeting was held in Seoul, Korea, on 8-19 May 1995. Matters considered at this meeting included entry into force and implementation of the Protocol on Environmental Protection, liability for damage to the Antarctic environment; tourism and other non-governmental activities in the Treaty area, inspections carried out under Article 7 of the Antarctic Treaty, establishment of additional protected areas, and establishment of a permanent secretariat to facilitate information exchange and organization of consultative meetings.

Entry into Force and Implementation of the Protocol on Environmental Protection — Article 11 of the protocol provides for the establishment of a

group of experts — the Committee for Environmental Protection — to provide advice on measures necessary to effectively implement the various provisions of the protocol. During the XVIIIth Consultative Meeting, it was agreed that a transitional environmental working group would be established and that, at future consultative meetings, this working group would consider agenda items likely to be referred to the Committee for Environmental Protection once the protocol enters into force.

The transitional environmental working group was constituted and met during the first week of the XIXth Consultative Meeting. It considered and provided advice to the plenary on a variety of environment-related issues, including implementation of environmental impact assessment procedures, the environmental impacts of tourism and other non-governmental activities, data and environmental monitoring requirements, and the Antarctic protected area system. A member of the Marine Mammal Commission staff participated in this working group. Actions taken by the plenary on these issues are described below.

During the discussion of environmental impact assessment procedures, a number of delegations indicated a belief that environmental impact assessments required by Annex I should be subject to review and approval by both the transitional environmental working group and the Committee on Environmental Protection to be established when the protocol enters into force. The U.S. delegation noted that, under the terms of the protocol, all parties are to be given the opportunity to review and comment on draft comprehensive environmental evaluations (CEEs), which are comparable to environmental impact statements prepared under the U.S. National Environmental Policy Act, but the decision to proceed or not is to be made by the party or parties contemplating the activity in question. Final CEEs would be subject to review by the Committee on Environmental Protection and Antarctic Treaty Consultative Meetings only if one or more parties question whether their comments on the draft had been addressed satisfactorily or whether the activity in question is inconsistent with the provisions of the protocol.

Although the U.S. view prevailed, some parties continued to believe that both initial and comprehensive environmental evaluations should be subject to review and approval by the Committee on Environmental Protection and, pending entry into force of the protocol, the transitional environmental working group. These parties likely will continue to advocate this point of view. If they prevail, it would mean that neither the United States nor any other Antarctic Treaty Party could undertake activities that might have more than a minor or transitory effect on the Antarctic environment without the prior approval of all Antarctic Treaty Consultative Parties.

Liability for Damage to the Antarctic Environment — Article 16 of the Protocol on Environmental Protection calls on the parties to elaborate rules and procedures to determine liability for damage to the Antarctic environment arising from activities in the Antarctic Treaty area. Toward this end, a group of legal experts met during the XIXth Consultative Meeting to discuss possible provisions for the annex. The group attempted to reach consensus on (1) what should be viewed as damage to the Antarctic environment, (2) the types of damage for which parties should be liable, (3) whether there should be any defenses or limits to liability, and (4) the mechanisms that might be used to determine damage and liability for damage to the Antarctic environment.

Although some progress was made, the group was unable to reach consensus on all related issues. The group met again in Brussels from 27 November to 1 December 1995. Again, while some progress was made, the group was unable to reach consensus on all related issues. The group will meet again during the XXth Consultative Meeting, to be held in the Netherlands from 29 April to 10 May 1996.

Tourism and Non-Governmental Activities — Until 1966 nearly all expeditions to the Antarctic were for scientific purposes and either were organized or had some measure of backing by one or more of the Antarctic Treaty Consultative Parties. In 1966 the first commercially organized tourist expedition occurred. Since then, there has been a steady increase in tourism and other non-governmental activities (*e.g.*, yachting and mountain climbing). In recent years the number of tourists and adventurers visiting Antarctica has surpassed the number of scientists and support personnel working there.

Tourism and other non-governmental activities can interfere with scientific research and, like other activities, can have adverse environmental impacts. The Antarctic Treaty Consultative Parties have recognized these possibilities and adopted a number of measures to govern tourism and non-governmental activities, as well as governmental activities, in the Antarctic. As noted in the Commission's previous annual report, the XVIIIth Antarctic Treaty Consultative Meeting developed and adopted a recommendation calling on the treaty parties to implement agreed "Guidance for Visitors to the Antarctic" and "Guidance for Those Organizing and Conducting Tourism and Non-Governmental Activities in the Antarctic." As also noted in its previous annual report, the Commission contracted in 1994 with a person familiar with the Antarctic tourist industry to design and carry out a field test to determine how best to ensure that visitors are aware of and comply with the guidelines.

Available information and monitoring programs generally are insufficient to predict or detect the effects of tourists expeditions or other activities in the Antarctic. To determine how this problem might best be overcome, the National Science Foundation provided funds in 1994 for a study to (1) characterize the physical and biological features of representative sites in the Antarctic peninsula typically visited by tourist expeditions, and (2) determine whether periodic visits by trained observers aboard tour ships can effectively monitor features that could be affected by visitors.

Preliminary reports from both the Commission and NSF-sponsored studies were provided to the XIXth Consultative Meeting. In addition, New Zealand, Argentina, Chile, and the United Kingdom jointly tabled a paper proposing adoption of standard formats for pre- and post-trip reporting of tourist operations in Antarctica. Although it was agreed that standardized reporting would be desirable, it was not clear how the data required in the proposed reporting forms would be used, whether all the data proposed to be required would be useful, or whether the proposed reporting form would actually facilitate compilation and analysis of data required to effectively assess and monitor the impacts of tourism on the Antarctic environment. The meeting identified the basic information that should be provided to the relevant national authorities (the National Science Foundation in the United States) before and after tourists and other non-governmental expeditions to Antarctica. The meeting agreed that development and adoption of possible standard reporting forms should be considered further at the next consultative meeting.

During the discussion of tourist-related issues, it was noted that the U.S. National Science Foundation annually holds meetings of Antarctic tour operators with U.S. connections to ensure that they are aware of the provisions of the Antarctic Treaty and related agreements and legislation regarding tourism in Antarctica. The National Science Foundation was asked and agreed to explore ways whereby its annual meetings with tour operators might be broadened to help other treaty parties meet their responsibilities regarding tourism. In response, the foundation invited representatives of other treaty parties to attend its 1995 meeting with Antarctic tour operators.

Representatives of several treaty parties, as well as representatives of individual tour operators and the International Association of Antarctic Tour Operators, attended the 13 July 1995 meeting. A Marine Mammal Commission representative attended the meeting and provided a brief overview of the tourism-related issues addressed by the XIXth Consultative Meeting.

Both the Commission and the National Science Foundation representatives encouraged the members of the International Association of Antarctic Tour Operators to review the tourism-related papers that had been submitted for consideration at the XIXth Consultative Meeting and to prepare and present a paper at the next consultative meeting describing the types of data that tour operators believe necessary to effectively assess, monitor, and minimize the impacts of tourism on the Antarctic environment and in what form those data would be most useful. They also suggested that tour operators prepare and table a paper describing how their personnel are trained and how they supervise tourists while they are ashore visiting bird and seal colonies, research stations, and other tourist sites in the Antarctic.

Inspections Under the Antarctic Treaty — Article 7 of the Antarctic Treaty provides that all areas of Antarctica, including all stations, installations, and equipment within those areas and all ships

and aircraft at points of discharging or embarking cargoes or personnel in Antarctica, shall be open at all times to inspection by observers designated by any treaty party. Since the treaty entered into force in 1961, the United States has periodically inspected research stations and support facilities of other nations in Antarctica. In 1995 the United States carried out inspections of eight stations: Dumont d'Urville (France), Mirniy (Russia), Davis (Australia), Zhongshan (China), Syowa (Japan), Newmeyer (Germany), Signey (United Kingdom), and Orcadas (Argentina).

A draft report on the findings of the U.S. inspections was presented at the XIXth Consultative Meeting. Argentina tabled a report on inspections of three stations — King Sejong (Republic of Korea), Rothera (United Kingdom), and Signey (United Kingdom) — that it had carried out between December 1994 and March 1995. No violations of the Antarctic Treaty were observed during these inspections. The U.S. inspection team noted that some fuel storage facilities and transfer practices posed threats to the environment. The United States proposed and the parties agreed that the Council of Managers of National Antarctic Programs should be asked to identify steps that might be taken to improve fuel storage and handling and that this item should be included on the agenda for the next consultative meeting.

On a related matter, the Australian delegation tabled a paper expressing concern about the introduction and presence of non-native species of animals and plants at and near some stations in Antarctica. Such introductions could compete with and introduce exotic diseases to native plants and animals, including marine mammals. For this reason, most introductions would be prohibited by Article 4 of Annex II of the Protocol on Environmental Protection.

The meeting recommended that parties (1) examine their facilities in Antarctica to identify any non-native species present in or in the vicinity of the facilities, (2) remove any non-native species found unless they are present in accordance with an appropriate permit, and (3) take such other action as necessary to prevent the introduction of non-native species of animals and plants into Antarctica.

Antarctic Treaty Secretariat — Antarctic Treaty Consultative Meetings are organized and hosted by the consultative parties on a rotating basis. Information concerning member states' activities in Antarctica is shared through an annual information exchange. The number of treaty parties and the level of international interest in Antarctica have both increased substantially since the treaty was concluded in 1959.

Organization of consultative meetings, exchange of information, and implementation of the Protocol on Environmental Protection all could be enhanced by establishment of a permanent secretariat. As noted in the Commission's previous annual report, agreement was reached in principle at the XVIIth Consultative Meeting on the need for and the general functions of a small secretariat. The matter was discussed further at the XVIIIth and XIXth Consultative Meetings.

Although the need for a permanent secretariat is widely recognized, it has not been possible to reach consensus on where it should be located, how it should be funded and staffed, or what legal status it should be afforded. The principal impediment has been the inability of Argentina and the United Kingdom to agree on where the secretariat should be located. The matter will be considered again at the 1996 Consultative Meeting.

Activities Related to Marine Living Resources

Several countries began experimental fisheries for krill and finfish in the Southern Ocean in the 1960s. As noted in previous Commission annual reports, concerns that those fisheries, particularly the krill fishery, could adversely affect seals, whales, and other non-target species, as well as target species, led the Antarctic Treaty Consultative Parties to negotiate and adopt the Convention on the Conservation of Antarctic Marine Living Resources.

The Convention was concluded in May 1980 and entered into force in April 1982. Among other things, it established the Commission and the Scientific Committee for the Conservation of Antarctic Marine Living Resources. The Commission and Scientific Committee meet annually. The Marine Mammal Commission's involvement in negotiating the Convention and its participation in the first 13 meet-

ings of the Commission and Scientific Committee are described in previous annual reports.

The XIVth meetings of the Commission and Scientific Committee for the Conservation of Antarctic Marine Living Resources were held in Hobart, Tasmania, Australia, from 24 October to 3 November 1995. The principal results of these meetings are described below.

[Meeting reports and other information concerning the Commission and Scientific Committee for the Conservation of Antarctic Marine Living Resources can be obtained by writing the Commission for the Conservation of Antarctic Marine Living Resources, 25 Old Wharf, Hobart, Tasmania, 7000, Australia.]

The Krill Fishery — The total Antarctic krill catch reported in 1994-1995 was 118,715 metric tons (mt), approximately 33 percent greater than the reported catch of 83,818 mt in 1993-1994. The increase was due to an increase in the catch by the Ukraine from 8,708 mt in 1993-1994 to 48,886 mt in 1994-1995. As in past years, most of the catch was from statistical areas 48.1, 48.2, and 48.3 (the areas around Elephant Island, the South Sandwich Islands, and South Georgia Island).

In 1991 the Antarctic Living Resources Commission established a 1.5-mt precautionary catch limit on krill in statistical area 48. In 1994 the Scientific Committee advised the Commission that a number of the variables used to calculate the precautionary catch limit were conservative and that calculations using less conservative values indicated that a 4.1-mt precautionary catch limit might be more appropriate.

As noted in the Marine Mammal Commission's previous annual report, the data used in these calculations are more than ten years old. Also, the model used as the basis for the calculations incorporates a number of assumptions concerning the discreteness and productivity of krill stocks and their relationships with krill predators that cannot presently be verified and may be wrong.

During the 1995 meeting of the Working Group on Ecosystem Monitoring and Management (see below) and the later meetings of the Antarctic Living Resources Commission and Scientific Committee, U.S. representatives called attention to the uncertainties and the possible consequences if management decisions are based on assumptions that are not conservative and cannot be verified. The Scientific Committee advised the Commission that a synoptic survey of krill biomass in statistical area 48 should be afforded high priority and recommended that plans for such a survey be developed. The Commission endorsed the Scientific Committee's recommendation. The Commission also endorsed the Scientific Committee's plans to develop a booklet describing their approach to ecosystem monitoring and management in layman's terms, and called on the Scientific Committee to include in the booklet an explanation of the assumptions used in the calculations of precautionary catch limits.

Effective implementation of the Antarctic Living Resources Convention requires that the Commission be made aware of and take into account uncertainties concerning the size and productivity of stocks of krill and other species being harvested and the possible effects of that harvesting on other components of the Southern Ocean food web. Toward this end, the Marine Mammal Commission will continue to work in 1996 with the National Marine Fisheries Service, the National Science Foundation, and the Department of State to (1) ensure that the best available data and models are used to estimate the levels of krill harvest that can be sustained in different areas without adversely affecting either the krill stocks or krill-dependent species, and (2) determine the krill and predator monitoring programs necessary to confirm that the levels of krill catch do not have unacceptable impacts on either krill or krill-dependent predators.

Finfish Fisheries — A total of 12,933 mt of finfish was taken from the convention area during the 1994-1995 fishing season. The principal target species was Patagonian toothfish (*Dissostichus eleginoides*). The reported catches of this species were 3,241 mt in statistical area 48.3 (South Georgia), 5,564 mt in area 58.5.1 (Kerguelen), and 115 mt in area 58.6. The only other reported catch was 3,936 mt of mackerel icefish (*Champsocephalus gunnari*) in statistical subarea 58.5.1.

The Scientific Committee estimated that the take of *D. eleginoides* in sub-area 48.3 and the adjacent Rhine

and North Banks has been substantially greater in each of the past five years than either the authorized or the reported catch. In 1995, for example, the Scientific Committee estimated that the actual catch was 6,171.1 mt while the reported and authorized catches were 3,301.1 mt and 2,800 mt, respectively. Much of the unreported catch appears due to continued fishing after the authorized catch level has been reached and legal fishing has ended for the year. Many of the vessels that have been sighted apparently fishing illegally were registered in Argentina or Chile. Both countries have taken steps to identify and prosecute the owners and operators of vessels fishing illegally. The efforts to date appear, however, to have had limited success.

At both the 1994 and 1995 meetings of the Commission for the Conservation of Antarctic Marine Living Resources, the U.S. delegation has proposed mandating use of an automated satellite-linked vessel monitoring system to help identify vessels fishing in closed areas or during closed seasons. Other countries have proposed that fishing vessels be required to report when they are entering and leaving areas where fisheries are regulated by agreed conservation measures. Some parties believe that both mandatory reporting and automated vessel monitoring would infringe on either high seas rights or national jurisdiction in claimed areas. Thus, while the need to stop illegal fishing is recognized, it has not been possible to develop a consensus on how to do so.

Possible means for detecting and stopping illegal fishing will be considered again at the next meeting of the Antarctic Living Resources Commission. The Marine Mammal Commission will continue to work with the Department of State and the National Marine Fisheries Service to identify and prepare working papers proposing measures that might be taken to stop illegal fishing.

The Crab Fishery — At present, the crab fishery is the only Southern Ocean fishery in which a U.S. fishing vessel is involved. As noted in the Marine Mammal Commission's previous annual report, this is an exploratory fishery governed by conservation measures enacted in 1993 and continued each year since then. The fishery is limited to statistical area 48.3 and the total allowable catch is 1,600 mt. The management plan developed for this exploratory fishery has established an important precedent for other new and developing fisheries.

Incidental Mortality — Many species of marine mammals, seabirds, sea turtles, and non-target fish species are caught incidentally in commercial fisheries throughout the world. Many also are caught and killed in lost and discarded fishing gear or die from eating plastics and other non-digestible material discarded at sea.

As noted in previous Marine Mammal Commission annual reports, the Commission and Scientific Committee for the Conservation of Antarctic Marine Living Resources have taken a number of steps to assess and prevent such mortality in the Southern Ocean. Fishermen are required to report both lost fishing gear and all incidents of marine mammals, seabirds, and other non-target species caught incidentally in the convention area. Placards and information brochures have been prepared and distributed to ensure that fishermen are aware of hazards posed by lost and discarded fishing gear and other potentially hazardous materials and to advise them of what they can do to prevent such materials from being lost and discarded at sea. To prevent seabirds from being attracted to bait from hooks on longlines, longlines can be set only at night, trash and offal cannot be dumped when longlines are being set or hauled and streamers must be towed during deployment of longlines to discourage birds from attempting to take bait from hooks.

Incidental catch data reported to the Antarctic Living Resources Commission in 1995 indicate that the mortality of albatrosses incidental to longline fisheries in the convention area has been reduced by nearly 80 percent and that the reduction would have been nearly 100 percent, had all longliners complied fully with the mortality-reduction measures described above. However, catches of white-chinned petrels increased, presumably because this species is active at night when longlines are to be set and retrieved.

As noted earlier, there is evidence of substantial illegal longline fishing, particularly in statistical area 48.3. Vessels fishing illegally do not report catches of either target or non-target species and probably do

not employ the measures required to minimize incidental mortality. Further, many of the seabird and other non-target species being caught and killed in fisheries in the convention area also are caught and killed in fisheries outside the convention area. Thus, while there is reason to believe that measures instituted by the Antarctic Living Resources Commission have reduced seabird mortality in the convention area, data are insufficient to accurately estimate the level of unreported take or the impacts of the take on the affected stock. Further, it is not clear whether there is significant under-reporting of incidental catches of marine mammals, seabirds, and other non-target species in krill or other trawl fisheries.

Ecosystem Monitoring and Management — The Convention for the Conservation of Antarctic Marine Living Resources is unique in that it specifies that fisheries must be managed to prevent adverse impacts on other species dependent on or associated with harvested species, as well as to prevent over-exploitation and depletion of harvested species. As noted in previous Marine Mammal Commission annual reports, the Scientific Committee for the Conservation of Antarctic Marine Living Resources established a working group in 1984 to formulate and coordinate implementation of a multinational program to assess and monitor the status of key components of the Antarctic marine ecosystem. The working group developed and recommended adoption of a long-term monitoring program with three components: (1) monitoring of representative land-breeding krill predators (*e.g.*, Antarctic fur seals and Adelie and chinstrap penguins) at a network of sites throughout the Antarctic, (2) comprehensive studies of krill, krill predators, and environmental variables in three integrated study areas (Prydz Bay, the Bransfield Strait, and the area around South Georgia Island), and (3) directed studies of crabeater seals, one of the principal consumers of Antarctic krill, in one or more pack-ice areas.

Because of the central role of krill in the Antarctic marine ecosystem, there necessarily has been some overlap in the responsibilities of this working group and of the working group constituted to assess and provide advice on krill stocks. In 1993 and 1994 portions of the intersessional meetings of these two working groups were held concurrently to consider issues of joint interest. In 1995 the two groups were combined to form the working group on ecosystem monitoring and management.

The new working group met for the first time in August 1995. Prior to the meeting, the Department of State, in consultation with the Marine Mammal Commission, the National Marine Fisheries Service, and the National Science Foundation, convened a meeting of U.S. scientists with firsthand experience in studying and modeling various components of the Antarctic marine ecosystem to provide advice on a range of matters to be considered by the new working group. The advice of this *ad hoc* group of scientists was used to help develop U.S. positions regarding issues considered at the working group meeting and the subsequent meetings of the Antarctic Living Resources Commission and Scientific Committee.

At its meeting in August 1995 the working group on ecosystem monitoring and management began formulation of a strategic model to assist in the assessment of measures needed to maintain the integrity of the Antarctic marine ecosystem and to evaluate the effectiveness of management actions taken. The model incorporates biological, environmental, and fishery variables and the links between them. Both the Scientific Committee and the Commission endorsed formulation of a strategic model as proposed by the working group. They also noted the overlap between the location of much krill harvesting and the foraging areas of krill-dependent predators and the need to (a) ensure that krill catches are not concentrated in time and space to an extent that local populations of dependent species may be affected adversely and (b) take into account relevant biological and environmental variables, and uncertainties concerning those variables, when determining precautionary catch limits and subdividing limits set for broad areas.

Continued formulation of a strategic ecosystem model and other ecosystem-related matters will be considered further at the next meeting of the working group to be held in Bergen, Norway, 12-22 August 1996. The Department of State, in consultation with the Commission, the National Marine Fisheries Service, and the National Science Foundation, plans to convene a meeting of knowledgeable U.S. scientists early in 1996 to help identify issues that should be

pursued at the working group meeting and the subsequent meeting of the Conventin's Scientific Committee. The Marine Mammal Commission will continue to work with these agencies to determine how best to implement the ecosystem-approach to fisheries management mandated by the convention.

Resumption of Closed Fisheries — Fisheries often develop faster than the information base necessary to estimate optimum sustainable yield levels. Rapid development in turn often leads to overcapitalization of fisheries, over-exploitation of fishery resources, and management to minimize loss of investment capital rather than management to maintain productivity of the resource.

The Commission for the Conservation of Antarctic Marine Living Resources has recognized this dilemma and adopted guidelines to ensure that new and exploratory fisheries develop and grow no faster than the information base necessary to estimate the size and productivity of the target stock and its interactions with other species. During the 1995 meetings of the Commission and the Scientific Committee for the Conservation of Antarctic Marine Living Resources, U.S. representatives suggested that it would be desirable to develop similar guidelines for ensuring that fisheries that have been closed because of depletion of the target stock do not again cause depletion of the stock if resumed. Both the Commission and the Scientific Committee endorsed this suggestion.

The content of a possible conservation measure to guide reopening of closed fisheries will be considered at the 1996 meetings of the Antarctic Living Resources Commission and Scientific Committee. The Marine Mammal Commission will work with the National Marine Fisheries Service, the Department of State, the National Science Foundation, the Antarctic and Southern Ocean Coalition, and relevant U.S. scientists to identify provisions that should be included in such a conservation measure.

Proposed Overview of Measures Taken to Implement the Convention — During the 1995 meeting of the Antarctic Living Resources Commission, several members questioned whether conservation measures implemented unilaterally by other members were consistent with the intent and provisions of the Convention. They proposed and it was agreed that efforts to date to implement the Convention should be reviewed at the 1996 Commission meeting.

The Marine Mammal Commission believes that efforts to implement the Convention have been innovative and generally successful. The Commission also believes that many of the measures enacted to give effect to the Convention establish important precedents that can guide ecosystem-oriented management of fisheries in other geographic areas. Further, the Commission believes that there may well be additional steps that might be taken to improve implementation of the Convention and that the proposed review of steps taken to date can help to identify those measures. The Commission therefore will work with the Department of State, the National Marine Fisheries Service, the National Science Foundation, and interested scientists and environmental groups to identify issues that might be raised during the review in 1996.

U.S. Antarctic Marine Living Resources Research Program

The Antarctic Marine Living Resources Convention Act of 1984 provides the domestic legislative authority necessary for the United States to implement the Convention of Antarctic Marine Living Resources. Among other things, the Act directs the National Science Foundation to continue to support basic marine research in the Antarctic and that the Secretary of Commerce, in consultation with the Secretary of State, the Director of the National Science Foundation, and appropriate officials of other Federal agencies, such as the Marine Mammal Commission, prepare, implement, and annually update a plan for directed research necessary to effectively implement the Convention. The Secretary of Commerce has delegated responsibility for designing and conducting the directed resource program to the National Marine Fisheries Service. The Service in turn has delegated responsibility for the program to the Southwest Fisheries Science Center in La Jolla, California.

[Information on this program and related matters can be obtained from the Chief, Antarctic Ecosystem Research Group, Southwest Fisheries Science Center, P.O. Box 271, La Jolla, California 92038.]

The National Marine Fisheries Service's directed research program has two principal elements: (1) ship-supported studies of krill and related oceanographic conditions in the waters near Elephant Island (part of the Bransfield Strait Integrated Study Area noted earlier); and (2) land-based studies of penguins and seals on Seal Island (a small island off the northwest coast of Elephant Island) that could be affected indirectly by krill harvesting in the Elephant Island area. Between mid-January and early March 1995, the NOAA R/S *Surveyor* carried out seven surveys to document and determine seasonal and inter-annual variation in krill distribution and abundance and related oceanographic features in the vicinity of Elephant Island. Average krill abundance was about one-third that found during the previous three field seasons. Mostly older age classes were found, indicating relatively poor recruitment since the 1990/1991 year class. The poor recruitment in the past three years appears linked to less than normal winter sea ice in the Antarctic area during this period.

Land-based studies of penguins and seals on Seal Island were conducted from December 1994 through February 1995. Births and growth rates of fur seal pups were lower than in previous years. However, the average weight of pups was similar to that in previous years, suggesting that their mothers were able to find sufficient food to produce normal quantities of milk for nursing. The number of breeding chinstrap penguins present was lower than in all past years except 1990/1991 and the number of breeding macaroni penguins present was the lowest yet observed on Seal Island. Fledgling success for chinstrap chicks was the second highest ever recorded on the island, suggesting an adequate food supply offshore.

The R/V *Surveyor* was decommissioned in 1995. In October 1995 the National Oceanic and Atmospheric Administration's Office of Corp Operations, which operates the agency's fleet of ships, contracted a Russian research vessel, the R/V *Yuzhmorgeologiya*, to conduct a series of krill and other studies in the Bransfield Strait area beginning in 1996.

As noted in the Commission's previous annual report, an assessment of the Seal Island study site done during the 1993-1994 austral summer indicated that the support camp was located in an area where heavy rains and earthquakes could lead to landslides and tidal waves that could destroy the camp. Also as noted in the Commission's previous annual report, participants in a meeting convened by the Department of State on 14 November 1994 advised that the Seal Island research program be transferred to a safer site as soon as possible and that site selection should take into account the results of oceanographic modeling and other related studies being done by the National Science Foundation grantees. Participants in the meeting also advised that efforts to implement the Convention on the Conservation of Antarctic Marine Living Resources might be enhanced by involving scientists from U.S. academic institutions in both the National Marine Fisheries Service's directed research program and the work of the Convention's Scientific Committee and its subsidiary bodies.

There was insufficient time at the 14 November 1994 meeting to identify and fully consider all of the steps that might be taken to improve implementation of both the U.S. Antarctic Marine Living Resources Research Program and the Convention for the Conservation of Antarctic Marine Living Resources. Consequently, the Department of State, in consultation with the Commission, the National Marine Fisheries Service, and the National Science Foundation, held a second meeting of government and academic scientists on 22 June 1995 to seek advice on a variety of issues regarding implementation of the Living Resources Convention and the National Marine Fisheries Service's directed research program.

Among other things, the meeting participants noted that land-based studies of krill predators were an essential component of the Living Resources Convention's ecosystem monitoring program. They advised that the Seal Island research program be reestablished at a new site as soon as possible and that the new site be as far south as possible, within the area where krill fishing normally occurs in the Antarctic Peninsula area, to allow further collaboration with the Palmer Station Long-Term Ecological Research Program being supported by the National Science Foundation.

By the end of 1995 the National Marine Fisheries Service had not yet decided where to relocate the Seal Island research program. Counts of fur seals and penguins and the weighing of a small sample of fur

seal pups in Seal Island were scheduled to be done early in 1996 to continue developing the database on species that could be affected by the krill fishery. Surveys of possible alternative monitoring sites also were planned for 1995-1996.

The Antarctic Pack-Ice Seals Program

As noted above, the ecosystem monitoring program recommended by the Scientific Committee for the Conservation of Antarctic Marine Living Resources included directed studies of crabeater seals in one or more pack-ice areas. As noted in the Commission's previous annual report, nothing was done until 1992 to initiate directed studies of crabeater seals, one of the principal consumers of Antarctic krill. In 1992 the Scientific Committee on Antarctic Research's Group of Specialists on Seals outlined the basic components of an international research program necessary to assess the ecological importance of crabeater seals and other pack-ice seals in the Antarctic marine ecosystem.

A general program prospectus was developed in 1993 and a five-year plan for implementing the program was developed in 1994. A program planning meeting was held at the U.S. National Marine Mammal Laboratory in Seattle, Washington, on 7-9 June 1995. Twenty-six scientists from nine nations participated in the planning meeting. The participants proposed that a circumpolar survey of seal distribution and abundance in the Antarctic ice pack be carried out during the 1998-1999 austral summer and estimated the amount of ship and aircraft support that would be required to conduct the survey. They also determined the types of behavior, genetics, disease, diet, and ecotoxicology studies that should be done to improve understanding of the basic biology and ecology of pack-ice seals. They formed four task groups to coordinate collection, processing, and analysis of data.

If implemented as proposed, the Antarctic Pack-Ice Seal Program would resolve many uncertainties concerning the role of seals in the Antarctic marine ecosystem and whether long-term, directed studies of crabeater seals would be useful for detecting the possible ecological effects of the krill fishery and other human activities in Antarctica. In 1996 the Marine Mammal Commission will continue to work with the National Marine Fisheries Service, the National Science Foundation, and the Department of State to try to find the financial and logistic support necessary to implement the program.

Convention on International Trade in Endangered Species of Wild Fauna and Flora

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) provides an international framework for regulating trade in animals and plants that are or may become threatened with extinction. The Convention entered into force in 1975 and has been signed by 130 parties. During 1995 two additional nations became signatories to the Convention; they are Belarus and Dominica. Within the United States, the Fish and Wildlife Service acts as the lead agency for Federal actions carried out under the Convention.

The Convention provides for three levels of trade control. Depending on the extent to which a species is endangered, it may be included in one of three appendices to the Convention. Appendix I includes those species considered to be threatened with extinction and that are or may be affected by trade. Appendix II includes species that are not necessarily threatened with extinction but could become so unless trade in them is strictly controlled. Species may also be included on Appendix II if they are so similar in appearance to a protected species that the two could be confused. Appendix III includes species that any party identifies as being subject to regulation within its jurisdiction for the purpose of preventing or restricting exploitation and for which the party needs the cooperation of other parties to control trade. Additions or deletions of species listed on Appendices I and II require concurrence by two-thirds of the parties voting on a listing proposal. Species may be placed on Appendix III unilaterally by any party.

Parties to the Convention meet every two-and-a-half years to consider, among other things, additions and deletions to the appendices. The next Conference of Parties is scheduled for 9-20 June 1997 in Victoria Falls, Zimbabwe.

During the Ninth Conference of Parties, held 7-18 November 1994 in Fort Lauderdale, Florida, the CITES parties adopted a resolution revising the criteria used for listing species on the appendices. The role of the United States, and the Marine Mammal Commission, in developing the revised criteria is discussed in detail in the previous annual report.

Proposed Changes to the Appendices

As noted in the previous annual report, in 1993 the Environmental Investigation Agency proposed that the narwhal (*Monodon monoceros*) be transferred from Appendix II to Appendix I. In its submission to the Fish and Wildlife Service, the petitioner argued that abundance assessments for many narwhal populations are inadequate and that international trade in narwhal ivory is placing unsustainable pressure on the species.

The Marine Mammal Commission commented on the proposal, noting that, while there was insufficient evidence to demonstrate that any stock of narwhal is threatened with extinction, it shared a concern that current harvest levels of some stocks may be unsustainable and that better information is needed on status and trends and on harvest levels. Based on these comments and others, the Fish and Wildlife Service concluded that evidence did not support adding the narwhal to Appendix I, and the proposal was not put forward at the Ninth Conference of Parties.

In preparation for the 1997 meeting in Zimbabwe, the Fish and Wildlife Service plans to publish a notice in the *Federal Register* in February or March 1996, requesting information on species that should be considered for addition to or deletion from the appendices or transfer from one appendix to another. As of the end of 1995 the Commission was not aware of any plans to request listing actions involving marine mammals. However, it was anticipated the reclassification of narwhals may again be proposed.

CITES Significant Trade Reviews

As noted, species listed on Appendix II may be traded, provided that the country of export has granted a permit for the shipment. Countries issuing permits must make a finding that the export will not be detrimental to the survival of the species concerned and that the specimens were legally obtained. Issuance of permits must be monitored and, if necessary, limited "in order to maintain that species throughout its range at a level consistent with its role in the ecosystems in which it occurs and well above the level at which that species might become eligible for inclusion in Appendix I."

It order to determine whether such limitation is necessary, the CITES Animals Committee undertakes reviews of species for which there are significant amounts of international trade. As noted above, there is concern that international trade in narwhal ivory may be causing harvests to reach unsustainable levels. In 1995 the CITES Animals Committee initiated a study on the level of trade involving the narwhal. Based on its review, the committee is expected to issue a report and recommendations in 1996.

CITES Permit Request

The sea otter (*Enhydra lutris*) is listed on CITES Appendix II, which means that international trade in sea otters or parts is subject to regulation. On 1 April 1994 Kuiu Kwan Inc., of Lynnwood, Washington, applied to the Fish and Wildlife Service for a CITES permit to export sea otter pelts to several foreign countries. This application, which was denied, is discussed in the sea otter section in Chapter III.

Illegal Trade in Whale Meat

Since 1979 CITES parties have cooperated with the International Whaling Commission to prevent trade in whale meat from any species or stock protected from commercial whaling by the IWC. As discussed in the previous annual report, in 1994 CITES parties adopted a resolution recognizing the need for the IWC and CITES to cooperate and exchange information on international trade in whale products. The resolution urged countries to report any incidents of illegal trade in whale products to the CITES secretariat.

As noted above, in response to the CITES resolution, the IWC at its 1995 meeting in Dublin, Ireland, adopted a resolution aimed at improving mechanisms to prevent illegal trade in whale meat.

Chapter VI

ACTIVITIES RELATED TO MARINE MAMMALS IN THE ARCTIC

More than a dozen species of marine mammals inhabit the Arctic Ocean and surrounding seas, either seasonally or throughout the year. They include bowhead and beluga whales, ringed, ribbon, bearded, and spotted seals, polar bears and walruses. Each of these species has been an important component of the culture and subsistence of Arctic Natives for thousands of years. The ranges of most marine mammals occurring in the Arctic include the high seas and areas under the jurisdiction of more than one country. Consequently, effective conservation of these species and their habitats require cooperative action by the range states.

Congress recognized the importance of marine mammals to coastal Alaska Natives when it enacted the Marine Mammal Protection Act in 1972. Section 102 of the Act exempts coastal Alaska Natives from the Act's provisions governing the taking of marine mammals when the taking is not wasteful and is done for subsistence purposes or for purposes of creating and selling authentic Native articles of handicraft and clothing. Section 119, added to the Act in 1994, gives the Secretaries of Commerce and the Interior explicit authority to enter into co-management agreements with Alaska Native organizations.

Bowhead whales, polar bears, walruses, and other Arctic marine mammals have been subjected to commercial as well as subsistence hunting, mostly in the past 100 years. Commercial hunting was largely unregulated and, because market demand generally was greater than the annual replacement level, led inevitably to overexploitation and depletion of the stocks. Both the marine mammal stocks and the Native Arctic residents who depended on them for food, clothing, and other necessities were affected.

The consequences of unregulated or poorly regulated commercial and subsistence hunting have been widely recognized. As noted elsewhere in this report, commercial hunting of bowhead whales has been prohibited by the International Whaling Commission (IWC), and Alaska Natives have formed the Alaska Eskimo Whaling Commission, which works cooperatively with the IWC and U.S. Federal and state agencies to ensure that Native subsistence and cultural needs are met without jeopardizing recovery of the western Arctic bowhead stock. Also as noted elsewhere in this report, a number of government-to-government and Native-to-Native agreements have been or are being concluded to cooperatively manage populations of polar bears and other marine mammals shared with other countries. The possible adverse effects of industrial development and pollution on the Arctic environment and on resident peoples also have been recognized. The following sections describe a number of ongoing activities of particular importance to the conservation of marine mammals and their habitats in the Arctic.

Arctic Environmental Protection Strategy

In June 1991 the eight Arctic countries — Canada, Denmark (for Greenland), Finland, Iceland, Norway, the Russian Federation, Sweden, and the United States — adopted the Arctic Environmental Protection Strategy. The goals of the strategy are to preserve the environmental quality and natural resources of the Arctic, reduce pollution and monitor environmental conditions, and accommodate the traditional cultural and subsistence needs, values, and practices of indigenous peoples, insofar as they relate to the environment and natural resources of the Arctic.

The strategy notes specific problems and priorities with regard to persistent organic contaminants, oil pollution, heavy metals, noise, radioactivity, and acidifying substances from various sources. Working groups have been established to develop and oversee implementation of four program areas: Arctic monitoring and assessment; protection of the Arctic marine environment; emergency prevention, preparedness, and response; and conservation of Arctic flora and fauna. A task force was created in 1994 to identify and initiate cooperative actions to promote sustainable development and utilization of Arctic resources.

The Arctic Environmental Protection Strategy contains no legally binding obligations. However, the eight signatory nations have committed themselves to implementing it. Senior Arctic officials from the eight nations meet at least once a year to review work being done by the various working groups and to identify additional measures that might be taken. Ministerial-level meetings are held approximately every other year to provide overall guidance. Representatives of three international Arctic indigenous peoples organizations have been granted permanent participant status and are entitled to attend all working group, senior Arctic officials, and ministerial meetings. The organizations are the Inuit Circumpolar Conference, the SAAMI Council, and the Association of Indigenous Minorities of the North, Siberia and the Far East of the Russian Federation. As noted in the Marine Mammal Commission's previous annual report, the Commission and the Department of State cooperatively provided funding to the Inuit Circumpolar Conference in 1994 to ensure that Alaska Natives could participate in key meetings.

The Department of State has lead responsibility for developing and overseeing general U.S. policy regarding implementation of the strategy. The Department of State also has lead responsibility for formulating and implementing U.S. policy regarding the Task Force on Sustainable Development and Utilization. Other agencies have lead responsibility for the remaining program areas: the National Science Foundation and the National Oceanic and Atmospheric Administration share lead responsibility for coordinating U.S. policy and activities regarding Arctic monitoring and assessment; the Fish and Wildlife Service has lead responsibility for coordinating U.S. policy and activities concerning conservation of Arctic flora and fauna; the Coast Guard has lead responsibility for U.S. activities regarding emergency prevention, preparedness, and response; and the National Oceanic and Atmospheric Administration has lead responsibility for U.S. activities regarding protection of the Arctic marine environment.

General policy formulation is coordinated through an interagency working group chaired by the Department of State. This group includes representatives of the Marine Mammal Commission, the Arctic Research Commission, the Environmental Protection Agency, the U.S. Geological Survey, the Department of Defense, and the National Park Service, as well as the previously mentioned agencies.

Proposed Formation of an Intergovernmental Arctic Council

Many of the Arctic nations believe a more formal, intergovernmental organization is necessary to effectively implement the Arctic Environmental Protection Strategy and to address other matters of mutual regional concern. At a meeting of senior Arctic officials in Iqaluit, Canada, on 15-17 March 1995, Canadian officials proposed that an informal meeting be held in June 1995 to draft an agreement establishing an intergovernmental Arctic council that could be concluded at the ministerial meeting expected to be held in March 1996.

The drafting meeting was held in Ottawa on 6-7 June 1995. In preparation, the Department of State conveyed to the other Arctic nations a set of points outlining the United States' general approach to the formation of the proposed council. The communique indicated the U.S. view that the proposed Arctic council should have two primary functions: (1) oversight and coordination of efforts to implement the Arctic Environmental Protection Strategy, and (2) provision of a forum for addressing issues regarding sustainable development in the Arctic.

With regard to the second point, it noted that a number of the issues raised within the Task Force on Sustainable Development and Utilization had addressed domestic legislative prerogatives and interna-

tional legal obligations that were beyond the mandate of the Arctic Environmental Protection Strategy. For example, several papers tabled by task force members had advocated amendment of the Marine Mammal Protection Act to eliminate restrictions on import into the United States of furs and other articles and products derived from marine mammals. Other papers had proposed that Arctic nations take collective action to restore markets for seal skins and other marine mammal products in the United States and Europe.

Canada subsequently prepared and circulated a paper to serve as the basis for discussion at the June 1995 meeting. The paper, entitled "The Arctic Council: Objectives, Structure, and Program Priorities," placed substantial emphasis on development. For example, it proposed that the Arctic council afford priority attention to such things as management and development of both renewable and non-renewable resources, promotion of circumpolar trade, and development of Arctic transportation and communication systems. It proposed formation of additional working groups to address a range of development-related issues. It made no provision for involving non-Arctic countries in the work of the council even though many non-Arctic countries have legitimate interests and are carrying out research relevant to the protection of the Arctic environment.

A member of the Marine Mammal Commission staff served as an advisor to the U.S. delegation to the June 1995 meeting. The meeting produced general agreement on a number of key points. For example, it was generally agreed that the council should be formed by signature of a non-binding declaration; that indigenous peoples groups should be afforded permanent participant status; that the four Arctic Environmental Protection Strategy working groups should be continued under the umbrella of the council; that additional working groups should be established as necessary to address economic, social, cultural, and other issues of common interest; and that secretarial duties should rotate with the host of council meetings.

The meeting revealed substantially different views among the participants on a number of key points. For example, there was no consensus on how the Arctic council should interact with existing regional and international bodies involved in Arctic issues. Nor was there consensus on broadening representation of indigenous peoples on the council or involving non-Arctic countries in the activities of the council. It was agreed that Canada would prepare a draft declaration taking into account the various views expressed during the meeting, and that a second informal negotiating session would be held during a meeting of senior Arctic officials in Washington, D.C. on 6-8 September 1995.

Following the Ottawa meeting, Canada prepared and circulated a draft "Charter on the Establishment on the Arctic Council." The U.S. Government views on the draft were developed through the interagency process and were communicated to Canada on 2 August 1995. A small drafting group met in Copenhagen in July 1995 to prepare a draft declaration for consideration at the 6-8 September meeting in Washington, D.C. This draft, dated 16 August 1995, was forwarded to the meeting participants late in August.

During the first day of the Washington meeting, representatives of international and regional organizations, non-Arctic states, indigenous peoples groups, and public interest groups were given the opportunity to explain their interests in Arctic affairs and how they would like to be involved in the activities of the Arctic council. Much of the discussion the next two days focused on the possible role of non-Arctic states in the work of the council and a proposal by the United States that two Alaska Native groups — the Council of Athabascan Tribal Governments and the Aleutian/Pribilof Island Association — be afforded permanent participant status comparable to that proposed in the draft declaration to be afforded to the three groups mentioned above. These and a number of other issues could not be resolved. It was agreed that further discussions would be held during the meeting of senior Arctic officials in Toronto on 29 November - 1 December 1995. Participants in the 6-8 September meeting were requested to forward comments on the 16 August draft declaration to Canada by 1 October 1995.

The United States provided comments on the 16 August working draft as requested, and Canada prepared and circulated a revised draft on 6 November 1995. The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors,

reviewed the revised draft and provided comments to the Department of State on 22 November 1995. The Commission noted that the revised draft, dated 3 November 1995, reflected few of the points raised by the United States during the September 1995 meeting of senior Arctic officials and in comments on the 16 August draft provided to Canada 29 September 1995.

In the Commission's view, the 3 November draft was a step backward from the preceding draft. It highlighted the development focus advocated by Canada and, as a consequence placed reduced emphasis on the Arctic Environmental Protection Strategy. The Commission recommended that it be made clear to Canada and other Arctic nations that the United States could not agree to provisions in a charter or declaration establishing an Arctic council that arguably would commit the U.S. Government to seek amendment of the Marine Mammal Protection Act and that would establish the council as the appropriate body for resolving trade and other disputes that arise among Arctic states.

The Department of State shared many of the Commission's concerns. It advised the other Arctic governments of these concerns in advance of the meeting of senior Arctic officials in Toronto. Among other things, the Department of State advised the Arctic governments that the council, as envisioned in the 3 November 1995 draft, went beyond what the United States viewed as a useful, high-level forum in which governments could address issues of mutual regional concern. It pointed out that the 3 November draft proposed a broad and ill-defined mandate for promoting sustainable development of Arctic resources, a mandate that could impinge on domestic policy prerogatives and international obligations of Arctic governments.

During the meeting of senior Arctic officials in Toronto, the United States tabled a simple, abbreviated declaration for establishing the Arctic council. The proposed U.S. text did not receive wide support. Recognizing that attempting to develop a consensus agreement for adoption at the March 1996 ministerial meeting could interfere with preparations for that meeting, the senior Arctic officials agreed to defer further consideration of the Arctic council until after the ministerial meeting. Canada offered to host a two- or three-day meeting in Ottawa immediately following the ministerial meeting to continue efforts to formulate a consensus declaration establishing the council. At the end of the year, no arrangements had yet been made to continue the discussions.

The Marine Mammal Commission believes that effective implementation of the Arctic Environmental Protection Strategy is important to the long-term welfare of both Arctic marine mammal stocks and the Alaska Natives who depend on them for subsistence. The Commission also believes that the proposed Arctic council, if structured appropriately, could provide a useful intergovernmental forum for promoting implementation of the Arctic Environmental Protection Strategy and other matters of mutual regional interest. The Commission will continue to work with the Department of State and other U.S. agencies to seek agreement on the establishment of an Arctic council, as well as to promote implementation of the Arctic Environmental Protection Strategy.

Agreements Related to Polar Bears

Polar bears occur throughout the Arctic in six relatively discrete populations that overlap national boundaries. Thus, effective conservation of polar bears requires cooperative actions by the range states. Activities undertaken during 1995, and the events leading up to them, are discussed below.

Agreement on the Conservation of Polar Bears

In 1973 the Governments of Canada, Denmark (for Greenland), Norway, the Soviet Union, and the United States negotiated the Agreement on the Conservation of Polar Bears. The measure was the result of growing concern about the possible effects of polar bear sport hunting, which had increased during the 1950s and 1960s, combined with the effects of industrial activities on polar bears and their habitat. Article I of the Agreement prohibits the taking of polar bears, subject to certain exceptions. Article II requires that each contracting party "take appropriate action to protect the ecosystems of which polar bears are a part, with special attention to habitat components such as denning and feeding sites and migration patterns...."

When the Agreement was concluded, the parties also adopted a resolution banning the hunting of polar bear cubs, female bears with cubs, and bears moving into denning areas or in dens.

As noted above, the Polar Bear Agreement requires contracting parties to focus special attention on protecting important components of polar bear habitat, such as denning and feeding sites and migration routes. Steps taken by the Fish and Wildlife Service to meet this requirement are described in Chapter XI in the discussion of small-take exemptions. These steps include the preparation of a polar bear habitat conservation strategy.

As discussed in previous annual reports, the Marine Mammal Commission and others have questioned whether the Marine Mammal Protection Act or other domestic statutes provide sufficient legal authority for the United States to fully implement the Agreement, particularly as it relates to habitat protection. In 1992 the Commission contracted for an examination of the relevant provisions of the Agreement, the Marine Mammal Protection Act, and other domestic legislation to identify possible inconsistencies and provide suggestions as to how provisions of the Agreement and the Act might be reconciled. The contractor's report, *Reconciling the Legal Mechanisms To Protect and Manage Polar Bears under United States Law and the Agreement for the Conservation of Polar Bears* (see Appendix B, Baur 1995), was provided to the Commission in December 1993, and in January 1994 the Commission forwarded the report to the Fish and Wildlife Service.

In light of amendments to the Marine Mammal Protection Act enacted in 1994 and discussed below, the Commission asked the contractor to revise the report. This revision, completed in August 1995, was provided to the Fish and Wildlife Service and other interested parties.

As discussed further in Chapters II and IV, in April 1994 Congress enacted extensive amendments to the Marine Mammal Protection Act. In response to concerns that the Agreement on the Conservation of Polar Bears may not have been fully implemented by the United States and other parties, Congress amended section 113 to require the Secretary of the Interior to initiate two reviews. Section 113(b) requires that the Secretary, in consultation with the contracting parties, review the effectiveness of the Agreement. The review was to be initiated by the end of April 1995. Also, the Secretary is to work with the contracting parties to establish a process by which future reviews of the Agreement will be conducted.

With regard to domestic implementation of the Polar Bear Agreement, section 113(c) requires the Secretary of the Interior, in consultation with the Secretary of State and the Marine Mammal Commission, to review the effectiveness of U.S. implementation, particularly with respect to the habitat protection mandates of the Agreement. A report on the results of that review was to be submitted to Congress by 1 April 1995. In addition, the amendments call on the Secretary, acting through the Secretary of State and in consultation with the Marine Mammal Commission and the State of Alaska, to consult with appropriate officials in the Russian Federation to develop and implement enhanced cooperative research and management programs for conserving polar bears in Alaska and Russia. A report on the consultations and periodic progress reports on research and management actions taken under this provision are to be provided to Congress.

As noted in the previous annual report, on 18 July 1994 the Commission wrote to the Fish and Wildlife Service with regard to both the legal analysis that had been prepared under contract and the new requirements under the 1994 Marine Mammal Protection Act amendments. In its letter, the Commission recommended that, as a first step toward meeting the requirements of the amendments, the Service convene a meeting of representatives of interested governmental and non-governmental entities to review and agree on points put forth in the legal analysis.

With regard to full implementation of the Agreement by the United States, the Commission noted that the three aspects of greatest concern are (1) the habitat protection mandate, (2) the prohibition on the use of aircraft and large motorized vessels for taking polar bears, and (3) the resolution calling for a ban on hunting of cubs and females with cubs and a ban on hunting in denning areas.

On 31 August 1994 the Service responded to the Commission's 18 July letter, endorsing the Commission's recommendation to convene a meeting of interested groups to review U.S. implementation of the 1973 Polar Bear Agreement and to use the legal analysis prepared for the Commission as a basis for the review. On 26-27 June 1995 the Service convened a meeting to review U.S. implementation of the Agreement in response to directives set forth in section 113. The purpose of the meeting was to discuss inconsistencies between the Agreement and the Act and to identify additional measures that may be necessary to fulfill requirements set forth in the Agreement. Participants included representatives of Service, the Marine Mammal Commission, the State Department, the Alaska Nanuuq Commission, Alaska Eskimo Walrus Commission, the Inuit Circumpolar Conference, and the Department of the Interior's Solicitor's Office. Meeting participants identified some discrepancies between the two measures but generally agreed that there was no need to open the Agreement to modification.

Subsequently the Service prepared a draft report and circulated it to the meeting participants and the Commission for comment. The Commission expects to comment on the draft report early in 1996. A final report will then be submitted to Congress.

As noted above, section 113 also directs the Secretary of the Interior to consult with contracting parties to review the effectiveness of the 1973 Polar Bear Agreement. At the end of 1995 the Commission was not aware of any efforts taken by the Service to convene a meeting of the parties to the Agreement or otherwise to consult on its effectiveness. It should be noted that, apparently independent of this requirement, the Task Force on Sustainable Development and Utilization of the Arctic Environmental Protection Strategy (which includes all parties to the Polar Bear Agreement) has initiated a review of the Agreement as it pertains to sustainable development in the Arctic. This is discussed in the section on Arctic Environmental Protection Strategy, above.

In its 18 July 1994 letter, mentioned above, the Commission also commented on the requirement that the Secretary consult with appropriate officials in the Russian Federation to develop cooperative research and management programs for conserving polar bears in Alaska and Russia. One of the three Commissioners then serving on the Marine Mammal Commission is a resident of the State of Alaska and a recognized authority on polar bears. The Commission recommended that, to facilitate the Service's required consultations with the Commission on these issues, the Service keep the above-mentioned Commissioner fully apprised in a timely fashion of all matters relating to the review of the Agreement and that the Commissioner be included as a member of the U.S. delegation negotiating the bilateral agreement with Russia.

In its 3 August 1994 response to the Commission, the Service noted that it had begun discussions and was continuing a dialogue with Russian counterparts regarding development of the bilateral polar bear agreement. The Service further noted that it fully intended to keep the Commission apprised of activities related to the review and preparation of draft documents. It also noted it had invited the Commissioner to join the U.S. working group formulated to develop draft documents and that a meeting was scheduled for 6-9 September 1994 in Nome, Alaska, with representatives of the Russian Federation.

Bilateral Polar Bear Agreements

As discussed in Chapter III, two discrete polar bear populations occur in Alaska, and both are shared with other countries. The northern (Beaufort Sea) population is shared with Canada and the western (Bering-Chukchi Seas) population is shared with Russia. Efforts to develop cooperative programs with these countries for the management and conservation of polar bears are discussed below.

Alaska/Inuvialuit Polar Bear Agreement — Prior to passage of the Marine Mammal Protection Act in 1972, both sport and subsistence hunting of polar bears in Alaska was managed by the State. The Act transferred management authority to the Fish and Wildlife Service, and exempted coastal Alaska Natives from its moratorium on taking provided the taking is non-wasteful and for subsistence or for making authentic handicrafts or clothing.

The Beaufort Sea polar bear population is hunted by Natives from northwestern Canada as well as Alaska. If not regulated effectively, such hunting, by itself and in combination with other activities, could cause the population to decline below its optimum sustainable population level. Recognizing this, the Fish and Game Management Committee of Alaska's North Slope Borough and the Inuvialuit Game Council of Canada's Northwest Territories entered into an agreement in January 1988 to govern cooperatively the hunting of polar bears in the area between Icy Cape, Alaska, and the Baillie Islands, Canada.

Among other things, the agreement calls for protection of cubs, females with cubs, and all bears inhabiting or constructing dens. It also prohibits hunting at certain times of the year and provides that a harvest quota, based on the best available scientific evidence, be established annually. Quotas are allocated equitably between Natives in Alaska and Canada, and data are collected and shared on the number, location, age, and sex of bears killed. Although the agreement is not legally binding, both Alaska and Canadian Natives have complied with the mutually agreed conservation measures. The agreement does not apply to Native subsistence hunting of polar bears in Alaska south and west of Icy Cape. Polar bears in this area are part of the population shared with Russia, and efforts are underway, as described below, to conclude agreements for the cooperative management of this population as well.

U.S.-Russian Polar Bear Agreement — As noted earlier, a relatively discrete polar bear population, the western or Bering-Chukchi Seas population, occurs partially in Alaska and has traditionally been used by Native peoples of both Alaska and Chukotka, Russia. In its 28 June 1992 letter forwarding the draft polar bear conservation plan to the Fish and Wildlife Service, the Commission identified the possible need for a cooperative U.S.-Russian program to manage the take of polar bears from the Bering-Chukchi Seas population. On 22 October 1992 the Fish and Wildlife Service's Alaska Regional Director signed a protocol with the Russian Ministry of Ecology and Natural Resources stating the parties' intentions to conclude an agreement on the conservation and regulated use of polar bears from the Bering-Chukchi Seas population common to the two nations.

As discussed in the previous annual report, the protocol called on both Governments to create special working groups composed of representatives of government agencies and Native peoples to prepare proposals for such an agreement and to convene a meeting of the working groups in Russia to prepare a draft agreement.

During informal discussions between the Fish and Wildlife Service and Alaska Native groups relative to development of the Service's draft conservation plan for polar bears, consideration was given to forming an Alaska polar bear commission similar to the Alaska Eskimo Walrus Commission and the Alaska Sea Otter Commission. This idea, one which has been supported by the Marine Mammal Commission, was subsequently considered and positively received at a meeting between Native hunters and Service representatives on 22 June 1993.

On 9-10 November 1993 representatives of the Service's Alaska Regional Office met with representatives of the Alaska Native community to discuss the proposed conservation agreement with Russia. At that meeting, it was recognized that formation of an Alaska Native polar bear commission was needed to represent the interests of Alaska Natives effectively in matters affecting the conservation of polar bears. It was agreed that, in order to stimulate Russian Native interest in the process of negotiating a polar bear conservation agreement, it would be useful to hold a meeting involving Natives of both countries prior to the first meeting of U.S. and Russian delegations, as called for in the protocol.

On 16-17 June 1994 the Alaska Nanuuq Commission was formed to represent polar bear hunters in 20 Alaska communities. The broad mission defined by the Commission's bylaws is to encourage and implement self-regulation of harvest and use of polar bears.

On 28 July 1994 the Fish and Wildlife Service provided the Commission and others with a draft management agreement for polar bears shared with Russia (formally titled the Draft Agreement on the Management of the Chukotka-Alaska Polar Bear Population between the U.S. Fish and Wildlife Service and the Russian Federation Ministry of Ecology and Natural Resources) and a draft of the Native-to-

Native implementation agreement, described as being in the early formative stages.

On 12 August 1994 the Commission wrote to the Service's Alaska Region regarding the 1994 amendments to the Act. The Commission noted that it had recently been provided with a working draft of an agreement on the management of the Chukotka-Alaska polar bear population between the Fish and Wildlife Service and the Russian Federation Ministry of Ecology and Natural Resources.

In its letter the Commission noted that although it was pleased that the parties were attempting to develop rational plans to manage and conserve polar bears, it questioned whether the agreements apparently being envisioned fully met the objectives of the Marine Mammal Protection Act. In the Commission's opinion, greater attention needed to be focused on the 1973 polar bear agreement, the umbrella under which this more specific bilateral agreement should be negotiated.

On 22 August 1994 the Department of State wrote to the Fish and Wildlife Service expressing its concerns regarding the Service's draft working agreement. In its letter, the State Department noted its view that the draft tended to emphasize managed use of polar bears over conservation needs. The Department also pointed out that it was an appropriate time for the Service to initiate consultations with other relevant agencies and organizations, including the Marine Mammal Commission, the Justice Department, the State of Alaska, and environmental organizations. As a final point, the State Department stressed the importance of not exchanging any proposed agreements with the Russians until there is an agreed U.S. Government draft. Subsequently, the Fish and Wildlife Service withdrew its draft agreement.

Representatives from Native and governmental agencies from the United States and Russia met on 6-9 September 1994 in Nome, Alaska, for technical discussions concerning joint conservation of the shared population of polar bears occupying the Chukchi, Bering, and eastern Siberian Seas. This resulted in an agreement signed 9 September 1994 entitled "Protocol on U.S./Russia Technical Consultation for the Conservation of Polar Bears of the Chukchi/-Bering Sea Regions."

Prior to negotiating a bilateral agreement with the Russians, the Department of the Interior must obtain formal authorization from the Department of State. On 9 December 1994 the Fish and Wildlife Service provided to the State Department, the Commission, and others a draft request for such authorization to participate in negotiations with Russia on conservation and management of polar bears.

On 14-20 September 1995 representatives of the United States and the Russian Federation met in Petropavlovsk-Kamchatskiy, Russia, for scientific and technical consultations relative to a future government-to-government agreement on the conservation and management of the Chukotka-Alaska population of polar bears, as well as joint management of the shared walrus population. A representative of the Marine Mammal Commission was a member of the U.S. delegation.

On 6 November the Fish and Wildlife Service circulated a discussion document entitled "Draft Principles of Conservation and Management of the Alaska-Chukotka Polar Bear Population" to the Commission and others for comment. The Commission, in consultation with its Committee of Scientific Advisors, reviewed the draft principles and by letter of 11 December 1995 provided comments to the Service.

As a general comment, the Commission noted that the negotiating process for a U.S./Russian polar bear agreement had suffered from insufficient consultation with the Commission and others. It suggested that henceforth it would be appropriate and proper to involve all interested parties in a continuing dialogue on the topic.

Among other things, the Commission noted that the document's introductory language gives the impression that the primary purpose of the proposed agreement is to provide for subsistence take of polar bears by Alaska and Chukotka Natives. The Commission suggested that it would be appropriate to include language that refers to the intrinsic value of polar bears as a common resource shared by all people.

In its letter, the Commission also noted that, although the draft agreement prohibits the taking of cubs less than one year of age, it does not prohibit the Native take of one- and two-year-old cubs. In the Commission's view, this is not consistent with the 1973 Agreement on the Conservation of Polar Bears (discussed above), which calls for the protection of cubs and females with cubs. This protection has been interpreted as applying to cubs-of-the-year, yearlings, and two-year-old cubs.

The Commission noted that the draft document provides for establishment of a four-member polar bear commission, comprising one member each from the Russian and U.S. Federal governments and one member each representing Alaska and Chukotka Natives. The Commission pointed out that, because polar bears are a resource for all, it would be appropriate to enlarge the proposed commission by adding one or two public members.

The Commission's letter also suggested that the agreement be expanded to provide for preparation of a conservation plan that would include provision for soliciting public comment and for informing the public of the plan's contents. The Commission noted that, unless there is a mechanism to inform the public of conservation actions proposed for polar bears and their habitat, and the need for such actions, public support, and ultimately the success of the program, is likely to be limited.

As of the end of 1995 the Fish and Wildlife Service was reviewing comments on the draft bilateral agreement prior to updating the document. It was the Commission's understanding that a revised draft agreement would be made available early in 1996 for public comment. It was expected that at that time the Department of the Interior would submit a formal request to the Department of State for authority to enter into formal negotiations with Russia on the bilateral polar bear agreement.

Polar Bear Trophy Imports

The 1994 amendments to Marine Mammal Protection Act allow the Secretary of the Interior to issue permits to import sport hunted polar bear trophies from Canada. As discussed in the previous annual report, such import permits may be issued for legally acquired polar bear parts (other than internal organs), provided that the Secretary, in consultation with the Marine Mammal Commission, has made certain determinations with regard to Canada's sport hunting program. Specifically, the Secretary must find that:

- Canada has a monitored and enforced sport hunting program consistent with the purposes of the Agreement on the Conservation of Polar Bears;
- Canada has a sport hunting program based on scientifically sound quotas ensuring the maintenance of the affected population stock at a sustainable level;
- the export and subsequent import are consistent with the provisions of the Convention on International Trade in Endangered Species of Wild Fauna and Flora and other international agreements and conventions; and
- the export and subsequent import are not likely to contribute to illegal trade in bear parts.

The amendments also direct the Secretary to charge a reasonable fee for the issuance of polar bear import permits to be used for developing and implementing cooperative research and management programs for the conservation of polar bears in Alaska and Russia.

The Secretary is further directed to undertake a scientific review of the impact of issuing import permits on the polar bear populations in Canada. The review is to be subject to public comment and is to be completed by 30 April 1996. No permits may be issued after 30 September 1996 if the review indicates that the issuance of such permits is having a significant adverse effect on Canadian polar bear stocks.

As discussed in the previous annual report, in mid-1994 the Fish and Wildlife Service began work on developing proposed regulations to implement the new import measures. Subsequently the Service provided the Commission and others with a draft *Federal Register* notice regarding regulations to govern polar bear imports. The Commission responded by letter of 19 October 1994. The Commission noted that, under the amendments, the Service would not be able to act on any application to import polar bear trophies until

it had resolved several outstanding questions and was able to make the findings required under section 104(c)(5)(A) of the Marine Mammal Protection Act.

On 27 October 1994 the Fish and Wildlife Service provided information on steps it was taking to implement the new import provisions. It stated that it was working concurrently on developing permit regulations and gathering data to make the required legal and scientific findings. The Service further noted that applications for the import of sport hunted polar bear trophies would not be accepted until the completion of the permit rulemaking process early in 1995, and that it anticipated publishing a proposed rule on permit requirements by November 1994.

On 3 January 1995 the Fish and Wildlife Service published in the *Federal Register* a proposed rule to establish application requirements, permit procedures, issuance criteria, permit conditions and a special issuance fee for permits to import polar bear trophies from Canada. The Service stated that it was working with Canadian wildlife authorities to obtain information needed to make the required legal and scientific findings and that it expected to issue a second proposal addressing these findings early in 1995.

By *Federal Register* notice of 17 July 1995 the Service published its supplemental proposed rule on legal and scientific findings to implement section 104(c)(5)(A) of the 1994 amendments. The proposed rule noted that the worldwide population of polar bears is estimated at 21,000 to 28,000 animals, including an estimated 13,120 in Canada. According to the Service, the Canadian polar bear population comprises 12 relatively discrete stocks, all of which are in or are shared with the Northwest Territories. Because this is the only area in Canada where polar bears can be harvested currently by non-residents through a regulated sport hunting program, the Service limited its proposed rule to the Northwest Territories.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, reviewed the Service's proposed rule and provided comments by letter of 9 November 1995. In its letter, the Commission addressed the findings required under section 104(c)(5)(A), stated above. In general, it concluded that some of the findings proposed by the Service could be better explained or further justified.

Finding on Consistency with Polar Bear Agreement – With regard to the finding of consistency with the international Agreement on the Conservation of Polar Bears, the Commission noted that the international agreement does not include a specific section describing its purposes. Thus, in determining whether Canada's sport hunting program is consistent with the agreement, the Service should examine whether the program is consistent with each of the applicable provisions of the treaty.

For instance, the Commission noted that Article I of the agreement established a general prohibition on the taking of polar bears, with certain exceptions set forth in Article III. To be consistent, Canada's sport hunting program must fit under at least one of the exceptions. The Commission further noted that Article III.1.(d) of the international agreement authorizes parties to allow taking "by local people using traditional methods in the exercise of their traditional rights and in accordance with the laws of that Party." Canada has long interpreted this provision as allowing local people in a settlement to authorize the selling of a polar bear permit from its quota to a non-Inuit or non-Indian hunter. The Commission therefore recommended that in its final rule the Service expand this discussion to indicate whether it concurred with Canada's interpretation. In doing so, the Service should consider whether this exception is limited to taking by local people or whether it would include taking by non-nationals.

Similarly, Article III.1.(e) authorizes the taking of polar bears "wherever polar bears have or might have been subject to taking by traditional means by its nationals." In its letter, the Commission concurred that the best interpretation of this exception would allow a party to authorize taking by any person, including a non-national, as long as the take occurs in an area where the nationals of that country have engaged in or might have engaged in taking by traditional means.

The Commission suggested that, if the Service concurred with this interpretation, it should take steps to determine where polar bears in Canada were or

might have been taken by traditional means at the time the agreement was negotiated and compare that to where sport hunts now occur.

Article II of the agreement requires each party to take appropriate action to protect the ecosystem of which polar bears are a part and to manage polar bear populations in accordance with sound conservation practices based on the best available scientific data. In its letter the Commission stated that it believed that the Canadian polar bear program is generally sound and satisfies the requirements of Article II. However, the Commission suggested that it is also necessary to make a related finding of conformity with a resolution adopted by the parties in 1973 to ban the hunting of female polar bears with cubs and their cubs and to prohibit the hunting of polar bears in denning areas.

In its letter, the Commission pointed out that Article IV of the agreement requires the parties to prohibit the use of aircraft and large motorized vessels for the purpose of taking polar bears, except where the application of such a prohibition would be inconsistent with domestic laws. The Service's *Federal Register* notice indicated that "[a]ircraft, snow machines, and boats are sometimes used to transport equipment, hunters, and dogs to base camps which can be a great distance from the community."

The Commission noted that it agreed that use of aircraft and vessels may be consistent with the treaty. However, it stated that the *Federal Register* discussion did not clearly explain why Canada and the Service have concluded that the stated use of aircraft to transport equipment, *etc.*, to base camps is consistent with Article IV. In the Commission's opinion, the use of airplanes to identify base camp locations with high polar bear densities or otherwise to assist in locating or taking bears would run afoul of the treaty provisions, as would using aircraft to gain access to areas that would not have been hunted traditionally. Therefore, the Commission recommended that the Service in the final rule provide more information on how aircraft are used in the hunting of polar bears and better explain the rationale for its view that such use is consistent with the international Agreement on the Conservation of Polar Bears.

With regard to the 1973 resolution, mentioned above, to ban the hunting of cubs and female polar bears with cubs and to prohibit the hunting of polar bears in denning areas, the Commission noted that these prohibitions are considered by some to be non-binding on the parties. Nevertheless, the prohibitions fit within the purposes of the agreement and should be considered as sound conservation practices under Article II. Therefore, the Commission stated, the Service's proposal is correct not to approve the importation of trophies taken from any population/management unit unless adequate provisions are in place to prohibit the taking of cubs and females with cubs and to protect all polar bears in or moving into denning areas.

Finding on Scientific Soundness – As noted above, before the Service can authorize the importation of polar bear trophies from Canada, it must determine that Canada has a sport hunting program based on scientifically sound quotas ensuring the maintenance of the affected population stock at a sustainable level. The alternatives considered by the Service are whether this provision requires the Service to make the findings based on one population for the whole of Canada or on the 12 units under which Canada has been managing polar bears.

In the Commission's opinion, the Service's discussion of possible interpretations of section 104(c)(5)(A)(ii) apparently failed to consider the statutory definition of the term "population stock." The Commission therefore recommended that the Service provide additional justification in the final rule for the determination that the 12 management units used by Canada constitute separate population stocks as defined in the Act. If there is any doubt concerning what constitutes a separate population, the Commission suggested that the Service should interpret the available information conservatively.

In its comments, the Commission further suggested that the Service factor into its determinations the status and trends of polar bears in adjacent management units. In particular, it should be recognized that splitting a discrete, naturally occurring population into smaller sub-units could lead to an affirmative finding for one or more sub-units that would not be reached if the population were considered as a whole.

The Commission noted that the Service's proposed rule provided a population estimate, the calculated sustainable harvest level for the last harvest season and averaged over the last three and five seasons, and an indication, in relative terms, of the population status (*i.e.*, increasing, decreasing, or stable) for each of Canada's 12 polar bear management units. For each population estimate, it also provided an assessment of the reliability of the estimate in relative terms (*i.e.*, good, fair, or poor). However, the Commission pointed out, there is no explanation or definition of what constitutes acceptable and uncertain precision or of minimum capture bias or capture bias problems. Therefore, it was not possible to evaluate the reliability of the assessment ratings.

The Commission noted that the Service's approach for determining population status assumed that the population estimates are accurate and that population size is affected only or principally by the harvest. In the Commission's opinion, a number of factors, independent of kill levels, may likely affect population size. These include the age and sex structure of the population, ice and denning conditions, prey availability, and disease. Therefore, the Commission suggested that the final rule should provide a better justification for using this method for making determinations concerning population status.

Also, the Commission commented on the production model used by the Northwest Territories to establish harvest levels, which assumes that polar bears are experiencing maximal recruitment and survival rates. The Commission noted that use of the model will result in very conservative management for populations near carrying capacity, but that populations below their maximum net productivity level will remain depleted under this management scheme.

The greatest uncertainty regarding the model is the reliability of the population estimates being used. If a population estimate is precise or negatively biased, the formula for calculating harvest levels is reasonable. If, however, an estimate of the population has low precision or is positively biased, use of the formula could lead to overharvesting. To assess the validity of the determinations, quantitative estimates of standard errors and, where possible, identification of likely biases are required.

The Commission suggested that it would also be useful if the Service were to explain why the use of midpoint or "best" population estimates, rather than minimum population estimates (as used in calculating potential biological removal levels under the 1994 amendments to the Marine Mammal Protection Act), is believed to be appropriate.

Finding on Consistency with CITES – Polar bears are listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Before a polar bear trophy can be imported into the United States, the appropriate officials in Canada must issue a CITES export permit. Such a permit is issued only after the scientific authority in Canada determines that (1) the export will not be detrimental to the survival of the species and (2) the specimen was legally obtained. In the Commission's opinion, the fact that Canada has issued an export permit after making these determinations should provide sufficient evidence that the export and subsequent import are consistent with the Convention.

Finding on Illegal Trade – The Marine Mammal Protection Act requires the Service, before authorizing the importation of polar bear trophies from Canada, to determine that the export and subsequent import are not likely to contribute to illegal trade in bear parts. In the Commission's opinion, the system for marking and tracking bear trophies in Canada, as described in the Service's *Federal Register* notice, provides adequate assurance that only those bears legally taken in an approved sport hunt will be allowed entry into the United States. The requirement that a CITES permit be obtained from the appropriate Canadian authorities further assures that only those bears legally taken will be exported from Canada.

The Commission concurred with the Service's assessment that the only potential problem involves trade in gall bladders. Although polar bear gall bladders may not be as desirable as those from other bear species, the number of exports over the years suggests some demand exists. Therefore, the Commission agreed with the Service's proposal to eliminate the possibility that imports of polar bear trophies into the United States will contribute to illegal trade by requiring hunters to destroy the gall bladder. However, the Commission suggested that it may be

more appropriate to have the responsible government agency, rather than the hunter, certify that the gall bladder has been destroyed. Therefore, the Commission recommended that the proposed rule be revised accordingly.

In its *Federal Register* notice, the Service discussed the applicability of the Marine Mammal Protection Act's prohibition on importing any marine mammal that was pregnant or nursing at the time of taking or less than eight months old. The Commission agreed with the Service that this prohibition remains applicable to polar bear imports from Canada. The *Federal Register* notice identified three possible means for ensuring that the requirements of the Marine Mammal Protection Act pertaining to imports of pregnant, nursing, or young bears are satisfied. The options are (1) have the Northwest Territories certify that at the time of take the bear was not pregnant, was not a nursing cub, and was not a mother with cubs, (2) condition the import permit to require the permittee to certify at the time of import that at the time of take a female bear was not pregnant or a mother with cubs, and a young bear was not nursing, and/or (3) include issuance criteria that permits would not be issued for female bears taken during the month of October or for bears taken while in family groups.

Because of the difficulty in determining and verifying that a polar bear was not pregnant, lactating, or nursing when taken, the Commission stated it did not believe that options 1 or 2 would provide sufficient assurance that such bears will not be imported. With respect to option 3 of the proposed finding, the Commission noted that virtually all pregnant females are in dens by December and that some pregnant bears are building dens or moving to denning sites in October and November. However, there is a good possibility that single, adult female bears taken in October or November could be pregnant. Therefore, the third option provided little assurance that bears taken at those times are not pregnant females.

The Commission recommended that a fourth possibility be incorporated into the final rule – that no import permits be issued for polar bears taken from populations for which the hunting season begins prior to 1 December.

Section 104(c)(5)(A) of the Marine Mammal Protection Act also allows for the importation of polar bear trophies from Canada that were taken, but not imported, prior to enactment of the 1994 amendments. Such imports are subject to the same findings as are imports of trophies taken after enactment of the amendments. The Service proposed issuing permits for sport hunted polar bears taken prior to the effective date of any final rule that may be issued, provided the applicant shows that the polar bear was legally taken and was not pregnant or nursing when taken.

In the Commission's opinion, the Service seemed to have overlooked the applicability of the requirement that the Service determine the Canadian sport hunting program to be based on scientifically sound quotas ensuring the maintenance of the affected population stock at a sustainable level. While the statute does not explicitly require the finding to be based on historical data, the Commission believes that the nature of the required finding strongly suggests that historical data must be used. The Commission stated that it did not see how the Service could find that the quotas are scientifically sound and ensure that the affected populations are maintained at sustainable levels if it did not weigh the quotas that were in place at the time the bears were taken. Even if the Service's interpretation of the timing of the required sustainability finding were correct, it appeared that a present-day finding needed to be in place. At the absolute minimum, the Service should require the applicant to demonstrate that the trophy to be imported was taken from a population for which the Service has made a current affirmative finding.

With respect to the required showing that a pre-amendment bear was not pregnant or nursing at the time of taking, the Commission stated its belief that the Service should assume that a bear is a female unless the applicant provides sufficient evidence that it is a male and assume that the bear may have been pregnant or nursing unless it was taken at a time of year when all such bears would normally be in dens.

In its notice, the Service proposed to provide a mechanism whereby trophies taken after the effective date of the rule, from a population for which an affirmative finding has yet to be made, may be imported. The import would be permissible if the

Service later determined that the "total harvest during [the] harvest season [in which the bear was taken] and the average of the three preceding harvest seasons was sustainable for the affected population" and a management agreement was in place with Greenland and/or other provinces for shared populations. In the Commission's opinion, inclusion of this provision is not based on sound policy. It is not necessary and can only serve to encourage U.S. hunters to take bears from populations that may be declining. It would make more sense to limit imports, once the final rule is in place, to trophies taken from those populations for which an affirmative finding has already been made. The Commission therefore recommended that this provision be deleted in the final rule.

At the end of 1995 it was the Commission's understanding that the Service was consulting with Canadian officials to obtain additional information.

Agreements Related to Walruses

As noted in Chapter III, a single stock of walruses occurs in waters off Alaska and eastern Russia. Government officials and Native communities in both countries therefore share common interests with regard to assessing the status and trend of this walrus population and in addressing conservation issues arising from harvests to meet Native subsistence needs and the impacts of tourism, oil and gas development, and other human activities. To develop a cooperative international framework for conserving this walrus stock, Government officials and Native community leaders from both countries met in Nome, Alaska, on 6-9 September 1994. At the meeting, representatives of both countries signed a protocol agreeing to develop bilateral government-to-government and Native-to-Native walrus agreements that would set forth shared responsibilities for walrus research and management. To pursue this goal, it was agreed that the parties would hold a technical meeting in the fall of 1995 to consider specific topics that might be included in the agreements.

The Russian Federation Ministry of Protection of the Environment and Natural Resources offered to host the meeting, and it was held in Petropavlovsk, Kamchatka, Russia, on 13-20 September 1995. The U.S. delegation was led by a representative of the Fish and Wildlife Service and included representatives of the Alaska Native community, the Marine Mammal Commission, the State of Alaska, and the environmental community. During the meeting, consideration was given to developing similar agreements for polar bears (see above). Based on the discussions relating to walruses, representatives of the Fish and Wildlife Service and the Russian Ministry ended the meeting by signing a new protocol of intent concerning the bilateral walrus agreements.

The new protocol expresses a mutual understanding that the agreements will provide for the conservation, research, habitat protection, and Native subsistence use of the Pacific walrus stock. It also notes that they will be based on principles of sustained yield and maintenance of the Pacific walrus population at optimum sustainable levels. With respect to Native participation and subsistence use, the protocol notes that both sides are committed to assisting Native communities in their respective countries with the development of a parallel Native-to-Native walrus agreement, and recognizes the need for Native communities to participate in determining harvest allocations. Regarding scientific data, the protocol expresses agreement that joint five-year population surveys should be continued, as funding and environmental conditions permit; that the age, sex, and number of walruses taken in annual harvests should be monitored in each country; and that scientific and technical data should be exchanged routinely.

Areas noted in the protocol as needing further discussion include the methods to be used in determining biologically sustainable harvest levels, the need for a joint scientific committee with government and Native representation, and determination of geographic boundaries. In view of these points, the two sides agreed to continue discussions on developing government and Native walrus agreements at a meeting in the United States in 1996.

The Marine Mammal Commission reviewed the terms of the signed protocol and concluded that it provides a solid basis on which to begin drafting specific language for the bilateral walrus agreements. By letter of 11 December 1995 to the Service, the

Commission advised the Service of its conclusion, noting that the September meeting was an important step forward and congratulating the U.S. delegation for its accomplishments. In view of the need for further work and plans for a joint meeting in 1996, the Commission also noted its interest in remaining involved in the development and negotiation of the walrus agreements and asked to be advised of the steps and schedule to be followed in drafting the text of the bilateral walrus agreement and in preparing for the next meeting. As of the end of 1995 the Commission had not yet received a reply to its letter.

The Bering Sea Ecosystem

Since the mid-1970s there have been alarming declines in populations of northern fur seals, Steller sea lions, harbor seals, and several species of fish-eating birds in parts of the Bering Sea and Gulf of Alaska. The nature and magnitude of the fur seal, sea lion, and harbor seal declines are described in the species discussions in Chapter III.

The causes of the declines are uncertain and, as noted in previous reports, the Commission and the National Marine Fisheries Service jointly sponsored a workshop in December 1990 to identify the critical uncertainties and the research that would be required to resolve them. A related workshop was held by the Alaska Sea Grant College Program in March 1991. Participants in both workshops noted that the harbor seal and Steller sea lion declines were continuing and appeared to be food-related. They also noted that available data were insufficient to determine whether the apparent declines in food availability were a product of natural environmental cycles or change, a consequence of the pollock fishery that had developed since the late 1960s, or some combination of these or other factors.

The participants in the December 1990 workshop noted that potentially relevant data were being collected and archived by many government agencies and universities, but that the data often were difficult to locate and access. Among other things, they recommended development of a common data management system to facilitate archiving, accessing, mapping, and integrating marine mammal, seabird, fish, fishery, environmental, and other data concerning the Bering Sea and Gulf of Alaska (see Appendix B, Swartzman and Hofman 1991).

In partial response to this recommendation, the Commission contracted for a study in 1992 to determine the types of data relevant to the conservation of marine mammals in the Bering Sea and adjacent areas that are being collected and archived by different agencies and institutions and how those data are being archived and can be accessed (see Appendix B, Hoover-Miller 1992). In 1993 the Commission provided support for a workshop to determine what might be done to improve access to and use of such data. The workshop was held in Anchorage, Alaska, on 5-7 April 1994. Participants included scientists and data managers from the National Marine Fisheries Service, the Fish and Wildlife Service, the U.S. Geological Survey, the Minerals Management Service, the Alaska Department of Fish and Game, the Alaska Department of Natural Resources, the Natural Heritage Program, the Florida Department of Environmental Protection, the University of Alaska, the University of Washington, and Oregon State University.

Following the workshop, the contractor held a number of small group meetings to determine how the workshop recommendations might best be implemented. One of the products of these meetings was establishment of the Alaska Marine Resource Information Network at the University of Alaska, School of Fisheries and Sciences, in Fairbanks. The network helps individuals from Federal, state, and private organizations locate and exchange information regarding Alaska marine resources.

The report from the April 1994 workshop was completed and published in March 1995 (see Appendix B, Hoover-Miller 1995). Copies were provided to the workshop participants and to agencies responsible for conserving marine mammals and their habitat in Alaska.

Development of a Coordinated Studies Plan

The 1994 amendments to the Marine Mammal Protection Act directed that the Secretary of Commerce, in consultation with the Secretary of the

Interior, the Marine Mammal Commission, the State of Alaska, and Alaska Native organizations, "undertake a scientific research program to monitor the health and stability of the Bering Sea marine ecosystem and to resolve uncertainties concerning the causes of population declines of marine mammals, seabirds, and other living resources of that marine ecosystem." In partial response to this directive, the National Marine Fisheries Service, in consultation with Alaska Native organizations, developed a draft study plan.

The draft study plan was provided to the Commission and others for comment in March 1995. The Commission, in consultation with its Committee of Scientific Advisors, provided comments to the National Marine Fisheries Service by letter of 17 April 1995. The Commission noted that the descriptions of and rationale for some of the tasks listed in the draft plan were not clear. The Commission also noted that it was not clear whether the likelihood of being able to determine the cause of the observed population declines had been considered in the design of the draft plan. The Commission suggested reformulating the study objectives to make it easier to relate specific research and monitoring tasks to the objectives.

The Service advised the Commission by letter of 18 April 1995 that a workshop was to be held in Anchorage, Alaska, on 14-15 June to review the draft plan. A number of key participants could not attend on those dates, and the workshop was delayed until 2-3 November 1995. Participants included representatives of the Commission, the National Marine Fisheries Service, the Fish and Wildlife Service, the State of Alaska, the University of Alaska, and Alaska Native groups. The workshop report is expected to be completed by mid-March 1996.

The North Pacific Marine Science Organization (PICES)

As noted in previous Commission reports, Canada, Japan, the People's Republic of China, the former Soviet Union, and the United States concluded the Convention for the North Pacific Marine Science Organization (PICES) in December 1990. The purpose of the Convention is to provide scientific understanding of the North Pacific Ocean and its processes, living resources, and oceanographic features. The Convention entered into force in 1992 with four initial members: Canada, Japan, the People's Republic of China, and the United States. Russia and Korea joined during 1995.

At the second annual meeting in October 1993, PICES established a working group on the Bering Sea. This working group has identified key scientific issues relating to the Bering Sea, held a one-day symposium, "Oceanography and Fisheries of the Bering Sea," at the fourth annual PICES meeting in Quingdao, China, in October 1995, and is undertaking preparation of a review volume on the Bering Sea. This will be published along with the proceedings from the 1995 symposium as two separate volumes.

PICES is undertaking a program called "Climate Change and Carrying Capacity." Background information was brought together at a symposium held with the third annual meeting in Nemuro, Japan, in October 1994. Since then PICES has established a steering committee for the program, which is now called PICES-GLOBEC, and is developing an implementation plan. At the same time, PICES is working closely with U.S. GLOBEC, which is sponsoring two planning workshops, one held in Seattle in April 1995 and a second scheduled for January 1996, to develop a science plan. A plan for the Bering Sea is included.

A new working group on consumption by marine birds and mammals was established at the fourth annual PICES meeting in Quingdao in October 1995. The members have not yet been appointed.

North Pacific Universities Marine Mammal Research Consortium

Because of their continuing decline, Steller sea lions were listed as threatened under the Endangered Species Act in 1990. Recognizing that the uncertainty concerning the cause of the decline could lead to restricting fisheries in areas where the decline had occurred, representatives of several North Pacific fisheries initiated efforts in 1992 to develop and seek funding for an independent, non-governmental research program to investigate the relationship between fisheries and marine mammals in the North Pacific

Ocean and eastern Bering Sea. This led to formation of the North Pacific Universities Marine Mammal Research Consortium. Members are the University of Alaska, University of British Columbia, University of Washington, and Oregon State University.

In 1993 the North Pacific Marine Science Foundation was formed to seek and manage funding. Research and management committees were established to provide oversight. A five-year research plan was completed in January 1993. The plan includes a balance of short- and long-term projects designed to test various hypothesis concerning the possible cause or causes of the Steller sea lion decline (*e.g.*, nutritional stress, disease, pollution, intentional shooting, and incidental take in fisheries).

The Commission provided a small amount of funding in 1993 to help pay initial administrative costs. Since then, funding has been provided by a broad range of fishing boat owners, fish processors, and related organizations. The program is expected to be continued at least through 1996.

[*Information concerning the Consortium and its marine mammal research program can be obtained from the Chairman, North Pacific Universities Marine Mammal Research Consortium, Fisheries Center, University of British Columbia, Vancouver, B.C., Canada V6T 1Z4*].

National Academy of Sciences Study

As noted in previous Marine Mammal Commission's reports, the Department of State provided funds in 1992 to the National Academy of Sciences' Polar Research Board to undertake a comprehensive review and evaluation of information concerning the Bering Sea ecosystem. The Polar Research Board established a special committee to undertake the review. The committee includes experts in oceanography, fisheries biology and management, marine mammals, seabirds, socioeconomics, and marine policy.

The Committee met several times in 1993, 1994, and 1995. During an organizational meeting in June 1993, a Marine Mammal Commission representative reviewed Commission-sponsored reports bearing on the conservation of marine mammals and their habitat in the Bering Sea and Gulf of Alaska.

The Committee's report is expected to be completed and published early in 1996. The Commission expects that the report will provide a thorough and objective assessment of the factors possibly responsible for the observed changes in marine mammals, seabirds, and other components of the Bering Sea ecosystem.

Chapter VII

MARINE MAMMAL STRANDINGS AND DIE-OFFS

Since the late 1970s there has been an apparent increase in the incidence of unusual marine mammal mortalities throughout the world. These incidents have involved a broad range of species in widely separated geographic areas, including monk seals in the Northwestern Hawaiian Islands, harbor seals and humpback whales in New England, sea lions in California, manatees in Florida, and bottlenose dolphins along the east and Gulf coasts of the United States. The largest and most publicized events were the deaths of more than 700 bottlenose dolphins along the U.S. mid-Atlantic coast in 1987-1988, more than 17,000 harbor seals in the North Sea late in 1988, and more than 1,000 striped dolphins in the Mediterranean Sea in 1990-1991.

As noted in previous Marine Mammal Commission reports, a number of these mass mortalities appear to have been caused by a morbillivirus, congeners of which cause distemper in dogs and measles in humans. The etiology of the disease is uncertain; *i.e.*, it is not known whether cetaceans and pinnipeds have been exposed to the virus only recently and thus have no acquired immunity to it; whether more virulent forms of the virus have evolved; whether animals in the affected populations have been stressed in ways that compromise their immune systems; or whether there simply is increased awareness and better means for detecting such viruses.

High levels of a number of environmental contaminants were found in the blubber, liver, and other tissues of some, but not all of the bottlenose dolphins and striped dolphins that died during the unusual mortality events. These contaminants may have affected the animals' immune systems and made them more vulnerable to the virus. Available information is insufficient, however, to determine how, or at what levels and in what combinations, environmental contaminants may compromise the immune systems or otherwise affect marine mammals.

Unusual Mortality Events in 1995

There were two reported and one possible unusual marine mammal mortality events in 1995. In addition, there were indications that some populations of cetaceans and pinnipeds in the Pacific have come into contact with morbillivirus and other disease-causing organisms, perhaps for the first time. These matters are described below.

Common Dolphins

Early in February 1995 more than 200 common dolphins *(Delphinus delphis)* were found dead on beaches and floating offshore along the northwest coast of the Gulf of California (Sea of Cortez), Mexico. Many dead seabirds also were found. Cyanide compounds were found in liver and lung samples taken from the dead dolphins for toxicological analysis, suggesting that the mortalities may have been caused by cyanide poisoning. A possible source of the poison was not identified.

Sea Otters

Between 16 and 22 July 1995 ten dead sea otters were found in Monterey Harbor and the Del Monte Beach area of California. A decomposed carcass of another otter, thought to have died the preceding week, was found on 25 July. The cause of this unusually high sea otter mortality could not be determined. Gross necropsies and analyses of tissue samples collected from the dead otters found no evidence of consistent gross lesions, naturally occurring biotoxins, or unusually high levels of environmental contaminants (*e.g.*, chlorinated hydrocarbons and heavy metals).

Bottlenose Dolphins

During the first 19 days of December 1995, 17 bottlenose dolphins stranded along the coast of Texas. Most of the dead dolphins were found on the seaward-facing beaches of barrier islands and were badly decomposed. The animals may have died in offshore areas from multiple, unrelated causes and been carried ashore by unusual tides, winds, or currents. The high number of strandings did not continue after 19 December.

Morbillivirus

Since 1993 the National Marine Fisheries Service has provided funds to the Alaska Department of Fish and Game to assess the status and try to determine the cause of declines in harbor seal populations in parts of Alaska (see the harbor seal discussion in Chapter III for information concerning the declines). The study has included collection and testing of serum samples for antibodies to several viruses, including the phocine and canine distemper viruses. The tests were more sensitive than those used previously and, although 17 of 42 samples tested positive for phocine distemper antibodies and 2 of 42 samples tested positive for canine distemper antibodies, the results may have been false positives not indicative of infections. The test results could indicate that harbor seals and possibly other seals in Alaska have been exposed to the type of virus that caused the deaths of more than 17,000 harbor seals in the North Sea in 1988. To date, however, there have been no indications of unusually high numbers of dead harbor seals or other seals in Alaska or elsewhere along the Pacific coast of North America.

Two common dolphins that stranded live on California beaches in 1995 also tested positive for morbillivirus. The first animal, which was found on 21 August 1995 near Marina Del Ray, appears to have recovered and is being held by Sea World of California, pending determination of when such animals might be returned to the wild with no risk of transmitting the virus to uninfected animals. The second dolphin stranded at Newport Beach, California, on 8 December 1995 and was euthanized. These were the first indications of morbillivirus infections in Pacific cetaceans.

Brucellosis and Leptospirosis

As part of ongoing studies of harbor seals in Washington State waters, the Washington Department of Fish and Wildlife collected and tested blood samples from 62 harbor seals for evidence of brucellosis and leptospirosis infections. Thirteen of the 62 blood samples tested positive for *Brucella*, a bacterium known to affect cattle and humans. Twenty-four of the 62 blood samples tested positive for *Leptospira gripptophosa*, a spirochete not previously found in west coast pinnipeds. By the end of 1995 there were no indications of unusually high mortalities in the affected population.

The Regional Marine Mammal Stranding Networks

Much can be learned from stranded marine mammals. For example, changes in the locations and frequency of strandings may indicate changes in the distribution and size of coastal marine mammal populations. Similarly, the types and levels of environmental contaminants found in tissues from stranded marine mammals, coupled with stranding rates, may be a good indicator of the health of marine ecosystems. Stranded marine mammals also can help identify regional marine mammal conservation issues. For example, examination of dead stranded harbor porpoises provided the first indication of their mortality in coastal fisheries (see Chapter III).

In 1977 the Marine Mammal Commission sponsored a workshop to determine how data obtained from both live and dead stranded marine mammals might contribute to the conservation of marine mammals and their habitat. The workshop participants described data that should be obtained from stranded amimals. They recommended that regional stranding networks be organized to obtain and disseminate such data (see Appendix B, Geraci and St. Aubin 1979).

In response to the workshop, the National Marine Fisheries Service established regional stranding networks in the northeast (Maine to Virginia), the southeast (North Carolina to Texas, Puerto Rico, and the U.S. Virgin Islands), the southwest (California and Hawaii), the northwest (Oregon and Washington),

and Alaska. The networks are staffed by volunteers who participate under terms and conditions set forth in letters of authorization from the Service. The Service has designated one person in each of its regional offices to coordinate collection and dissemination of information about marine mammal strandings. In 1994, the last year for which reports are complete, the regional networks reported strandings of 2,309 pinnipeds, 1,533 cetaceans, 203 manatees, and 126 sea otters in the United States.

The regional networks provide the principal means for detecting and initiating investigation of unusual marine mammal mortality events, as well as gathering basic information on the species, number, age, sex, and general condition of live and dead strandings in different geographic locations.

Response to Unusual Mortality Events

The deaths of hundreds of bottlenose dolphins along the U.S. mid-Atlantic coast in 1987-1988, followed by the deaths of thousands of harbor seals in the North Sea and striped dolphins in the Mediterranean Sea, raised concerns worldwide about the health of marine mammal populations and the oceans in which they live. In partial response to this concern, Congress enacted the Oceans Act of 1992. Among other things, the Act added a new title to the Marine Mammal Protection Act: Title IV — Marine Mammal Health and Stranding Response. This new title directed the Secretary of Commerce to (1) establish a marine mammal unusual mortality event working group to provide advice on measures necessary to better detect and respond appropriately to future unusual marine mammal mortality events, (2) develop a contingency plan for guiding response to such events, (3) establish a fund to compensate persons for certain costs incurred in responding to unusual mortality events, (4) develop objective criteria for determining when rehabilitated marine mammals can be returned to the wild, (5) continue development of the National Marine Mammal Tissue Bank (described in previous Marine Mammal Commission annual reports), and (6) establish and maintain a central database for tracking and accessing data concerning marine mammal strandings.

The Secretary of Commerce delegated responsibility for implementing these directives to the National Marine Fisheries Service. As directed, the Service, in consultation with the Commission and the Fish and Wildlife Service, established a working group in 1993 to advise on measures necessary to better detect and respond to unusual marine mammal mortality events. The group held its first meeting on 1-2 April 1993 and met again on 15 March 1994 and on 3-4 April 1995. A member of the Marine Mammal Commission staff serves on the working group.

Development of a National Contingency Plan

As noted in the Commission's previous annual report, the National Marine Fisheries Service in June 1994 requested comments on its Draft National Contingency Plan for Response to Unusual Marine Mammal Mortality Events. The Commission, in consultation with its Committee of Scientific Advisors, reviewed and provided comments on the draft on 12 September 1994. The Service revised the draft to take account of comments provided by the Commission and others and distributed the revision to the Commission and members of the unusual mortality event working group on 1 February 1995 for review.

The Commission, in consultation with its Committee of Scientific Advisors, reviewed the revised draft and by letter of 21 March 1995 provided comments to the Service. The Commission noted that the revision appeared to identify most actions that could and should be taken to respond appropriately to unusual marine mammal mortality events in U.S. waters. The Commission pointed out, however, that the plan was not formatted so as to make it easy to use. It provided an outline illustrating how the plan might be reformatted to make it more useful.

Members of the working group also provided comments on the revised draft. A final proofing draft of the contingency plan was developed, taking into account comments provided by the Commission and the working group. This final draft was forwarded to the working group members on 29 June 1995 for final review. At the end of 1995 it was the Commission's understanding that the contingency plan had been completed but, because of Fiscal Year 1996 funding uncertainties, had not been printed and distributed.

Determining the Cause of Unusual Mortality Events

Determining the cause or causes of unusual marine mammal mortality events has been hampered, in part, because few laboratories have the expertise and equipment necessary to screen tissues for viruses and other possible disease-causing organisms, naturally occurring biotoxins, and various anthropogenic contaminants that might be toxic. By letter of 19 December 1994 the Commission recommended that the National Marine Fisheries Service make arrangements with the Department of Agriculture, which maintains state-of-the-art viral testing facilities at Plum Island, New York, and Ames, Iowa, to do viral screening when unusual marine mammal mortality events occur. The Commission also recommended that the National Marine Fisheries Service (1) determine the types of other routine screens that might help facilitate prompt identification of non-viral causes of unusual marine mammal mortality events, (2) identify the facilities best equipped to do those screens, (3) make arrangement for the facilities to carry out such screens when unusual mortality events occur, and (4) advise the regional marine mammal stranding networks of the arrangements.

The working group on unusual marine mammal mortality events strongly supported the Commission's recommendations and advised the National Marine Fisheries Service of its support by letter of 3 May 1995. The Service agreed it would be desirable to make arrangements with leading laboratories to do routine viral and other screening, and indicated it was attempting to do so, subject to budget constraints.

Release Criteria

If marine mammals strand because they are sick, returning them to the wild before they are fully healthy could risk transmitting disease-causing organisms to healthy animals. Prematurely returned animals also could die from starvation or injury because they are not healthy enough to capture prey, defend themselves during encounters with other animals, or avoid predators. Similar problems may be encountered when releasing animals that have been maintained for relatively long periods of time in captivity for purposes of scientific research or public display.

As noted earlier, the Secretary of Commerce is to develop objective criteria for determining when rehabilitated marine mammals can be returned to the wild. The unusual marine mammal mortality event working group has been asked to recommend appropriate criteria. The pros and cons of possible criteria were discussed at the working group's 1994 and 1995 meetings, but no consensus was reached. The working group is expected to develop recommended criteria at its next meeting, to be held in the first half of 1996.

The Possible Role of Marine Pollution

As noted earlier, pollution of the marine environment may be affecting marine mammals both directly and indirectly. That is, some environmental contaminants, by themselves and in combination with others, may be toxic and cause mortality or interfere with reproduction or other vital processes. Some others may affect physiological processes and suppress the immune system, making animals more vulnerable to parasites and disease-causing organisms. Also as noted earlier, the types and levels of contaminants present in the tissues of stranded marine mammals may be good indicators of the types and levels of pollutants present in coastal marine ecosystems.

Ocean pollutants include noise and marine debris as well as chemicals and metals. Actions taken by the Commission to assess the sources and effects of marine debris are described in Chapter VIII. Actions taken by the Commission to assess and minimize the effects of noise pollution are described in Chapter XI.

In 1996 the Commission will focus on identifying threats from chemical contaminants and actions to minimize those threats. As a first step, it has compiled a bibliography on physical and chemical constituents in the marine environment and their effects on marine mammals. This will be published in 1996.

Chapter VIII

IMPACTS OF MARINE DEBRIS

Over the past 40 years the increasing amount of plastic and other synthetic materials lost and discarded into the marine environment has become a major new form of marine pollution throughout the world. In addition to its socioeconomic impacts — posing hazards to human health and safety, imposing economic constraints on tourism and commercial fisheries, and creating financial burdens for coastal communities that must clean it up — marine debris causes mortality and serious injury to marine mammals, seabirds, sea turtles, fish, and shellfish.

As discussed in previous annual reports, the latter concern prompted the Marine Mammal Commission to assume an important role in bringing marine debris pollution to the attention of responsible agencies and in precipitating responsive domestic and international action. This chapter discusses the nature of the problem and recent actions taken by the Commission to address the issue.

Biological Impacts of Marine Debris

Biological impacts of marine debris on marine animals take two forms: entanglement and ingestion. In both cases, these interactions are magnified by factors that attract animals to marine debris. For example, debris sometimes resembles natural prey. In other cases, predators are attracted to vulnerable prey items already caught in debris or using debris as a source of cover. Once entangled, animals that are unable to free themselves quickly are likely to exhaust themselves and drown, incur infections from the abrasion of attached debris, have their ability to catch food impaired, or be unable to avoid predators. Animal that ingest debris items may have their digestive tracks blocked or injured.

As a contribution to the Third International Conference on Marine Debris in Miami, Florida, on 8-13 May 1994, a member of the Marine Mammal Commission staff reviewed information on the biological impacts of marine debris. The results demonstrated that marine debris is a broadscale pollutant that affects many of the world's marine species. As shown on Table 11, marine debris entanglement or ingestion records have been reported for at least 267 species, including at least 43 percent of the world's marine mammal species, at least 44 percent of the world's seabird species, all but one of the world's seven sea turtle species, and at least 68 species of fish and shellfish, many of which are commercially important.

In general, death and serious injury of marine life are far more likely to occur as a result of entanglement and entrapment in debris than by ingestion. In this regard, most entanglement reports involve derelict fishing gear, including both intact gear and smaller fragments of netting, rope, and monofilament line. Strapping bands, such as those used to bind bait boxes and cargo, are also a significant entanglement hazard. The principal cause of ingestion-related deaths is blockage of digestive tracks by plastic sheeting, plastic bags, or balloons. Ingestion-related deaths are reported most frequently for sea turtles but also occur in cetaceans and manatees. Small plastic pellets and plastic fragments are also common in the stomachs of some seabird and sea turtle species; however, the effect of ingesting these items is less apparent.

While there is clear evidence that animals of many marine species actively seek out and interact with marine debris, efforts to quantify the frequency of such interactions and their impact at a population level have been frustrated by difficult, unresolved sampling problems. For example, documentation of interactions at sea is rarely feasible because both the debris and the affected animals are scattered across vast areas and are very hard to detect. In addition, animals killed by marine debris tend to sink or be eaten quickly, confounding study efforts. Most studies

therefore have been done on shore when animals haul out, roost, or strand. Interaction rates from land-based studies, however, do not account for animals killed at sea, and probably reflect only those that interact with debris close to shore or that sustain mild impacts (*e.g.*, entanglement in small pieces of debris). Nevertheless, analyses to date suggest that some populations are impacted significantly.

Some seal species, such as the northern fur seal and the Hawaiian monk seal, appear to be the marine mammals most affected by marine debris. Studies of the world's largest northern fur seal population, the fur seal herd on the Pribilof Islands, suggest that late in the 1970s up to 50,000 juvenile fur seals per year may have been entangled and killed annually by marine debris, and that entanglement was a principal cause in a six to eight percent annual decline in that population in the 1970s and early 1980s. More plausible explanations for the decline have not been postulated and, given the population's failure to recover over the past decade, it is possible that entanglement is still a problem for this population.

Observations from seasonal field camps established to study Hawaiian monk seals, one of the world's most endangered seals, also suggest potentially serious entanglement problems. Observed entanglement rates at the species' major colonies typically are less than one percent of a colony per year, but rates of up to 7.5 percent per year have been recorded, and field camps usually are only in place for a few days to a few months. Entangled seals are routinely disentangled when found and, while entangling material is often loose, suggesting seals might have been able to free themselves, in some cases it is firmly attached and would likely have remained attached without intervention. Considering the short period of observation and the probability that some seals are entangled and killed at sea unobserved, these incidents could reflect a significant problem for this species.

Two other U.S. marine mammal populations for which marine debris may be a particular concern are Florida manatees and western North Atlantic northern right whales. Analyses of photo catalogues for both populations suggest that 3.6 percent of the manatee population and 57 percent of the northern right whale population bear scars from entanglement incidents. Carcass salvage programs for these populations also report that about 1.7 percent of manatee carcasses and 8 percent of the right whale carcasses are the result of entanglements. In both cases, most incidents probably involve interactions with active rather then derelict fishing gear, but distinguishing between these sources is not possible. Some manatee deaths due to ingestion of marine debris also have been documented.

Other species that may have high levels of impact from marine debris include sea turtles and certain species of commercial shellfish. Studies to tag loggerhead turtles in the eastern North Atlantic Ocean have found six percent of the turtles captured at sea entangled in debris. Considering the effects of such a burden on turtle metabolic requirements and their increased vulnerability to predators, as well as the species' penchant for ingesting plastic, it seems probable that marine debris is a significant conservation issue for this population and sea turtles generally. As discussed below, the accumulation of derelict crab and lobster pots and gillnets also may pose significant entrapment potential for commercially valuable shellfish stocks.

In light of marine debris impacts on marine mammals and their ecosystems, the Marine Mammal Commission has continued to assist other agencies and groups in addressing the problem. Major efforts in this regard in 1995 are discussed below.

Derelict Fishing Gear

During the course of commercial fishing operations, derelict fishing gear may be generated by at least eight factors — the weather (*e.g.*, storms and ice conditions), bottom snags, ship collisions, fishing methods, human error, vandalism, gear failure, and deliberate discards. Many of the types of marine debris most hazardous for marine mammals and other species (*e.g.*, netting, rope, and monofilament line) are produced by commercial fisheries. Although entanglement of animals in small pieces of netting and line is the major source of entanglements reported by land-based observers, the catch of animals in relatively intact fishing gear lost and discarded at sea may be a greater source of mortality.

Table 11. The number and percentage of species worldwide with records of marine debris entanglement and ingestion by species group

Species Group	Total No. of Species Worldwide	Entanglement Records No. (%)	Ingestion Records No. (%)	One or Both Types of Records No. (%)
Sea Turtles	**7**	**6 (86%)**	**6 (86%)**	**6 (86%)**
Seabirds	**312**	**51 (16%)**	**111 (36%)**	**138 (44%)**
Sphenisciformes (Penguins)	16	6 (38%)	1 (6%)	6 (38%)
Podicipediformes (Grebes)	19	2 (10%)	0 (0%)	2 (10%)
Procellariiformes (Albatrosses, Petrels, and Shearwaters)	99	10 (10%)	62 (63%)	63 (64%)
Pelicaniformes (Pelicans, Boobies, Gannets, Cormorants, Frigatebirds, and Tropicbirds)	51	11 (22%)	8 (16%)	17 (33%)
Charadriiformes (Shorebirds, Skuas, Gulls, Terns, and Auks)	122	22 (18%)	40 (33%)	50 (41%)
Other Birds	—	**5**	**0**	**5**
Marine Mammals	**115**	**32 (28%)**	**26 (23%)**	**49 (43%)**
Mysticeti (Baleen Whales)	10	6 (60%)	2 (20%)	6 (60%)
Odontoceti (Toothed Whales)	65	5 (8%)	21 (32%)	22 (34%)
Otariidae (Fur Seals and Sea Lions)	14	11 (79%)	1 (7%)	11 (79%)
Phocidae (True Seals)	19	8 (42%)	1 (5%)	8 (42%)
Sirenia (Manatees and Dugongs)	4	1 (25%)	1 (25%)	1 (25%)
Mustellidae (Sea Otter)	1	1 (100%)	0 (0%)	1 (100%)
Fish	—	**34**	**33**	**60**
Crustaceans	—	**8**	**0**	**8**
Squid	—	**0**	**1**	**1**
Species Total	—	**136**	**177**	**267**

The catch of marine life in derelict nets and traps is called ghostfishing and has long been recognized as an inevitable consequence of gear loss. Except for efforts to develop degradable time-release escape panels on fish and crab traps, however, the problem has received little attention from fishery managers and little funding for study. Instead, the issue has been dismissed largely on unsupported or poorly examined assumptions that derelict gear quickly loses its ability to catch marine life because of degradation, collapse, burial, encrusting marine life, or other factors.

In reviewing marine debris impacts for the Third International Conference on Marine Debris, the Commission examined past studies of ghostfishing. It found that few studies have been done on the subject, and that most of those focus on impacts of lost traps; very few studies have been done on derelict gillnets and other types of nets. The review also found that although netting and corrosion-resistant materials used in fishing gear can now last for decades or longer in the ocean waters, there are almost no long-term studies to assess the length of time different types of

derelict gear might continue to catch marine life. Also, no systematic records are kept on the amount or location of lost gear or the fate of old gear retired from service. As a result, efforts to quantify the amount of derelict gear entering the ocean have relied on interviews with fishermen to estimate accidental loss rates for selected fisheries, and none have attempted to consider all relevant derelict gear sources.

While information on derelict gear and its impact on marine ecosystems is limited, the results of some ghostfishing studies suggest that, for at least some commercial fishery resources, particularly shellfish, impacts could be significant. For example:

- an estimated 31,600 pots were lost in Alaska's Bristol Bay king crab fishery in 1990 and 1991; assuming each trap caught and killed just one legal-sized crab per year, the annual catch would be 205,400 pounds of king crab;
- an estimated 11 percent of the traps in the British Columbia Fraser River Dungeness crab fishery were lost in 1984; the estimated non-retrieved catch in those traps was 21,000 kg equal to about seven percent of that year's landed catch of Dungeness crab;
- 300 metric tons of sablefish, equal to about 7.5 to 30 percent of annual landings, were estimated to have been lost in derelict fish traps off British Columbia from 1977 to 1983;
- an estimated 5 to 30 percent of the lobster traps used off New England are lost annually, and in 1978 an estimated 670 metric tons of lobster were caught in derelict traps;
- lost gillnets observed by remotely operated cameras and submersibles off New England over a three-year period continued to catch fish, crabs, and lobster and had not completely collapsed by the end of the study;
- nine lost gillnets were found during a submersible search of about 0.4 km^2 of ocean bottom off New England and 2,240 lost gillnets were estimated to be present in 1987 in 64 nmi^2 at two major New England gillnet fishing areas; and
- lost gillnet retrieval efforts off Newfoundland, Canada, recovered 148 nets in 20 days in 1975, 176 nets in 24 days in 1976, and 16.5 nets in 20 days in 1984; the nets recovered in 1975 had 3,000 kg of fish and 1,500 kg of crab, the nets recovered in 1976 had 5,000 kg of fish and 2,500 kg of crab, and the nets recovered in 1984 had no fish or crab.

Proposed Derelict Fishing Gear Retrieval Project

In light of the particularly limited information on derelict gillnets and their potentially significant ghostfishing impact, the Commission wrote to the National Marine Fisheries Service's Marine Entanglement Research Program (discussed below) on 20 May 1994 recommending that it support a pilot project to retrieve and examine lost gillnets off New England. The purposes of the project were to assess the amounts of lost netting in major gillnet fishing areas, to determine the types and amounts of marine life being caught in lost gear, and to evaluate the potential for directed efforts to remove such hazardous debris. At the Service's annual planning meeting for the program in July 1994, there was some support for the effort, but it was recommended that funding be sought first from other sources within the Service.

Therefore, on 27 July 1994 the Commission wrote to the Service's Office of Sustainable Development and International Affairs. At the time, the office was distributing $30 million in emergency financial assistance grants to New England fishermen no longer able to fish because of a collapse in regional groundfish stocks. Some of those funds were to be used to eliminate fishing pressure on groundfish stocks, and the Commission suggested that funds be used to hire displaced commercial fishermen to test the feasibility of recovering lost gillnets and assessing their impact.

The Commission received no reply from the office and on 30 November 1994 it wrote to the Director of the Service recommending that it use one of its research vessels to provide ship support for a gillnet retrieval project and that partial funding for other project expenses be provided through the Marine Entanglement Research Program. On 19 January 1995 the Service's Director replied, noting that the Commission's recommendations had been provided to its Northeast Fisheries Science Center for technical review and cost evaluation. The reply also noted that pending review by the Center and a response from the above-noted office, Service funding for such work

would be limited to that which might be provided through the Marine Entanglement Research Program.

The Commission did not receive a reply from the office, nor was it provided results of the Center's technical evaluation of the recommended gear retrieval project; however, in April 1995 the Service's Northeast Regional Office announced plans to make available $4.5 million in grants under its Fishing Industry Grant Program. Among other things, the grants were intended to develop methods of eliminating or reducing bycatch. An owner of several groundfish fishing vessels in the New England sink-gillnet fishery, who was also concerned about the number and effect of lost gillnets, submitted a proposal to the Service for a pilot study to assess the amounts and impact of lost gillnets in two major sink-gillnet fishing areas off New England. The proposal, developed in cooperation with scientists from the New England Aquarium, involved retrieving lost gillnets with grappling hooks following a systematic sampling protocol. Knowing of its interest in such work, a copy of the proposal was sent to the Commission by the vessel owner.

After reviewing the proposal, the Commission wrote to the Service's Northeast Regional Office on 26 May 1995 and to the Director of the Service on 25 July 1995 expressing strong support for the proposal.

In its letter to the Regional Office, the Commission noted that derelict fishing gear has been accumulating on fishing grounds in New England for decades and since there were no data on its amount or effects, efforts to collect such data were urgently needed. It also noted that, while the proposed sampling scheme was scientifically sound and very well designed, it seemed possible that the project's most fundamental objectives could be answered by sampling a smaller number of areas than proposed. Therefore, the Commission urged that if the amount of the request was a limiting factor in deciding whether to approve it, consideration be given to reducing the sampling effort, which would lower the project cost. In this regard, the Commission also noted that some funding support for the project also could be provided by the Service's Marine Entanglement Research Program.

In its letter to the Director of the Service, the Commission enumerated the potential benefits of the project. For instance, it could demonstrate a major new mitigation approach for improving fish habitat, minimize a major source of mortality for commercially valuable fish and shellfish resources, reduce one of the most biologically hazardous sources of marine debris, and generate valuable data for fishery managers on a source of mortality for fish and shellfish stocks that is not presently addressed in fishery management models.

By letter of 9 August 1995 the Service advised the Commission that it had decided against funding the proposal, given other grant requests. No alternative approaches were suggested to meet the objectives that the proposal sought to address, and as of the end of 1995 no action had been taken or proposed by the Service to assess derelict gear amounts or impacts in New England.

Workshop on Reducing Bycatch

During the course of commercial fishing operations there is an inevitable catch of non-target species, including unmarketable and restricted species of fish and shellfish, as well as species of marine mammals and sea turtles. This non-target catch, called bycatch, is usually discarded overboard and survival rates of discarded species are typically very low. The cumulative impact of bycatch-related mortality on individual species and marine ecosystems has been recognized as a serious fisheries management issue internationally (see Chapter V) as well as domestically.

To examine bycatch problems and possible solutions being developed and applied worldwide, the U.S. fishing industry organized and sponsored a international workshop held in Seattle, Washington, on 25-27 September 1995. Entitled "Solving Bycatch Workshop: Considerations for Today and Tomorrow," a major objective of the workshop was to exchange practical knowledge and ideas that U.S. fishermen might apply to minimize the bycatch of non-target species. Because of the Marine Mammal Commission's efforts to address marine debris pollution, and because of its concern about the ecological effects of lost and discarded fishing gear, a representative of the Commission was invited to present a paper on marine debris entanglement and ghostfishing.

Workshop participants included a large number of U.S. commercial fishermen as well as gear manufacturers, scientists, and resource managers from nine countries. Meeting presentations and exhibits provided a valuable opportunity for U.S. fishermen to learn first hand about new fishing gear designs, fishing practices, and fishery management approaches being developed and applied to reduce or avoid bycatch. To make the information presented broadly available to fishermen and others, the meeting papers will be published in a proceedings volume in spring 1996.

The paper presented on behalf of the Marine Mammal Commission addressed ghostfishing impacts, particularly on commercial fishery resources, and possible solutions. It noted that many of the species taken as bycatch were also caught in derelict gear, and that the only difference between the two issues was that one involved active gear and the other derelict gear. It therefore urged that the two problems be considered jointly as related aspects of the same fundamental concern — preventing unwanted mortality of marine life in fishing gear.

The paper reviewed results of ghostfishing studies, such as those mentioned above, and noted that to date no assessments of ghostfishing have considered cumulative impacts from losses by all types of lost gear. For example, lobsters in New England are prone to entanglement in lost gillnets, but estimates of ghostfishing losses for lobsters have considered only those killed in lost lobster traps. As a result, many, if not most, quantitative estimates of ghostfishing could significantly underestimate losses. It also noted that almost no long-term studies had been done on escape panels in traps to verify the assumption they work effectively and pose no entrapment hazards. With some traps lasting a decade or longer and with trap losses in some fisheries reaching 30 percent or more of the traps in use each year, even very low ghostfishing rates may be significant.

To reduce ghostfishing and entanglement hazards, the paper recommended additional efforts to encourage proper disposal of old fishing gear and to study and improve gear design features, such as escape panels. Concerning the former point, it suggested the most urgent need was to develop convenient port reception facilities to recycle and dispose of old fishing gear and other ship-generated garbage. It noted that efforts to develop such facilities were being taken by the Marine Entanglement Research Program (see below), and it urged fishermen to work with port operators and government officials to demand their development. Regarding gear design, the paper recommended efforts to develop degradable floats or float release mechanisms that would reduce the time lost nets maintain vertical profiles that increase ghostfishing. It also recommended examining the possible use of degradable netting in some situations.

The paper also recommended further work in four other areas that have received little attention to date. First, it suggested exploring efforts to retrieve lost gear (such as the pilot gillnet retrieval project discussed above) encouraging greater efforts to retain lost gear caught incidentally during fishing operations, and recording the location where gear is lost to facilitate later retrieval. Second, it recommended steps to modify fishing practices, such as avoiding known hazard areas where the risk of bottom snags or vessel collisions are great. The paper noted that some fishermen may use their older, less valuable gear and risk losing it in order to fish in hazardous areas where catch rates may be higher. It was urged that such practices be eliminated.

Third, the paper recommended developing approaches to enhance the relocation of lost gear or to prevent its loss in the first place. Possible examples include attaching sonic devices or radar reflectors to submerged gear or using automatic float-release mechanisms to keep floats and other gear markers underwater where passing vessels and storms would be less likely to damage or carry off gear. And fourth, it recommended further research to assess the rates, location, and primary causes of gear loss, the hazard life and catch rates of different types of lost gear, and total ghostfishing losses for selected species, such as crabs and lobster, by all types of lost gear.

The Marine Entanglement Research Program

The National Marine Fisheries Service has carried out a program to study and mitigate marine debris

pollution since 1985. Plans for the program's first year were developed jointly by the Marine Mammal Commission and the Service, and since then annual program plans have been developed by the Service with help from an *ad hoc* interagency advisory committee on which representatives of the Commission have participated. In recent years, program funding has ranged from $625,000 to $750,000 per year. As the only program dedicated exclusively to addressing the full range of marine debris sources and impacts, the program has been a cornerstone of the Federal Government's response to marine debris pollution.

To help set priorities for program work in 1996, the Service convened a meeting of its interagency advisory committee on 14-15 June 1995 in Seattle, Washington. Based on the committee's advice, the Service developed a recommended program plan with a target budget of $624,100. Most of the proposed work for 1996 involved carrying forward previously supported work to:

- organize annual national volunteer beach clean-up efforts;
- remove entangling debris from endangered Hawaiian monk seals and monk seal haul-out beaches;
- assess marine debris impacts on endangered sea turtles in the North Atlantic;
- maintain a public information and outreach program on marine debris-related impacts, legal requirements, and source reduction measures;
- prepare and publish a quarterly marine debris newsletter;
- develop a national marine debris monitoring program to detect trends in the sources and amounts of marine debris;
- monitor marine debris levels at selected Alaska beaches;
- develop port reception programs in the Gulf of Maine to receive and recycle old fishing gear;
- develop recycling programs for old fishing gear in North Carolina and South Carolina; and
- maintain a full-time program coordinator.

Other projects proposed for support by the Service included an assessment of entanglement rates among northern fur seals and work to help develop an international marine debris program in the Wider Caribbean Region.

On 27 October 1995 the Service requested Commission comments on its recommended 1996 program plan. However, the fiscal year 1996 appropriation bill for the Department of Commerce included no funding to continue the Marine Entanglement Research Program. Although that bill was not signed, under the continuing resolutions passed during the final months of 1995, no funds were provided to maintain the program. As a result, at the end of 1995 no measures had been taken to implement projects in the proposed program plan and none were expected to be taken in 1996. It is not clear what steps the Service might take in the future to address the impacts of marine debris pollution on marine mammals or other marine species.

Annex V of the International Convention for the Prevention of Pollution from Ships

The International Convention for the Prevention of Pollution from Ships (also called the MARPOL Convention) is an agreement signed in 1973 to establish an international framework for cooperation in controlling accidental and deliberate pollution of the marine environment by discharges from ships. The Convention includes five annexes, one of which, Annex V, establishes regulations to control the discharge of ship-generated garbage. The Marine Environment Protection Committee of the International Maritime Organization oversees international efforts to administer and coordinate work to implement the Convention and Annex V. The principal features of Annex V are (1) discharge limits on the disposal of ship-generated garbage at sea, including a ban on all disposal of plastics (see Table 12); (2) the designation of "special areas" in which more stringent discharge restrictions apply, and (3) requirements that ports in nations that are party to the Annex have suitable, convenient reception facilities to accept and properly dispose of ship-generated garbage returned to port.

Annex V entered into force on 31 December 1987 after the prescribed number of nations representing 50 percent of the world's commercial shipping tonnage had filed instruments of ratification formally agreeing to its terms. All nations that are party to the Convention, and that also formally accept the provisions of

Table 12. Summary of garbage discharge limitations under the International Convention for the Prevention of Pollution from Ships (1973-1978) and the U.S. Act to Prevent Pollution from Ships, as Amended

Type of Garbage	Discharge Prohibitions for All Vessels		Discharge Prohibitions for Offshore Platforms and Associated Vessels[3]
	Outside Special Areas[1]	Inside Special Areas[2]	
Plastics, including synthetic ropes and fishing nets and plastic bags	Disposal prohibited	Disposal prohibited	Disposal prohibited
Dunnage, lining, and packing materials that float	Disposal prohibited less than 25 n.mi. from nearest land	Disposal prohibited	Disposal prohibited
Paper, rags, glass, metal bottles, crockery, and similar refuse	Disposal prohibited less than 12 n.mi. from nearest land	Disposal prohibited	Disposal prohibited
Paper, rags, glass, *etc.*, comminuted or ground[4]	Disposal prohibited less than 3 n.mi. from nearest land	Disposal prohibited	Disposal prohibited
Food waste not comminuted or ground	Disposal prohibited less than 12 n.mi. from nearest land	Disposal prohibited less than 12 n.mi. from nearest land	Disposal prohibited
Food waste comminuted or ground[4]	Disposal prohibited less than 3 n.mi. from nearest land	Disposal prohibited less than 12 n.mi. from nearest land[5]	Disposal prohibited less than 12 n.mi. from nearest land
Mixed refuse types	Apply most stringent disposal restriction	Apply most stringent disposal restriction	Apply most stringent disposal restriction

1 Under the Act To Prevent Pollution from Ships, discharge limitations in the United States apply within all navigable waters, including rivers, lakes, and other inland waters.
2 Special Areas listed in Annex V are the Mediterranean, Baltic, Red, Black, and North Seas; the Persian Gulf/Gulf of Oman; the Wider Caribbean Region; and the Antarctic Ocean. However, at the end of 1995 only the North Sea, the Baltic Sea, and the Antarctic Ocean Special Areas were actually in effect because nations bordering the other listed areas had not yet affirmed to the IMO that adequate port reception facilities were in place.
3 Offshore platforms and associated vessels include all fixed or floating platforms engaged in exploitation or exploration of seabed mineral resources and all vessels alongside or within 500 m of such platforms.
4 Comminuted or ground garbage must be able to pass through a 25-mm (1-inch) mesh screen.
5 For the Special Area in the Wider Caribbean Region only, disposal is prohibited within 3 rather than 12 n.mi. from the nearest land.

Annex V, are obligated to develop and enforce domestic rules that meet the provisions set forth in that Annex. The United States is among the approximately 70 nations that have formally accepted Annex V. To carry out its obligations under Annex V, the U.S. Congress passed the Marine Plastic Pollution Research and Control Act in 1987. That Act amends the Act to Prevent Pollution from Ships, which provides authorization to the U.S. Coast Guard to implement provisions related to the entire MARPOL Convention in this country.

New Amendments to Annex V

In 1988, when the Coast Guard began developing U.S. regulations to implement Annex V, it considered the need for provisions that would require certain vessels to post placards on garbage discharge restrictions, to carry vessel garbage management plans, and to maintain records of when and where garbage was discharged. While these measures were considered important for achieving the goals of Annex V, provisions on these matters were not adopted because explicit authority for doing so was not set forth in either Annex V or related domestic legislation.

Because of their importance, the Coast Guard therefore developed and submitted a paper concerning these needs to the Marine Environment Protection Committee at its 34th session in July 1993. The paper recommended that Annex V be amended to add provisions on each of the three needs. The Committee agreed to consider the matter and, at its next two meetings, specific language was developed and proposed. At its 37th session on 11-15 September 1995, the Committee unanimously adopted the proposed amendments to Annex V adding provisions to require placards, management plans for handling ship-generated garbage, and maintenance of a garbage disposal record book. The amendments will enter into force on 1 July 1997. During the intervening period, parties to the Annex are to adopt conforming domestic laws and rules to implement them.

The new amendments to Annex V require the following: (1) all vessels 12 meters or longer must post placards aboard ship advising passengers and crew of the restrictions on discharging garbage at sea; (2) all vessels greater than 400 gross tons or certified to carry 15 or more people must carry a garbage management plan that explains crew responsibilities for handling, processing, storing, and disposing of ship-generated garbage; and (3) all vessels greater than 400 gross tons or certified to carry 15 or more people, and also engaged in voyages to ports under the jurisdiction of another party to Annex V, must carry a record book that tracks certain information on garbage incineration or discharge events (*i.e.*, the dates and location, a description of the garbage, and the estimated amount of garbage discharged).

Navy Compliance with Annex V

Annex V exempts all government ships, including military vessels, from complying with its requirements. However, when Congress passed the Marine Plastic Pollution Research and Control Act, it directed that U.S. Government ships, including U.S. Navy vessels, comply with its provisions by the end of 1993. In response, the Navy initiated efforts to reduce its discharge of garbage, particularly plastics, at sea. Among its first actions were steps to reduce the amount of disposable plastics brought on board, and to begin designing suitable shipboard garbage-processing equipment, such as pulpers, compactors, and a thermal plastic processor that compresses plastic wastes into sanitized blocks for easier storage. It also instituted a practice of storing all food-contaminated wastes for at least the last three days ships are at sea, and all non-food contaminated plastics for at least the last 20 days at sea.

Although substantial progress was made in meeting Annex V discharge requirements, the Navy was unable to meet the 1993 compliance deadline. Restrictions that apply in special areas prohibiting the discharge of garbage other than food wastes proved particularly difficult. Among the reasons cited in this regard were the need for long voyages away from port in listed special areas (*e.g.*, the Mediterranean and the Caribbean Seas) and the limited space on military ships to add waste processing equipment and store generated waste.

Therefore, as part of the National Defense Authorization Act passed late in 1993, Congress extended the Annex V compliance deadlines for Navy ships and directed the Navy to submit a report to Congress by

November 1996 outlining its plan for bringing Navy vessels into compliance with the requirements. The new deadlines require all surface ships to comply with the plastic discharge prohibitions by the end of 1998 and with special area discharge restrictions by the end of 2000. Navy submarines must comply with all Annex V restrictions by the end of 2008.

To help develop its compliance plan for Annex V, the Navy initiated a series of studies to evaluate options for storing, processing and transferring waste to shore, to assess the fate and impact of solid wastes processed by new pulpers, and to examine existing and potential onboard waste destruction technologies. On 12 October 1995 the Navy also announced that it was preparing an environmental impact statement on plans for disposing of shipboard solid waste and asked for comments on approaches it should consider in those plans. In addition, the Navy invited agency officials, representatives of environmental groups, and technical experts familiar with Annex V and related solid waste technology to attend the first of two planned meetings to review and discuss Navy compliance plans. The meeting was held on 3 November 1995 and a representative of the Commission participated. The second meeting is to be held early in 1996 when the studies mentioned above are completed.

On 22 November 1995 the Commission responded to the Navy's 12 October request for comments. In its comments, the Commission noted that the Navy's many efforts to address practical problems associated with Annex V restrictions represented an outstanding commitment to meeting compliance goals and that they placed the Navy at the forefront of efforts to control ship-generated sources of marine debris pollution. Through information transfer to other fleets in the United States and abroad, the Commission noted the Navy's efforts should lead to substantial benefits beyond the compliance of Navy ships alone.

Recognizing the absence of a simple universal garbage disposal solution for the many different types and needs of Navy vessels, the Commission noted that it seemed necessary to match the broad array of provisioning, processing, training, storage, transport, and disposal options to the various needs of different classes of Navy vessels or individual vessels. Developing technologies, such as plasma-arc pyrolysis, may provide a simpler solution in the future, but in the Commission's opinion, it would be inappropriate to assume their development could meet compliance needs in the short term.

The Commission also noted the Navy's particular success in addressing plastic wastes through efforts to reduce plastics in ship supplies, plastic storage policies, and development of the thermal plastic processor. Noting that plastic items are among the most hazardous to marine life, the Commission noted that these steps were a particularly important contribution to reducing marine debris impacts. In light of plans to install plastic processors on all Navy ships by 1998, the Commission suggested the improved ability to handle plastic wastes might make it useful to shift ship provisioning back towards plastic supplies in order to reduce other waste materials that may be more difficult to process and store. With respect to other options, the Commission noted that experience with cruise ships and other vessels operating in special areas suggests that commercially available incinerators and compactors also should be carefully examined for possible use on some Navy ships.

While recognizing the unusual space constraints on military vessels, the Commission emphasized that allocating suitable space for waste storage on vessels was essential. Therefore, if it was not already being done, the Commission suggested that steps be taken to estimate the range of waste storage needs for different waste materials for all types of Navy vessels, given available processing options, and then to identify the best way to address storage needs to handle those volumes on a vessel-by-vessel basis. Also understanding that the Navy was examining options to shuttle solid wastes from ships to port aboard tending supply ships, the Commission suggested consideration also be given to hiring or purchasing other vessel tenders to meet this need if its existing vessels could not perform this function. In this regard, it noted that this may need to be only an interim measure, pending development of new technologies.

National Research Council Study on Annex V

In 1995 the National Research Council published the results of a two-year study entitled "Clean Ships, Clean Ports, Clean Oceans," which examined U.S.

efforts to implement programs and requirements addressing the provisions of Annex V. The study was conducted by the Committee on Shipboard Wastes, part of the Council's Marine Board, at the request of federal agencies with key responsibilities under the Marine Plastic Pollution Research and Control Act. These included the Coast Guard, the Environmental Protection Agency, and the National Marine Fisheries Service. During the course of the study the Commission provided information and participated in some of the Committee's meetings.

Among other things, the study examines the roles and responsibilities of agencies, organizations, fleets and ports in addressing Annex V requirements, and suggests steps the could be taken to better integrate and improve national compliance efforts. The study report provides a comprehensive review of the issue, proposes a national strategy and objective for different sectors of the maritime community (*e.g.*, recreational boats, commercial fishing vessels, cargo ships, naval vessels, research vessels, *etc.*), and recommends specific Federal actions to improve implementation of Annex V.

Concerning needed federal actions, the report includes recommendations for: (1) the National Oceanic and Atmospheric Administration to develop a statistically valid long-term monitoring program to assess the amounts and impacts of marine debris; (2) the Environmental Protection Agency to establish a framework for integrating port reception facilities with land-based solid waste management systems; (3) the Maritime Administration to establish a research and development program for onboard garbage-processing technology with technical support from the Navy; (4) the Coast Guard to aggressively enforce Annex V, extend the requirements for garbage logs to foreign vessels, and examine the potential for issuing tickets in civil cases; and (5) Congress to establish a permanent national commission that would provide an expert independent body to oversee, help coordinate, and advise Congress on the progress of work to implement Annex V in the United States.

Chapter IX

OUTER CONTINENTAL SHELF OIL AND GAS EXPLORATION AND DEVELOPMENT

Exploration and development of coastal and offshore oil, gas, and hard mineral resources may adversely affect marine mammals and their habitat. Under the Outer Continental Shelf Lands Act, the Department of the Interior's Minerals Management Service is responsible for assessing, detecting, and mitigating the adverse effects of these activities in offshore waters beyond state jurisdiction. Under the Marine Mammal Protection Act and the Endangered Species Act, the National Marine Fisheries Service and the Fish and Wildlife Service are responsible for reviewing proposed actions and advising the Minerals Management Service and other agencies of measures needed to ensure that those actions will not have adverse effects on marine mammals or endangered or threatened species. The Commission reviews relevant policies and activities of these agencies and recommends actions that appear necessary to protect marine mammals and their habitats. The Commission's activities in this regard in 1995 are discussed below.

Section 101(a)(5) of the Marine Mammal Protection Act directs the Secretaries of the Interior and Commerce to authorize, in certain instances, the unintentional taking of small numbers of marine mammals by U.S. citizens incidental to activities other than commercial fishing operations. Such small-take authorizations are sometimes required for activities related to offshore oil and gas exploration and development. These are discussed in Chapter XI.

Proposed Offshore Lease Sales

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, reviews and comments on environmental impact statements and other matters concerning proposed outer continental shelf oil, gas, and hard mineral lease sales. During 1995 the Commission commented to the Minerals Management Service on draft environmental impact statements concerning proposed lease sales in Cook Inlet, the Beaufort Sea, and the Gulf of Mexico. The Commission also provided comments in response to a call for information concerning additional proposed lease sales in the Gulf of Mexico.

Oil & Gas Lease Sale #149, Cook Inlet

Proposed lease sale #149, tentatively scheduled for summer 1996, involves 402 blocks (approximately 2 million acres) of submerged lands in Cook Inlet. On 13 January 1995 the Minerals Management Service issued a draft environmental impact statement on the proposed sale and distributed it to the Marine Mammal Commission and others for review.

The draft statement indicated that 15 species of non-endangered marine mammals are resident or occur seasonally in the lower Cook Inlet. Of these species, the northern fur seal, the harbor seal, and the sea otter are the most common and most abundant. In addition, seven marine mammal species that occur in the planning area are listed as endangered or threatened under the Endangered Species Act. The species are the Steller sea lion, blue whale, fin whale, humpback whale, right whale, sei whale, and sperm whale.

The draft concluded that, with respect to non-endangered or threatened marine mammal species, any noise, disturbance, or habitat alteration resulting from

the proposed action would be relatively short-term and very localized and should not affect marine mammal survival. With respect to endangered and threatened species, the effects of the proposed action, specifically exposure to disturbance and contaminants within and outside the proposed sale area, are expected to be minimal.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, reviewed the draft statement and by letter of 13 April 1995 provided comments to the Service. In its letter, the Commission noted that, while the conclusions put forth in the draft statement may be valid, the statement did not provide data, analyses, or references to support all of them.

In addition, the Commission noted that the draft statement did not provide a thorough summary or assessment of the best available information concerning marine mammals that occur in the planning area. For instance, it provided only limited information on the abundance and habitat-use patterns of marine mammals known to occur in Cook Inlet and adjacent waters and how these species and their habitats have been affected by previous oil and gas development and other activities. Further, it did not identify critical uncertainties concerning the natural history, demography, and the essential habitats and habitat components of the marine mammals that could be affected or how they might be affected, both directly and indirectly.

The Commission also noted that section 20 of the Outer Continental Shelf Lands Act, as amended, requires that the Service conduct post-lease monitoring to detect and determine the cause of environmental change possibly resulting from oil and gas exploration and development. Therefore, the Commission recommended that the statement be expanded to more fully describe what is being done to meet the monitoring requirements of the Outer Continental Shelf Lands Act and to ensure that lessees are aware of the Marine Mammal Protection Act's prohibition on taking marine mammals and the requirements for obtaining a small-take exemption.

Oil & Gas Lease Sales #157 and #161, Central and Western Gulf of Mexico

Proposed lease sale #157, tentatively scheduled for March 1996, involves 5,802 blocks (about 31.2 million acres) of submerged lands in the central Gulf of Mexico. Proposed lease sale #161, tentatively scheduled for August 1996, involves 5,155 blocks (approximately 28.3 million acres) in the western Gulf. In April 1995 the Minerals Management Service issued a draft environmental impact statement on the proposed lease sales and distributed it to the Marine Mammal Commission and others for review.

The draft statement noted that 31 marine mammal species, including 29 cetacean species, the West Indian manatee, and the California sea lion, occur in the proposed lease sale area. Of these, six cetacean species (right, blue, fin, sei, humpback and sperm whales), as well as the manatee, are endangered under the Endangered Species Act. The draft statement concluded that the proposed activity is expected to have primarily sublethal effects on the marine mammal species found in the area. With respect to endangered and threatened marine mammals, lethal impacts are expected to be rare, with the most likely impacts resulting from vessel collisions with lethargic surfaced individual animals.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, reviewed the draft statement and by letter of 14 July 1995 provided comments to the Service. In its letter, the Commission noted that the conclusions put forth in the statement may be valid, but that the draft statement did not provide the data, analyses, or references to support all of them. For instance, the Commission noted that the draft statement concluded that production waters, drilling noises, *etc.*, would not affect marine mammal food supplies, but it provided no information on principal prey, feeding areas, or food requirements of the various marine mammals that occur in and near the proposed lease sale areas.

Additionally, the draft statement indicated that the West Indian manatee is common in the Gulf of Mexico, but it provided little information with regard to the distribution, abundance, and productivity of the

species. The draft statement also noted that manatees rarely venture as far west as the proposed lease sale areas and therefore were excluded from the analyses.

In its letter, the Commission noted that, while it is true that few manatees are seen outside Florida, it does not necessarily follow that manatees rarely venture into the proposed lease sale area. Based on opportunistic sightings and recent strandings, it appears that at least small numbers of manatees migrate or disperse northward from Mexico and westward from Florida into areas shoreward of the proposed lease sale areas. In addition, vessels traveling to and from the lease sale areas could pose a threat to any manatees inhabiting or migrating through the northern Gulf. Likewise, oil spills and other contaminants introduced into the environment in or near the lease sale areas could pose a threat.

In the Commission's opinion, the greatest threat to manatees would be a large oil spill occurring in or near the lease sale areas and the oil being transported by wind and water currents to major manatee concentrations and habitats. Therefore, the Commission recommended that, if it had not already done so, the Minerals Management Service consult with the Fish and Wildlife Service to obtain the best available information on all manatee populations and habitats that potentially could be affected by the proposed action and any reasonable and prudent alternatives that might taken to avoid or minimize possible adverse effects. The Commission also recommended that the environmental impact statement be revised to indicate the distribution, relative abundance, and status of manatees along the rim of the Gulf of Mexico and to provide an assessment of the possible direct and indirect effects of a major oil spill on manatee distribution and abundance in known habitat areas.

With respect to cetaceans, the Commission noted that the Service had provided support for studies to determine when, where, and what cetacean species may be directly or indirectly affected by oil and gas activities in the Gulf. Although these studies are referred to in the draft statement, the study results to date apparently were not considered during its preparation. Therefore, the Commission recommended that, if the Service had not already done so, it consult its contractors and the National Marine Fisheries Service to obtain the best available information on populations of bottlenose dolphins, spotted dolphins, and other marine mammals that are present and could be affected, directly or indirectly, by oil and gas-related activities in the area.

On a related matter, the draft statement cited studies that suggested that contact with oil and consumption of oil and oil-contaminated prey are unlikely to have more than temporary, non-lethal effects on cetaceans. The Commission noted that the results of studies to assess the effects of the *Exxon Valdez* oil spill on seals, sea otters, and other marine mammals suggest that oil spills may have substantially greater chronic and acute effects on marine mammals, including cetaceans, than indicated by the studies cited in the draft statement. Therefore, the Commission recommended that the Minerals Management Service consult with the National Marine Fisheries Service, the Fish and Wildlife Service, the Environmental Protection Agency, the Alaska Department of Fish and Game, and other organizations to obtain the best available information concerning both the direct and indirect effects of the *Exxon Valdez* oil spill on marine mammals.

Proposed Lease Sale #144, Beaufort Sea

Proposed lease sale #144, tentatively scheduled for late in 1996, involves 1,879 blocks (approximately 9.8 million acres) of submerged lands off the northern coast of Alaska in the Beaufort Sea. In August 1995 the Minerals Management Service issued a draft environmental impact statement on the proposed lease sale and distributed it to the Marine Mammal Commission and others for review.

The draft noted that six species of non-endangered marine mammals (ringed seals, bearded seals, spotted seals, walruses, polar bears, and beluga whales) occur commonly in the Beaufort Sea and that the endangered bowhead whale is found seasonally in the area. The draft concluded that, with respect to non-endangered marine mammal species, the proposed activities are expected to result in the loss of small numbers of seals, walruses, polar bears, and beluga whales, and that the affected populations would recover within one

generation or less. With respect to the bowhead whale, the draft statement concluded that the species most likely would experience temporary, sub-lethal effects. The statement acknowledged that some mortality might result if bowhead whales were exposed to freshly spilled oil over a prolonged period; however, the population would be expected to recover within one to three years.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, reviewed the draft statement and by letter of 20 November 1995 provided comments to the Service. The Commission indicated that, while the conclusions concerning the possible effects on marine mammals may be valid, the draft statement did not provide data, analyses, or references to support many of them.

In its letter, the Commission noted that the draft statement did not provide a thorough summary or assessment of available information on marine mammals occurring in the proposed sale area. For instance, it provided little information on habitat-use patterns of the species that occur in the Beaufort Sea or information on how these species and their habitats have been affected by previous oil and gas development and other activities. Further, it did not identify critical uncertainties about the natural history, demography, and essential habitats and habitat components of marine mammals that could be affected or how they might be affected, both directly and indirectly.

The Commission further noted that the draft statement did not make it clear that lessees could be required to obtain authorization to take marine mammals under the Marine Mammal Protection Act if the proposed development activities affect either marine mammals or their availability to Alaska Natives for subsistence purposes.

The Commission recommended that the statement be expanded to more fully describe what is being done to meet the monitoring requirements of the Outer Continental Shelf Lands Act and to ensure that lessees are aware of the Marine Mammal Protection Act's prohibition on taking marine mammals and requirements for obtaining a small-take exemption.

Oil & Gas Lease Sales #166 and #168, Central and Western Gulf of Mexico

On 13 June 1995 the Minerals Management Service published a call for information and nominations and a notice of intent to prepare an environmental impact statement on two proposed oil and gas lease sales in the central and western Gulf of Mexico.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, responded to the request on 27 July 1995, providing information and comments on factors that should be considered in assessing the possible effects of the proposed action on marine mammals and their habitat.

In its letter, the Commission noted that at least 30 species of marine mammals have been observed or found stranded along the coast of the northern Gulf of Mexico. These species include six endangered whales (right, blue, fin, sei, humpback, and sperm whales) and the endangered West Indian manatee. The marine mammal species most commonly seen in the area is the bottlenose dolphin. The most commonly seen endangered marine mammal species are the West Indian manatee and the sperm whale.

Based on their status, relative abundance, distribution, behavior, and other factors, the species of greatest concern are manatees, sperm whales and other endangered cetaceans, and bottlenose and spotted dolphins. With respect to manatees, the Commission noted that it is unlikely that manatees will be affected significantly by the proposed activity in the central and western Gulf of Mexico. However, perhaps the greatest risk is that a major oil spill originating within the proposed lease areas could be transported by wind and currents into areas along the west coast of Florida or eastern Mexico where manatees are more common. Therefore, the Commission suggested that the Minerals Management Service consult with the Fish and Wildlife Service to determine (a) whether consultations should be initiated pursuant to section 7 of the Endangered Species Act to assess the possible direct or indirect effects of the proposed actions on endangered manatees, and (b) what additional measures are necessary to assess and avoid the possible adverse impacts of the proposed action on endangered manatees in Florida and eastern Mexico.

With respect to sperm whales and other endangered cetaceans, the Commission noted that the Service had sponsored a workshop in 1989 to assess available data and to determine what additional information was needed to reliably assess the possible effects of offshore oil and gas activities on marine mammals in the Gulf of Mexico. Subsequently, the Service contracted for a series of shipboard and aerial surveys to better determine the abundance, distribution, and habitat-use patterns of sperm whales and other marine mammals in the northern Gulf. The Commission suggested that the environmental impact statement for the proposed lease sales describe these studies and incorporate results obtained to date. Further, it should provide an assessment of the likelihood that the studies will fully meet the information needs cited in the 1989 workshop report.

With respect to bottlenose and spotted dolphins, the Commission stated that, because of their abundance and distribution, they may be the species most likely to be affected, directly and indirectly, by offshore oil and gas activities in the area. It noted that there have been at least three documented cases of unusual bottlenose dolphin mortalities in the northern Gulf. These events and the extent to which they have affected both the regional population and local sub-populations of the species in the northern Gulf should be described in the environmental impact statement and factored into the analysis of the possible cumulative impacts of oil and gas activities in the lease area.

The Commission suggested that the Service consult with the National Marine Fisheries Service to (a) obtain the best available information on the distribution, discreteness, abundance, seasonal movement patterns, essential habitats, diet, and status of important prey of bottlenose dolphins in and near the proposed lease sale area; (b) determine to what extent bottlenose dolphin populations and sub-populations may have been affected by unusual mortality events; (c) determine to what extent other human activities may be affecting bottlenose dolphins in the northern Gulf; and (d) determine what additional research and monitoring programs would be necessary to assess and verify both the direct and indirect effects of offshore oil and gas activities on bottlenose dolphins.

In addition, the Commission suggested that the environmental impact statement should identify and assess the possible cumulative effects on the various marine mammals species and populations of unusual high-mortality events, incidental take in fisheries, oil and gas activities in other parts of the northern Gulf, and other human activities.

The Commission further recommended that the Service consult with the National Marine Fisheries Service and the Fish and Wildlife Service to identify long-term monitoring programs that may be necessary or desirable to ensure that oil and gas exploration and development do not disadvantage marine mammals.

Chapter X

RESEARCH AND STUDIES PROGRAM

The Marine Mammal Protection Act requires that the Marine Mammal Commission maintain a continuing review of research programs conducted or proposed to be conducted under authority of the Act; undertake or cause to be undertaken such other studies as it deems necessary or desirable in connection with marine mammal conservation and protection; and take every step feasible to prevent wasteful duplication of research. To accomplish these tasks, the Commission conducts an annual survey of Federally-funded research on marine mammals; reviews research plans and programs and recommends steps that should be taken to prevent unnecessary duplication and improve the quality of research conducted or supported by the National Marine Fisheries Service, the Fish and Wildlife Service, the Minerals Management Service, and other Federal agencies; convenes meetings and workshops to review, plan, and coordinate marine mammal research; and contracts for studies to help identify, define, and develop solutions to domestic and international problems affecting marine mammals and their habitats so as to facilitate and complement activities of other agencies.

Survey of Federally-Funded Marine Mammal Research

Research directly or indirectly relevant to the conservation and protection of marine mammals and their habitat is conducted or supported by a number of Federal departments and agencies. To determine the precise nature of this research, and assess ways in which it can best be coordinated and used to facilitate marine mammal conservation and protection, the Commission annually requests information on the marine mammal and related research programs being conducted, supported, and planned elsewhere in the Federal Government.

In November 1994 the Commission requested information from 20 Federal agencies, departments, and offices. They were the Department of Agriculture; the Department of the Air Force; the Department of the Army; the Department of Commerce's Coastal Ocean Office, National Marine Fisheries Service, National Sea Grant College Program, Office of Ocean Resources Conservation and Assessment, and Sanctuaries and Reserves Division; the Department of Energy; the Department of the Interior's Fish and Wildlife Service, Minerals Management Service, National Biological Service, and National Park Service; the Department of the Navy; the Department of State; the Department of Transportation; the Environmental Protection Agency; the National Aeronautics and Space Administration; the National Institutes of Health; and the National Science Foundation. The Commission also requested information from the Smithsonian Institution, a trust instrumentality of the United States.

The information received is summarized in the Commission-sponsored report "Survey of Federally-Funded Marine Mammal Research and Studies FY74 - FY94" published in June 1995 by the National Technical Information Service (see Appendix B, Waring 1981 through 1995, for reports of this and previous surveys).

Marine Mammal Workshops and Planning Meetings

In 1995 the Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, provided comments on a broad range of issues involving the recovery of certain endangered and threatened species; the management of both depleted and non-depleted stocks; scientific research permit applications; marine mammal-fisheries interactions; the possible effects on marine mammals of high-

energy, low-frequency sound; marine mammals in captive display facilities; the possible effects of offshore oil and gas exploration and development on marine mammals and their habitat; and marine mammal strandings and die-offs.

The Commission and members of its Committee of Scientific Advisors and staff also were involved in organizing and/or participated in meetings and workshops to:

- review and coordinate international conservation efforts in the Arctic and Antarctic;
- review the Hawaiian monk seal recovery program;
- develop agreements to cooperatively manage polar bear and walrus populations shared by the United States and the Russian Federation;
- assess human-related factors affecting, and the research, monitoring, and management programs necessary to maintain, the health and stability of the Bering Sea and Gulf of Maine ecosystems;
- coordinate research and management actions necessary to conserve humpback and right whale populations off the northeastern United States;
- explore approaches for avoiding or reducing marine mammal bycatch in commercial fisheries;
- assess steps that might be taken to avoid or reduce the possible detrimental effects of growing pinniped populations in New England;
- identify data and management needs concerning the incidental take of harbor porpoises in gillnet fisheries off the east coast of Canada and the United States;
- exchange and review information on the status and management of West Indian manatees in the Wider Caribbean Region;
- evaluate the status of domestic and international actions to document and eliminate sources of marine debris pollution;
- review and evaluate research programs to determine the effects of high-energy, low-frequency sound on marine mammals;
- improve the Federal permitting system for authorizing the take of marine mammal for public display and scientific research;
- review population abundance data and analytical procedures to determine the best methods for estimating and monitoring harbor seal abundance in Alaska;
- determine variables that should be considered and factored into educational, research, and management programs for the Hawaiian Islands Humpback Whale Sanctuary;
- disseminate and review information on Arctic ecosystems resulting from research and monitoring programs related to offshore oil and gas exploration in the Alaska region;
- prepare for the meetings of the 1995 International Whaling Commission and its Scientific Committee;
- coordinate efforts by Federal agencies to standardize, archive, and disseminate geospatial data on marine bathymetry; and
- evaluate the adequacy of efforts to implement the manatee recovery program in the southeastern United States.

Commission-Sponsored Research and Study Projects

Under the Marine Mammal Protection Act, the Departments of Commerce and the Interior have primary responsibility for acquiring data needed to develop and assess the effectiveness of programs to conserve marine mammals and the ecosystems of which they are a part in areas under U.S. jurisdiction. This responsibility initially was delegated to the National Marine Fisheries Service and the Fish and Wildlife Service.

Beginning in November 1993 marine mammal research responsibilities for the Department of the Interior's Fish and Wildlife Service, Minerals Management Service, and National Park Service were transferred to the National Biological Service. Research budgets, scientific staff, and research contracts have been transferred from these agencies to the Biological Service. The Service will continue to carry out the Department's research responsibilities under the Marine Mammal Protection Act and the Endangered Species Act for manatees, dugongs, sea otters, polar bears, and walruses.

As noted earlier, the Commission convenes workshops and contracts for research and studies to help identify, define, and evaluate threats to marine mammals and their habitat. It also supports other research

to further the purposes and policies of the Act. Since it was established, the Commission has contracted for approximately 1,000 projects ranging in amounts from several hundred dollars to $150,000. The amount spent annually on research and studies since 1986 has averaged about $100,000.

Occasionally the Commission's investment in research is in the form of transfers of funds to and from other Federal agencies, particularly the National Marine Fisheries Service, the Fish and Wildlife Service, the Minerals Management Service, and the Department of State. When such funds are transferred from the Commission to another agency, the Commission provides detailed scopes of work describing precisely what the agency is to do or to have done, as well as the requirements for reporting on progress to the Commission. In many instances, this has made it possible for agencies to start needed research sooner than might otherwise have been possible and to subsequently support the projects on their own for as long as necessary. The Commission believes that it is essential to maintain agency involvement to the greatest extent possible and that such transfers provide a useful means of doing so.

In calendar year 1995 the Commission used approximately $103,000 of its own funds to support research and studies. Research undertaken by the Commission in 1995 also included projects co-sponsored by the Department of State, the National Marine Fisheries Service, and the Navy for which these agencies transferred $113,000 to the Commission. Research and studies supported by the Commission in 1995, including those funded jointly by the Commission and other Federal agencies, are described below.

Final reports from most Commission-sponsored studies are available from the National Technical Information Service; they are listed in Appendix B. Papers and other publications resulting entirely or in part from Commission-sponsored activities and published elsewhere are listed in Appendix C.

BASIC PRINCIPLES AND AGREEMENTS

Updating the Commission's Compendium of Selected Treaties and International Agreements Regarding Marine Resources (Alternative Business Systems, Washington, D.C; Editorial Experts, Alexandria, Virginia; Richard L. Wallace, Yale University, New Haven, Connecticut)

In December 1993 the Marine Mammal Commission published the *Compendium of Selected Treaties, International Agreements, and Other Relevant Documents on Marine Resources, Wildlife, and the Environment*. The *Compendium* is a single source of documents describing the United States' international obligations concerning fisheries, marine mammals, and other wildlife, ocean conservation and resource management, environmental protection, and related issues. It has been used extensively by Congressional staff and by environmental attorneys, biologists, resource managers, and students throughout the world. The *Compendium* is current through 31 December 1992. Since its publication, a number of international agreements bearing on resource conservation have been amended and new ones concluded. These contracts were provided to update the 1993 *Compendium*. The contractors are collecting, electronically scanning, and typesetting the texts of treaties and agreements amended and concluded since the end of 1992. The updated version will be published in 1996.

New Principles for the Conservation of Wild Living Resources Workshop (Marc Mangel, Ph.D., University of California, Davis)

A 1978 paper by Sidney J. Holt and Lee M. Talbot described "New Principles for the Conservation of Wild Living Resources." The principles set forth in the paper have not been applied widely. Also, human-caused pressures on many marine and terrestrial plant and animal species have increased, as has the body of scientific and technological knowledge regarding wildlife conservation. As discussed in previous annual reports, the Marine Mammal Commission contracted in 1992 with one of the authors of the 1978 paper to consult with scientists and managers from more than 30 countries to determine factors that have

impeded implementation of the "new principles." In 1994 the Commission held an international workshop on the subject. The purpose of this contract was to provide partial support for one of the workshop participants to coordinate preparation of a paper describing the workshop findings and conclusions. The paper is expected to be published in the spring 1996 edition of *Ecological Applications*.

REVIEWS AND ANALYSES

Identification of Key Components of Baleen Whale Habitats (Charles A. Mayo, Ph.D., Center for Coastal Studies, Provincetown, Massachusetts)

The future of many marine mammal species and populations depends, at least in part, on identifying and protecting essential habitats and habitat components. However, many marine mammal species, particularly baleen whales, have distinct summer and winter ranges, travel long distances during daily or seasonal movements, and spend large percentages of their time underwater where they are difficult to observe. Consequently, the concepts and procedures used to identify and describe essential habitats for land mammals are not directly applicable to marine mammals. To date only a few studies have been done to determine the home ranges and habitat requirements of cetaceans and to identify and determine the key components of habitats essential to their well-being. The contractor is reviewing available information to (a) determine methods being used to obtain and analyze data on baleen whale habitat-use patterns, home range sizes and characteristics, and essential habitat components; (b) identify critical uncertainties concerning baleen whale habitat requirements, essential habitat components, and essential habitats; and (c) ascertain the research that would be required to resolve the critical uncertainties. The contract report will be used by the Commission and its Committee of Scientific Advisors to determine and recommend steps that should be taken by the responsible regulatory agencies to identify and protect critical marine mammal habitat, particularly for endangered humpback and right whales.

Analysis and Reporting of Data Concerning the North Atlantic Humpback Whale Population (David K. Mattilla, Center for Coastal Studies, Provincetown, Massachusetts)

Humpback whale populations were severely depleted by commercial whaling in the 20th century. Although commercial exploitation of humpback whales has been prohibited for more than 20 years, there is little evidence that some stocks are recovering, particularly in the North Atlantic and North Pacific. In 1991 scientists from seven nations — Norway, Iceland, Denmark, Great Britain, Canada, the Dominican Republic, and the United States — formed a consortium to conduct coordinated surveys, photo-identification, and biopsy studies of humpback whales in the North Atlantic. The program, called Project YONAH ("Years of the North Atlantic Humpback Whale"), began in 1992. Project researchers collected biopsy samples from about 2,600 individual humpback whales and photographically identified at least 2,500 individuals. The Commission provided support in 1991 and 1993 to help plan and coordinate the field work and to analyze and disseminate the program results. This contract provided support for data exchange among collaborators, data analysis, report preparation, and other activities necessary to complete and disseminate the results of the project. The project will serve as a model for assessing and monitoring the vital parameters of whale populations.

Curation of the North Atlantic Humpback Whale Photograph Collection and Associated Databases (Judith M. Allen, College of the Atlantic, Bar Harbor, Maine)

As noted earlier, there are substantial uncertainties regarding certain aspects of the life history, population structure, and vital rates of endangered North Atlantic humpback whales. Many of these uncertainties can be resolved by photo-identification studies. Since 1975 at least 200 individuals and research groups have contributed more than 15,000 photographs of North Atlantic humpback whales to a central collection maintained at the College of the Atlantic. This contract provided partial support to evaluate the quality of photographs in the collection and to link the photograph database with related location, behavior, and other data concerning the individual whales in the

database. Ongoing and future analysis of the photographs and related data will yield better understanding of the abundance, productivity, and daily and seasonal movement patterns of humpback whales in the North Atlantic.

Posthumous Publication of the Scientific Works of Francis H. Fay, Ph.D.
(Brendan P. Kelly, Fairbanks, Alaska)

When eminent marine mammal biologist, Francis H. Fay, Ph.D., died in June 1994, he was working on a number of manuscripts of great potential relevance to the conservation of marine mammals. In order to make these unfinished works available to the marine mammal research and management communities, the Commission provided support to the contractor in 1994 to complete and publish various papers posthumously. A similar contract was provided in 1995. The work was also supported by the Fish and Wildlife Service and the National Biological Service. In the case of both Marine Mammal Commission contracts, the contractor made arrangements, as possible, to have Dr. Fay's students and collaborators complete manuscripts and submit them to appropriate journals for publication. In addition, the contractor has organized and cataloged hundreds of raw data files and has prepared or is preparing a number of manuscripts, primarily on Pacific walruses, for publication. To date, four papers reporting Dr. Fay's data have been published in peer-reviewed journals, and three papers are in press or in preparation.

Possible Application of New and Developing Technologies to the Study of Marine Mammals
(Andrew J. Read, Ph.D., Duke University Marine Laboratory, Beaufort, North Carolina)

Development of effective programs to protect and conserve marine mammals and their habitat requires reliable information on marine mammal natural history, demography, ecology, and behavior. Because marine mammals spend much of their lives underwater and in regions where they are difficult to observe, obtaining such information is difficult, time-consuming, and expensive. New and developing satellite-tracking and other technologies may provide better means for certain types of observations at less cost. The purposes of this contract are to identify and assess the potential application of existing and possible next-generation technologies to obtain information concerning abundance, movements, and habitat-use patterns of marine mammals; the nature of interactions among individuals; the feeding habits, diet, and commonly used feeding grounds of both cetaceans and pinnipeds; the genetic relatedness among individuals and stocks; and the general health or condition of individuals. The Commission, in consultation with its Committee of Scientific Advisors, will review the contract report and advise the relevant regulatory agencies of the potentially promising technologies that may merit further evaluation.

Assessment of Legislation and Regulations Banning Gillnets in U.S. Waters
(Brad Warren, National Fisheries Conservation Center, Seattle, Washington)

Gillnets provide an efficient and relatively inexpensive means for catching many commercially valuable species of fish and squid. However, they are indiscriminate and also catch marine mammals, seabirds, sea turtles, and non-target fish species. Their use has been banned in a number of areas because of potential impacts on both target and non-target species and the concerns expressed by recreational fishermen and others. It is not clear whether the legislation and regulations instituting the bans have been well-founded. The purposes of this study are to identify and assess the rationale for legislation and regulations that have been enacted to ban the use of gillnets in certain U.S. waters. The contract report is expected to provide a more objective basis for judging the pros and cons of gillnet fisheries.

Sea Otter Pup Survival and Development
(Charles W. Monnett, Ph.D., Homer, Alaska)

Sea otters were extirpated from most of their range as a result of unregulated commercial hunting in the 1700s and 1800s. Small groups survived in several areas and provided the beginnings for the present populations in California, British Columbia, Alaska, and elsewhere. Growth of the population in Alaska appears to have been much faster than the one in California. The reason for this has been the subject of much speculation. The contractor has been conducting radio-tracking and other studies of sea otters

in Prince William Sound, Alaska, for more than a decade. The purpose of this contract was to support analysis and reporting of ancillary data concerning pup development and survival in the study area. If the development and survival patterns differ from those in California, they may help to explain why the growth of the California population has been substantially slower than the growth of those in Alaska and British Columbia.

Development of a Database on Harbor Seals Hunted in Alaska
(Anne Hoover-Miller, Pacific Rim Research, Seward, Alaska)

As discussed in Chapter III, harbor seal populations in certain Alaska areas have declined significantly in recent years. The cause of the declines has not been documented but appears to be due at least in part to decreased food availability. Postmortem examination and collection and analysis of tissue samples from seals taken by Alaska Natives can provide valuable information on the age/sex structure, productivity, and general health of the harvested population. The Alaska Department of Fish and Game has gathered and archived information about traditional uses of harbor seals, harvest techniques, and related information. In 1994 Alaska Natives formed a commission to help identify and implement needed research, management, and monitoring programs. This contract provided partial support for a review of information collected by Native hunters and stored by the Alaska Department of Fish and Game and the Alaska Native Harbor Seal Commission. The review is to determine the feasibility of (a) developing a data summary that can be provided to scientists and managers without compromising confidential information, (b) conducting follow-up surveys of hunters to clarify information in the database and obtain additional information, (c) establishing a data-collection protocol for use by Native hunters, and (d) developing a supplemental database including narrative and quantitative information about harbor seals and related environmental parameters observed by Alaska Natives.

Review of Glacier Bay National Park and Preserve Vessel Management Plan
(Janice M. Straley, J. Straley Investigations, Sitka, Alaska)

During summer, a portion of the central North Pacific humpback whale stock inhabits the Glacier Bay National Park and Preserve. In the late 1970s the number of humpback whales in Glacier Bay declined significantly, and it was suspected that noise and disturbance from cruise ships and other vessel traffic may have caused whales to leave and avoid the bay. Therefore, in 1985 the National Park Service established regulations governing use of the bay by cruise ships in an effort to minimize disturbance of whales. Between 1988 and 1991 the number of whales using the bay decreased again. In 1991 the National Park Service began evaluating alternative approaches for managing vessel traffic in the bay, and in June 1995 a draft revision of the vessel management plan and an associated environmental impact statement were released for comment. Among other things, the draft vessel management plan proposed a 72 percent increase in the number of cruise ships permitted into the bay. The contractor, an expert on the biology, distribution, and ecology of humpback whales in Alaska, provided a comprehensive evaluation of the draft plan for the Commission. Her analysis was considered by the Commission, in consultation with its Committee of Scientific Advisors, to develop comments on the revised vessel management plan. (See the discussion on humpback whales in Chapter III for additional information regarding the Glacier Bay vessel management plan.)

RESEARCH PLANNING AND COORDINATION

Formation of the Russian Marine Mammal Council
(Viacheslav Zemsky, Ph.D., Russian Marine Mammal Council, Moscow)

Environmental protection and conservation of marine mammals have been a low priority in the Russian Federation recently because of political and economic uncertainties. Recognizing the need for an organized national marine mammal program, prominent Russian biologists established the Russian Marine Mammal Council in October 1995 to identify and

bring resources to bear on priority research and conservation problems. The Council will work under the Russian Government's Ichtaelogical Commission and the International Foundation for Science, Culture, and Economics. The purpose of this contract was to provide funds to assist in the formation of the Council and the development of a two-year work plan.

Humpback Whale Research Coordination Meeting (Hale Kohola, House of the Whale, Lahaina, Hawaii)

At least ten researchers or research groups conduct aircraft-, shore-, and boat-based studies of humpback whales that winter in the coastal waters of the Hawaiian Islands. In 1992 the Commission and the National Marine Fisheries Service jointly sponsored a meeting of the principal investigators to review and coordinate research plans so as to maximize the knowledge acquired while minimizing possible effects on the whales. Among other things, the meeting participants recommended that follow-up workshops be held in the field to standardize data collection techniques used by the different researchers and to further coordinate research efforts. In 1993, 1994, and again in 1995 the Commission provided partial funding for meetings to review and coordinate planned research programs and to standardize methods for collecting and recording certain data.

MEETINGS AND WORKSHOPS

Workshop on the Effects and Effectiveness of Acoustic Deterrents (Whitlow W.L. Au, Ph.D., Hawaii Institute of Marine Biology, Kailua; Stephen Dawson, Ph.D., University of Otago, Dunedin, New Zealand; William Dolphin, Ph.D., Boston University, Boston, Massachusetts; Thomas A. Jefferson, Ph.D., Ocean Park Conservation Foundation, Aberdeen, Hong Kong; Jon Lien, Ph.D., Memorial University of Newfoundland, St. John's, Newfoundland, Canada; Craig O. Matkin, North Gulf Oceanic Society, Homer, Alaska; Paul E. Nachtigall, Ph.D., Hawaii Institute of Marine Biology, Kailua; Randall R. Reeves, Ph.D., Okapi Wildlife Associates, Hudson, Quebec, Canada; Ronald J. Schusterman, Ph.D., Long Marine Laboratory, Santa Cruz, California; Bernd Würsig, Ph.D., Texas A&M University, Galveston; Battelle Seattle Conference Center, Seattle, Washington; and Lee Talbot Associates International, McLean, Virginia)

Many species of marine mammals are caught and killed or injured incidental to commercial fishing operations worldwide. Although much time and effort has been invested in testing possible acoustic and other means for preventing such incidental mortality, the results have been questionable. The Marine Mammal Commission and the National Marine Fisheries Service are jointly sponsoring a workshop, to be held in March 1996, to (a) evaluate past efforts to reduce entanglement using sound reflectors and generators, (b) identify critical uncertainties, and (c) describe the studies that would be required to resolve the uncertainties. These contractors are handling the workshop arrangements and preparing background papers on such topics as the hearing capability in and use of sound by various marine mammal species, the relative effectiveness of previous efforts to deter marine mammals using sound, and the possible behavioral effects of acoustic deterrents on marine mammals. The workshop results will be used by the National Marine Fisheries Service, the fishing industry, and others to assess the relative costs and benefits of possible acoustic deterrents and to guide decisions regarding the need for additional experiments.

Publication and Distribution of the Workshop Report on Scientific Aspects of Managing Whale-Watching (International Fund for Animal Welfare, Yarmouth Port, Massachusetts)

Whale-watching is a rapidly growing industry throughout the world, with more than four million participants per year in about 50 countries and overseas territories. Although there are obvious economic benefits to whale-watching, and some whale-watch ventures encourage scientists to use whale-watching vessels as platforms to study whales, in many cases, the activities are completely unregulated. In some countries, whale-watching rules have been established, but there appears to be little scientific basis for and considerable discrepancies between them. With this in mind, 28 scientists from 12 countries met in Montecastello di Vibio, Italy, on 30 March to 4 April

1995 to (a) create a framework to govern whale-watching, and (b) recommend further research and monitoring needed to assess the possible adverse impacts of whale-watching. With this contract, the Commission provided partial support for the printing and distribution of the workshop report. The report will be useful to operators and agencies, both domestically and internationally, responsible for managing the popular and growing whale-watching industry.

FIELD STUDIES

Distribution, Abundance, and Relative Probability of Sighting Right Whales in the Southeastern United States
(Associated Scientists at Woods Hole, Woods Hole, Massachusetts)

Twenty-five percent of all known right whale mortalities result from collisions with ships. As discussed in previous annual reports, the Navy, the Minerals Management Service, and the Commission provided cooperative support in 1991 for airship surveys to evaluate interactions between right whales and ship traffic off the Georgia and northern Florida coasts, believed to be the principal calving grounds of the northwestern Atlantic right whale population. In 1992 the Navy transferred funds to the Commission to continue the program. In 1993 the Navy and the Commission provided cooperative support to estimate the number of right whales in the area, quantify ship traffic in the major shipping channels, and improve efforts to make naval and commercial vessel operators aware of areas where right whales had been sighted. In 1995 the Navy transferred funds to the Commission for additional airship surveys to better determine the distribution, abundance, and sightability (*e.g.*, percent and length of time and the surface) of right whales in the coastal waters of the southeastern United States in winter. The contract report, expected to be completed in spring 1996, will be forwarded to the Navy, the National Marine Fisheries Service, the Army Corps of Engineers, and other agencies and organizations with responsibilities relating to ship operations in the area. It will be provided to the Right Whale Recovery Team and the Southeastern U.S. Right Whale Recovery Plan Implementation Team for use in evaluating current and possible additional measures for avoiding ship strikes.

Aircraft Surveys of Gray Seals in New England Waters
(Valerie Rough, Spruce Head, Maine)

Gray seal breeding colonies occurred historically at Muskeget Island, Massachusetts, and elsewhere off New England. Bounty hunting eliminated these colonies and periodic culling in Canada has maintained the total population at relatively low levels. Bounty hunting was stopped in the United States in 1962, and culling programs in Canada were reduced in the 1980s. Since then, the number of the gray seals in New England has increased significantly, and pupping was observed in 1988 after an 18-year hiatus. In 1993 the Commission provided support for aerial and ground surveys to document the size of the re-established pupping colonies. The contractor's report, completed in March 1995, was sent to the National Marine Fisheries Service with a letter noting the increasing potential for conflicts with fisheries. Recognizing the importance of anticipating possible conflicts, the Commission provided support in 1995 for spring surveys of gray seal abundance at known haul-out sites in Nantucket Sound. The number of seals at Muskeget and Monomoy Islands were 85 and 100 percent higher, respectively, than the previous year.

GENERAL

Citizens Guide to Protecting Coastlines
(Brooks S. Moriarty, Washington, D.C.)

Estuaries, mangrove swamps, salt marshes, kelp forests, and other coastal areas are among the most biologically productive areas in the world. They are nursery grounds for numerous fish and invertebrate species — many of which are commercially valuable and the foundation of numerous marine food webs — and are being destroyed by coastal development. Protecting and restoring these important coastal ecosystems begins with education. Recognizing this, the Commission provided support for the contractor to prepare a guide indicating why citizens should be concerned and how they can help protect marine

coastal areas. The guide will provide a general overview of basic ecological principles; descriptions of threats to, and reasons to protect, diverse coastal habitats; an overview of Federal legislation aimed at conserving coastal marine and estuarine habitats; and examples of actions that can be taken by ordinary citizens to help protect these biologically and economically important areas. The guide is expected to be published in 1996.

Survey of Federally-Funded Marine Mammal Research (George H. Waring, Ph.D., Southern Illinois University, Carbondale)

As noted above, the Marine Mammal Protection Act requires that the Marine Mammal Commission conduct a continuing review of marine mammal research conducted or supported by Federal agencies. Information concerning marine mammal research conducted by other agencies in fiscal year 1995 and planned to be conducted in fiscal year 1996 was requested from agencies in November 1995. The agency responses will be forwarded to the contractor, who will prepare a draft report synthesizing the information obtained. The draft will be sent to the responding agencies to verify the accuracy of the information provided. The final report is expected to be completed in spring 1996. It will be provided to the responding agencies and will be available to other interested persons and organizations through the National Technical Information Service (see Appendix B, Waring 1981 to 1995, for reports from previous years).

Chapter XI

PERMITS AND AUTHORIZATIONS TO TAKE MARINE MAMMALS

The Marine Mammal Protection Act places a moratorium, with certain exceptions, on the taking and importing of marine mammals and marine mammal products. One exception provides for the issuance of permits by either the Secretary of Commerce or the Secretary of the Interior, depending on the species of marine mammal involved, for the taking or importation of marine mammals for purposes of scientific research, public display, or enhancing the survival or recovery of a species or stock. Provisions were added to the Act in 1994 allowing the issuance of permits to authorize the taking of marine mammals in the course of educational or commercial photography and the importation of sport-hunted polar bear trophies from Canada. Activities with respect to polar bear trophy imports are discussed in Chapter VI.

Other provisions of the Act allow the Secretaries of Commerce and the Interior to authorize the take of small numbers of marine mammals incidental to activities other than commercial fisheries. Small-take authorizations are discussed later in this chapter.

Implementation of Permit-Related Amendments

As detailed in the previous annual report, the Marine Mammal Protection Act's permit provisions were amended in 1994. Among other things, the amendments place new restrictions on the export of marine mammals to foreign facilities; streamline procedures for authorizing scientific research that does not involve capturing marine mammals and does not have the potential to injure marine mammals; expedite the issuance of scientific research permits when delay could result in injury to a marine mammal or in the loss of unique research opportunities; and establish a new permit category for commercial and educational photography. Also, as discussed in Chapter VI, a new permit category was created under which polar bear trophies from Canada could be imported.

Export of marine mammals was not addressed previously under the Marine Mammal Protection Act. Under the 1994 amendments, however, unauthorized export of a marine mammal is prohibited, and provisions were added to specify when the export of marine mammals for purposes of public display, scientific research, or species enhancement is permissible. Exports for such purposes are only allowed when the foreign facility meets standards comparable to the requirements that must be met by facilities in the United States with respect to education and conservation programs, Animal and Plant Health Inspection Service licensure or registration, and public accessibility. Further discussion of Animal and Plant Health Inspection Service requirements is provided in Chapter XII.

The Act was amended in 1994 to establish a streamlined procedure for authorizing research that involves taking only by Level B harassment — *i.e.*, any act of pursuit, torment, or annoyance that has the potential to disturb but not injure a marine mammal or marine mammal stock. The amendment requires the National Marine Fisheries Service and the Fish and Wildlife Service, within 120 days of enactment of the new provision, to publish regulations implementing this new "general authorization." The National Marine Fisheries Service on 3 October 1994 published an interim final rule implementing the new provision.

Researchers conducting investigations involving aerial surveys, photo-identification, and other non-invasive techniques typically would be covered under the general authorization and are no longer required to obtain a permit. To be covered under the general

authorization, researchers are required to submit a letter of intent, at least 60 days before starting their research, that sets forth (1) the qualifications of the applicant, (2) the species or stocks of marine mammals that may be harassed, (3) the geographic location(s) of the research, (4) the period of time during which the research will be conducted, (5) the purpose of the research, including an explanation of why the research is believed to be *bona fide*, and (6) the methods to be used to conduct the research. A new statutory definition states that *bona fide* scientific research is that which would (1) likely be accepted for publication in a refereed scientific journal, (2) likely contribute to the basic knowledge of marine mammal biology or ecology, or (3) likely identify, evaluate, or resolve conservation problems. Within 30 days of receiving a letter of intent, the Secretary is required to write to the applicant confirming that the general authorization applies to the proposed research or, if the Secretary believes that the research is likely to result in taking other than by Level B harassment, that a permit must be obtained. Research that involves the capture of marine mammals or that has the potential to injure marine mammals will remain subject to the permitting requirements. Also, research involving any harassment, Level B included, of marine mammals listed as endangered or threatened under the Endangered Species Act remains subject to the permitting requirements of the Endangered Species Act.

By letter of 1 December 1994 to the National Marine Fisheries Service, the Commission provided comments on the interim final rule implementing the general authorization. In its letter, the Commission identified several areas in which the regulations deviate from the statutory requirements and need to be clarified. In addition, the Commission recommended that the Service coordinate its efforts with the Fish and Wildlife Service to enable the agencies to adopt consistent, if not identical, implementing regulations. Despite the Commission's recommendation, the Services have chosen to promulgate implementing regulations independently. The National Marine Fisheries Service is currently developing final regulations regarding the general authorization. The Fish and Wildlife Service has yet to propose implementing regulations and is not currently drafting any.

Authorization to conduct research under the general authorization was granted by the National Marine Fisheries Service to one researcher in 1994 and to 17 researchers in 1995. Implementation of the general authorization for certain types of research has substantially alleviated the delay experienced by some researchers in obtaining permits.

In response to concerns from many researchers that the process for issuing scientific research permits was unnecessarily restrictive in all instances, the 1994 amendments provided greater flexibility by allowing the Secretary to issue permits before the end of the otherwise required 30-day public review and comment period when such delay could result in injury to a species, stock, or individual animal or in the loss of unique research opportunities. To date, no permits have been issued under the expedited procedures.

During the 1994 reauthorization, it was noted that commercial and educational photography did not fit under any of the existing permit categories and, as a result, was sometimes carried out pursuant to a scientific research permit. In response, the Act was amended to create a new permitting authority for photography for commercial and educational purposes. This authority has yet to be implemented by regulation. A proposed rule is expected early in 1996.

Although the National Marine Fisheries Service has yet to develop regulations to implement the commercial and educational photography permit provision, it received an application seeking such a permit on 20 September 1995. The Service is processing the request as a pilot application for Level B harassment for photographic purposes and sent it to the Commission for comment. The Commission by letter of 28 November 1995 recommended that, with regard to future permits requested under this authorization, the Service evaluate each applicant's experience and familiarity with the subject marine mammals, and noted that the Service should provide additional support for its position with respect to endangered and threatened species. The Commission also recommended that the Service provide in its regulations additional guidance as to the information regarding expected publication of photographs or other products. The information, the Commission noted, should be

sufficient to demonstrate a commercial and/or educational purpose and a likelihood of publication.

To reflect the many changes to the Marine Mammal Protection Act's permit provisions enacted in 1994, the National Marine Fisheries Service plans to revise its existing permit regulations. As discussed in previous annual reports, in 1993 the Service proposed extensive revisions to those regulations. Some of the Service's proposals, however, particularly with respect to public display permits, were nullified by the 1994 amendments. Nevertheless, the Service intends to issue a final rule early in 1996 to institute some of the changes proposed in 1993 and to reflect the non-discretionary elements of the 1994 amendments. The Commission expects the rule to provide a clearer explanation of the permitting process and to institute needed administrative changes. In this regard, the Commission conducted two workshops on various aspects of scientific research in 1993. It is expected that the Service's rule will reflect the suggestions on ways to streamline the permitting process made by the workshop participants. The Commission understands that the Service is working on separate rulemakings to implement other aspects of the 1994 amendments, *e.g.*, permits for educational and commercial photography and those provisions applicable to public display permits, and to finalize its general authorization regulations.

As discussed in previous annual reports, the Commission wrote to the Fish and Wildlife Service in 1990 recommending that it work with the National Marine Fisheries Service to ensure consistent interpretation and implementation of the 1988 amendments to the Marine Mammal Protection Act and other permit requirements. The Fish and Wildlife Service informed the Commission, most recently at the Commission's 1994 annual meeting, that it intended to defer adoption of revised permit regulations until the National Marine Fisheries Service published its revised regulations. At that time, the Fish and Wildlife Service expected to propose its own regulations. On 5 September 1995 the Fish and Wildlife Service did, however, publish a proposed rule to amend its permit procedures to provide uniform rules and procedures for submitting applications, and for the issuance, denial, suspension, and revocation of permits issued by the Service. The proposed rule is intended to explain more clearly the procedures for submitting permit applications and the criteria used by the Service in making issuance determinations.

Permit Application Review

Whether for a scientific research, public display, species enhancement, or photography permit, the application review process involves the same four stages: (1) receipt and initial review of the application by either the Department of Commerce or the Department of the Interior; (2) publication in the *Federal Register* of a notice of the application, inviting public review and comment, and transmittal to the Marine Mammal Commission; (3) review of the application by the Commission, in consultation with its Committee of Scientific Advisors, and transmittal of its recommendation to the Department; and (4) final Departmental action on the application, including consideration of comments and recommendations made by the Commission and the public, and, if captive maintenance of animals is involved, the views of the Animal and Plant Health Inspection Service on the adequacy of facilities and transportation. Figure 4 on the following page illustrates this process.

Once a permit has been issued, it can be modified by the responsible agency, provided the proposed modification meets statutory and regulatory requirements. In some cases, a modification is subject to the same notice, review, and comment procedures as a permit application. Modifications involving a request to amend an existing permit, a request for authorization to continue activities under a permit, or a request for extension of a permit are subject to review by the Commission.

The total review time for a permit (from initial receipt of an application at the Service until final departmental action is taken) depends on many factors, including the sufficiency of the information provided by the applicant, any special requirements that must be satisfied before the application can be processed, and the efficiency of the review process in the agencies.

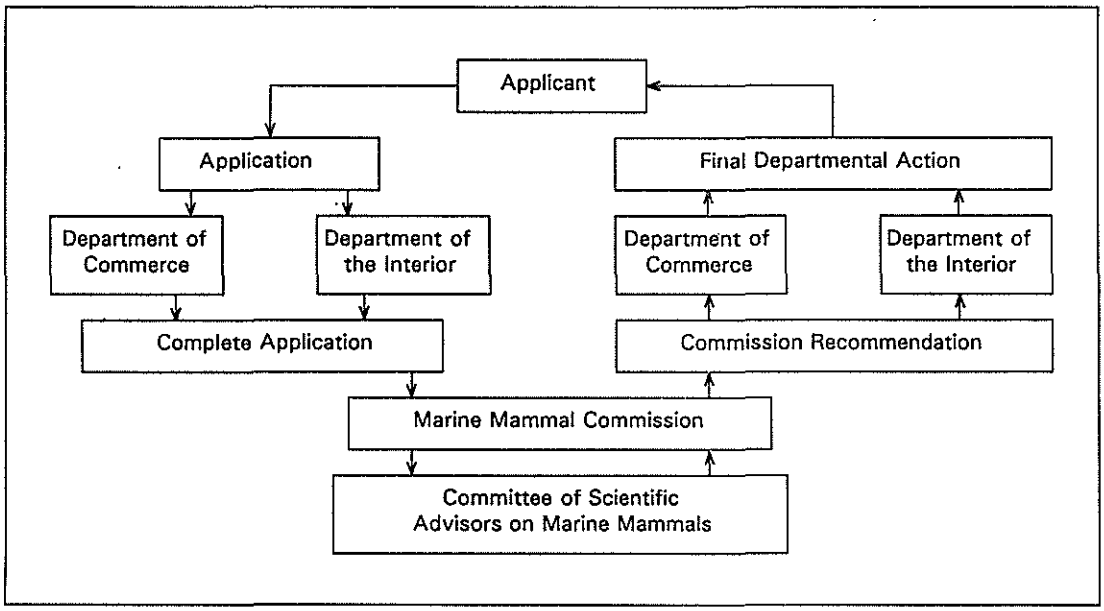

Figure 4. Process by which permit applications to take marine mammals are reviewed

During 1995 the Commission, in consultation with its Committee of Scientific Advisors, provided recommendations on 25 permit applications submitted to the Department of Commerce and 9 applications submitted to the Department of the Interior. Of these, two awaited final action by the Department of Commerce and five awaited final action by the Department of the Interior at the end of 1995. The Commission's average review time for the 34 applications on which it commented in 1995 was 31 days (range: 12-48 days). The Commission also made recommendations on 45 requests to modify permits in 1995. The average time required for Commission review of these requests was 20 days.

The Department of Commerce took final action on 23 permit applications during 1995, including one application that was received in 1994. The average processing time, from the date the application was received by the Department until final action was taken, was 105 days (range: 72-203 days). The Department of the Interior took final action on four permit applications during 1995. The average processing time, from the date the application was received by the Department of the Interior until final action was taken, was 92 days (range: 43-141 days). If calculated from the date the Department considered an application to be complete, the average processing times for the Departments of Commerce and the Interior were 99 and 80 days, respectively, compared to 103 and 78 days in 1994.

Permit-Related Litigation

As discussed in previous annual reports, in 1991 the National Marine Fisheries Service amended its regulatory definition of the term "take" to include feeding or attempting to feed marine mammals in the wild. As such, feeding wild marine mammals without a permit or other authorization constitutes a violation of the Act. In response, a tour operator who had been feeding wild dolphins on trips offered in the Gulf of Mexico filed suit in the U.S. District Court for the Southern District of Texas (*Strong* v. *United States*), seeking either to invalidate the new regulation or to compel issuance of a permit. While the district court agreed with the plaintiff's interpretation of the statute and invalidated the rule as it pertained to dolphins, that ruling was overturned on appeal.

The appellate court ruled that, inasmuch as Congress had not spoken to the precise question of whether feeding marine mammals in the wild consti-

tutes a take, the Service was free to adopt a regulatory interpretation of the term, provided its interpretation is "reasonable." The court found the rulemaking record to contain substantial scientific evidence that feeding wild dolphins disturbs their normal behavior and may make them less able to search for their own food. The court therefore concluded that it was "clearly reasonable [for the Service] to restrict or prohibit the feeding of dolphins as a potential hazard to them."

The 1994 amendments to the Marine Mammal Protection Act included a statutory definition of the term "harassment." Harassment is defined as any act of pursuit, torment or annoyance that has the potential to injure or to disturb a marine mammal or marine mammal stock in the wild by disrupting behavior patterns, including but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

On 29 August 1995 the plaintiff in the earlier case again filed suit challenging the Service's regulation against feeding wild marine mammals (also *Strong* v. *United States*). The plaintiff claimed that the statutory definition of harassment adopted in 1994 supersedes the previous regulatory definitions, which had prohibited the feeding of wild dolphins. The plaintiff did not ask the court to find that dolphin-feeding does not constitute harassment and is therefore permissible under the Act. Rather, he sought a ruling that dolphin-feeding *per se* is not a violation of the Act. The practical significance of such a ruling would be to require the National Marine Fisheries Service, in any subsequent enforcement proceeding, to demonstrate that feeding dolphins, under the facts of the particular case, constitutes harassment under the new definition.

The Federal defendants filed a motion to dismiss the case on 27 October 1995. The government sought dismissal on two grounds. The government argued that there was no pending enforcement action against the operator and therefore the case was not appropriate for judicial review. Secondly, the government argued that the statutory definition of harassment enacted in 1994 was consistent with the appellate court's ruling in the earlier case. As such, the plaintiff was precluded from relitigating the matter since the precise issue being raised had already been adjudicated.

Before the government's motion to dismiss the case could be considered by the court, the plaintiff agreed to dismiss the case without prejudice by joint stipulation of the parties.

Another matter involved a National Marine Fisheries Service enforcement action against a freelance photographer for allegedly harassing pilot whales in Hawaii. In 1992 the photographer and a companion had pursued a pod of pilot whales in a small boat and, when the whales stopped, entered the water to swim with them. While the photographer filmed the episode, his friend petted the whales. The friend was bitten by a whale and then grabbed in the whale's mouth and pulled underwater to a depth of about forty feet. She was held at that depth for about a minute before the whale brought her to the surface. The incident gained national prominence when the film was aired on television.

After review of the matter by an administrative law judge, the photographer was assessed a civil penalty of $10,000 for harassing the whales through operation of the boat and by activities in the water. A separate fine against the friend was later dropped when she agreed to cooperate with the agency in investigating the incident.

On 12 March 1995 the photographer filed an action for judicial review of the agency's decision in the U.S. District Court for the Northern District of California (*Tepley* v. *National Oceanic and Atmospheric Administration*). The court issued its ruling on 28 November 1995. Relying on a court of appeals' ruling in *United States* v. *Hayashi* (discussed in the Commission's 1994 annual report), the court stated that harassment under the Marine Mammal Protection Act refers to a "direct, serious disruption of a [marine mammal's] customary pursuits." Using this standard, the court ruled that the administrative law judge erred in finding that the actions of the photographer or his companion harassed the pilot whales. With respect to pursuit of the whales, the court found that substantial evidence was lacking to support the conclusion that the whales were fleeing the boat. As for the underwater encounter, the court found no evidence that the actions taken by the photographer and his companion were anything but gentle and cautioned that it would be difficult to

interpret the whale's reaction as a sign of harassment. In the court's view, the whale's actions could have been a playful response and did not necessarily indicate agitation.

Subsequent to the events at issue in this case, the Marine Mammal Protection Act was amended. As noted in the discussion of the previous case, one of the amendments added a statutory definition of harassment. The interpretation of what constitutes harassment applied in the *Hayashi* and *Tepley* cases has been superseded by that statutory definition.

Acoustic Thermometry of Ocean Climate Program

In January and February 1991 oceanographers from the United States and several other countries conducted an experiment to determine if underwater transmission of low-frequency sounds could be used to detect changes in ocean temperature, possibly indicative of global warming. The experiment, referred to as the Heard Island Feasibility Test, was successful and, in 1993 the Defense Department's Advanced Research Projects Agency provided funding to the Scripps Institution of Oceanography for a 30-month pilot or proof-of-concept study. This study, titled the "Acoustic Thermometry of Ocean Climate (ATOC) Program," called for installing 260-watt, low-frequency sound generators in deep water 15 km off Haena Point on the island of Kauai, Hawaii, and 40 km off Point Sur, California.

Many species of marine mammals use sound to communicate, navigate, and locate and capture prey. Available information is insufficient, however, to determine how these or other marine mammals might be affected by the ATOC program. Consequently, a marine mammal research program was included as part of the pilot study in both Hawaii and California. An advisory board, composed of five scientists not associated with the program, was established to provide advice on the design of the studies. Upon request, the Marine Mammal Commission agreed to have a staff member serve as an *ex officio* member of the board.

As noted in the Commission's previous annual report, several scientists, environmental groups, and legislators called for public hearings on the applications to the National Marine Fisheries Service seeking permits authorizing the ATOC-related marine mammal studies in both Hawaii and California. In response, the Service held a series of public hearings in the spring of 1994. Among other things, individuals attending the hearings questioned whether the proposed marine mammal studies would resolve the uncertainties concerning the possible effects of the ATOC program on marine mammals and other marine organisms. They questioned whether sufficient information to resolve the uncertainties was available or could be gathered before transmissions began. They also questioned whether the planned placement of a sound generator on Sur Ridge, within the Monterey Bay National Marine Sanctuary, was consistent with the sanctuary's objectives or California's Coastal Zone Management Program. They called for revision and expansion of the proposed marine mammal studies and preparation of environmental impact statements to ensure identification and objective evaluation of the possible environmental impacts of the planned ATOC program.

In response to the concerns expressed by scientists and others, the Advanced Research Projects Agency decided to prepare environmental impact statements to ensure that all relevant issues were identified and considered before moving ahead with the program. Also, the oceanographers responsible for the program agreed to structure its start-up phase to facilitate acquisition of information necessary to determine how and to what extent the ATOC sound transmissions might affect marine mammals and other biota.

Draft environmental impact statements for the programs in California and Hawaii were made available for review and comment in December 1994. The Commission, in consultation with its Committee of Scientific Advisors, provided comments on the drafts for the California and Hawaii projects by letters of 27 January and 9 March 1995, respectively. The Commission noted that both drafts provided generally thorough and objective assessments of the species and numbers of marine mammals that might be present in areas where they could be affected by sound transmissions and how the various species might be affected.

In both cases, the Commission noted that, while the drafts indicated that operation of the sound sources for climate-related research would not be initiated until the transmissions were determined to be safe for marine mammals, sea turtles, and other marine biota, they did not indicate what would be considered safe.

With regard to the preceding point, the Commission noted that, if climate-related sound transmissions resulted in the taking of marine mammals by harassment or other means, the taking would have to be authorized under the Marine Mammal Protection Act and, if endangered or threatened species are involved, under the Endangered Species Act. The Commission also noted that under the Marine Mammal Protection Act, such taking might be authorized either by a waiver of the Act's moratorium on taking or by a small-take exemption authorizing unintentional taking of small numbers of marine mammals as provided for in section 101(a)(5) of the Act. The Commission pointed out that authorization under section 101(a)(5) would require that the Secretary of Commerce (1) determine that the taking to be authorized would have a negligible impact on the affected species or stock, (2) prescribe permissible methods of taking and means for effecting the least practicable adverse impact on the affected species or stocks and their habitat, and (3) specify requirements for monitoring and reporting any taking.

Given the referenced provisions of section 101(a)(5), the Commission indicated that in its view the objectives of the ATOC-associated marine mammal research program should be to determine whether the planned climate-related sound transmissions could result in the taking of marine mammals by harassment or other means and, if so, (a) whether the taking would have a negligible impact on the affected species or stocks such that it could be authorized by a small-take exemption, (b) what measures might be taken to ensure that the transmissions have the least practicable adverse impact on the affected species or stocks and their habitat, and (c) what type of reporting and monitoring programs would be required to verify that the transmissions do in fact have negligible impacts on marine mammals and their habitat.

The Commission recommended that the final environmental impact statements be expanded and revised to (1) explicitly note the relevant provisions of section 101(a)(5) of the Marine Mammal Protection Act, and (2) explain the rationale for believing that the ATOC-associated marine mammal research programs would provide the information necessary to make a finding that any taking would have negligible impacts and prescribe reporting and monitoring requirements necessary to verify that the finding is correct.

The California Project — The National Oceanic and Atmospheric Administration's National Ocean Service provided comments on the draft environmental impact statement for the California ATOC project by letter of 6 February 1995. The letter indicated that, based on information provided in the draft statement, the Service had concluded it was not "appropriate to locate the ATOC sound source — and thus the zone of greatest ecological risk and uncertainty — within the Monterey Bay National Marine Sanctuary." It urged the Advanced Research Projects Agency and the Scripps Institution of Oceanography to select one of two alternative sites in central California.

Following receipt of the National Ocean Service's comments, project personnel decided to switch the location of the planned California sound generator from Sur Ridge to the Pioneer Seamount, approximately 55 miles southwest of San Francisco. The switch necessitated changes in the design of the marine mammal research program and revision of the environmental impact statement.

A proposed revision of the marine mammal research protocol was completed and forwarded early in April 1995 to members of the program's advisory board for comment. Board members, including the *ex officio* representatives of the Commission and the National Marine Fisheries Service, discussed the proposed revision in a conference call on 5 April 1995. The board's recommendations regarding the revised research protocol were transmitted to the program's principal investigators in a 25 April 1995 memorandum.

Among other things, the advisory board noted that, while studies had been done to gather baseline information on the distribution, abundance, and behavior of marine mammals in the vicinity of the proposed

Sur Ridge transmitter site, no studies had been done or were planned to obtain baseline information concerning the distribution, abundance, and behavior of marine mammals in the vicinity of the Pioneer Seamount before experiments with sound transmissions were expected to begin. The advisory board also noted that marine mammals in the study area could be affected by disturbance and sounds from research vessels, aircraft, and commercial vessels transiting the area, as well as by the experimental transmissions. It recommended changes in the survey design and effort to increase the likelihood of being able to detect cause-effect relationships. It pointed out that sound playback studies in areas where marine mammals are common may provide the only means for getting sample sizes large enough to formulate statistically meaningful conclusions. The research protocol was amended, taking into account the advisory board's recommendations, and forwarded to the National Marine Fisheries Service on 1 May 1995 as part of a revised application for a permit to conduct scientific research under the Marine Mammal Protection Act and the Endangered Species Act.

The Sierra Club Legal Defense Fund and several other environmental groups questioned whether the planned research program would resolve the uncertainties concerning the possible effects of the California ATOC program on marine mammals and other biota. Representatives of the environmental groups subsequently met with representatives of the University of California (representing Scripps Institution of Oceanography and the ATOC project) several times in April and May 1995 to identify and determine how questions concerning the adequacy of the planned marine mammal research program might be resolved. The discussions led to a 2 June 1995 agreement signed by representatives of the University of California and the Sierra Club Legal Defense Fund, the Natural Resources Defense Council, the Environmental Defense Fund, Earth Island Institute, the Humane Society of the United States, and the American Oceans Campaign. Among other things, the parties agreed that the pilot marine mammal research program would be extended through the entire initial research period of approximately 18 to 24 months; control of the sound source (including determination of duty cycles and decisions regarding operation, suspension, and termination) would remain with the personnel conducting the marine mammal research program through the entire initial research period; and two additional members and two additional observers would be appointed to the marine mammal research program advisory board, from individuals nominated by the environmental organizations.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, reviewed the revised permit application and provided comments to the National Marine Fisheries Service on 30 June 1995. The Commission noted that the basic research design seemed sound but was based on a number of untested assumptions. The Commission also noted that it was not clear whether all the assumptions had been recognized or whether the research had been designed to provide the information needed to validate them. The Commission recommended that the requested permit be issued with several conditions — *e.g.*, that the study be suspended if there is any evidence that the sound transmissions may be jeopardizing the health or welfare of individual animals or the populations of which they are a part and that authority to continue the proof-of-concept study be contingent on submission and approval of a report describing and evaluating the results of the pilot marine mammal study.

The National Marine Fisheries Service issued the permit for the California marine mammal study on 13 July 1995. Installation of the sound source and the cable connecting it to the power source on shore was initiated on 27 October 1995. During installation, a series of tests were done by the engineers to determine whether the power output of the transmitter was within the specified performance standards. These tests were done before the scheduled 9 November 1995 beginning of the marine mammal research program and were not under the control of the program personnel, as specified in the previously noted 2 June 1995 agreement between the University of California, the Sierra Club Legal Defense Fund, and other environmental groups.

On 3 November 1995 a dead humpback whale was observed floating near Stinson Beach, California. The carcass washed ashore the next day and was buried to prevent a public health hazard. The cause of death was not evident from external examination and a

necropsy was not performed. On 8 and 9 November two more dead humpback whales were seen floating offshore the Farallon Islands. Because of the concurrence with the performance test of the Pioneer Seamount ATOC transmitter, several of the environmental groups that had signed the 2 June 1995 agreement questioned whether the humpback whales may have been killed by the sound transmissions. Available information concerning the sightings and condition of the dead humpback whales and the engineering tests of the ATOC sound generator were compiled and provided to the marine mammal research program advisory board for review. In a 30 November 1995 letter to the leader of the ATOC marine mammal research program, the chairman of the advisory board indicated that the board believed it unlikely that the engineering test transmissions on 28-29 October and 1-2 November were responsible for the deaths of the humpback whales found on 3, 8, and 9 November. The letter indicated that the board believed that there had been a breakdown in communication between the engineers and oceanographers who were installing and testing the sound source and the researchers responsible for designing and carrying out the marine mammal research program. The board recommended that all future transmissions from ATOC sources, including any future engineering test transmissions, be either under the control or with the full knowledge and documented advance concurrence of the scientists responsible for the marine mammal research program.

The board also noted that authority to conduct experimental sound transmissions had been suspended, pending review of the possible relationship between the test transmissions and the humpback whale deaths, and that this delay in implementing the program might result in too few data being available at the end of the program to draw statistically meaningful conclusions concerning the likely effects of ATOC transmissions. The board recommended that the National Marine Fisheries Service authorize initiation of experimental transmissions as quickly as possible, subject to acceptance of the board's recommendations. The National Marine Fisheries Service modified the permit issued to the Scripps Institution of Oceanography on 13 July 1995 to reflect the board's recommendations and on 30 November 1995 authorized initiation of sound transmissions as part of the California marine mammal research program. Experimental transmissions were initiated on 2-3 December 1995.

The Hawaii Project — The final environmental impact statement for the Kauai ATOC project and its associated marine mammal research program was issued in May 1995. An application for a scientific research permit authorizing the taking of marine mammals in the course of the program was submitted to the National Marine Fisheries Service on 26 May 1995. The Commission, in consultation with its Committee of Scientific Advisors, provided comments on the permit application on 13 July 1995.

The Commission noted that the planned research program appeared conceptually sound but might not provide sufficient information to judge whether operation of the ATOC sound source off Kauai would have negligible effects on humpback whales or to design a cost-effective monitoring program to verify that the transmissions have negligible effects. The planned program would not, for example, provide data necessary to determine what proportion or subset of the humpback whales that winter in the Hawaiian Islands reside in or pass through the area off Haena Point and thus could be exposed to ATOC sound transmissions. The Commission recommended that the requested permit be issued recognizing that the planned research might not provide sufficient information to make the previously noted determinations.

The Commission also recommended that experimental sound transmissions be suspended if there is any indication that they may be jeopardizing the health or welfare of individual animals or the populations of which they are a part. In addition, the Commission recommended that authorization to continue the proof-of-concept study after the six- to ten-month pilot study be contingent on submission of a report describing the results of the pilot study and, if there is any doubt as to whether operation of the sound source would have more than negligible effects, submission and approval of a proposed monitoring program to verify that any effects on marine mammals are in fact negligible.

The National Marine Fisheries Service issued the requested permit on 5 October 1995. By the end of 1995 the State of Hawaii had not issued the permits

necessary to install the ATOC sound generator off Haena Point.

Small-Take Authorizations

Section 101(a)(5) of the Marine Mammal Protection Act directs the Secretaries of the Interior and Commerce to authorize, in certain instances, the unintentional taking of small numbers of marine mammals by U.S. citizens incidental to activities other than commercial fishing operations. This provision was added to the Act in 1981 to eliminate the need to obtain a waiver of the Act's moratorium on taking marine mammals, which is procedurally more burdensome in those instances when the number of animals likely to be affected is small and the impacts are likely to be negligible. The provision was amended in 1986 to allow the taking of small numbers of depleted, as well as non-depleted, marine mammals. All forms of incidental taking, including lethal taking, may be authorized under section 101(a)(5)(A). A new provision, section 101(a)(5)(D), was added by the 1994 Marine Mammal Protection Act amendments to provide a streamlined mechanism for authorizing the incidental take of small numbers of marine mammals when only taking by harassment is involved.

Authorizations under section 101(a)(5)(A) are issued through a two-step process. If the Secretary, through notice-and-comment rulemaking, determines that taking incidental to a specific activity in a specific geographical area will have a negligible impact on the affected species or stock, and will not have an unmitigable adverse impact on the availability of the species or stock for taking by Alaska Natives for subsistence use, the Secretary is to prescribe regulations setting forth permissible methods of taking and requirements for monitoring and reporting the take. [See Appendix B, Swartz and Hofman 1991, for an assessment of the reporting and monitoring requirements.] The regulations are to be designed so as to ensure that the authorized taking has the least practicable adverse impact on the species or stock and its habitat. Taking authorized by the regulations also must have the least practicable adverse impact on the availability of such species or stocks for subsistence use by Alaska Natives.

The second step in authorizing small takes under section 101(a)(5)(A) is issuance of a letter of authorization. Letters of authorization are issued if the Secretary determines that the type and level of taking likely to result from the proposed activities are consistent with the findings made for the class of activities under the regulations. Letters of authorization must specify the period of validity and may include additional terms and conditions tailored to the specific request. While the public has an opportunity to comment on small-take regulations, the issuance of individual letters of authorization generally is not subject to prior public review.

The authorization of incidental harassment under section 101(a)(5)(D) does not require the issuance of regulations for specific activities. Rather, the Secretary, within 45 days of receiving an application that makes the required showings, is to publish a proposed authorization for public comment in the *Federal Register* and in newspapers and appropriate electronic media in the locally affected area. After a 30-day comment period, the Secretary has 45 days in which to make a final determination on the application. Authorizations under section 101(a)(5)(D) may be issued for periods of no more than one year, but may be renewed annually.

The National Marine Fisheries Service on 31 May 1995 published proposed regulations to implement 101(a)(5)(D). The Commission expects to comment on those regulations early in 1996. The Fish and Wildlife Service has yet to publish proposed implementing regulations.

Small-take authorizations issued in 1995 are discussed below.

Dock Reconstruction on MacNeil Island in Puget Sound

As noted in the Commission's previous annual report, the Washington Department of Corrections applied to the National Marine Fisheries Service on 28 August 1994 for authorization to take small numbers of harbor seals by harassment incidental to the demolition and reconstruction of the deteriorating Still Harbor Dock Facility on MacNeil Island in Puget

Sound. The Service prepared an environmental assessment on the request and on 8 November 1994 published in the *Federal Register* a proposed authorization for public review and comment.

The Commission provided comments on the proposed authorization and environmental assessment by letter of 8 December 1994. The Commission concurred with the Service's assessment that the planned project likely would affect only a small number of harbor seals by harassment only and would have a negligible impact on the local harbor seal population. The Commission noted, however, that the details of the monitoring program to be conducted to verify that any effects were, in fact, negligible had yet to be agreed on by the Service and the applicant. The Commission recommended that the proposed small-take authorization not be issued until the uncertainties concerning the monitoring program had been resolved and the Service was able to conclude that the program was adequate to detect any non-negligible effects.

The requested authorization was issued by the Service on 12 January 1995, incorporating most of the Commission's recommendations.

Lockheed Vehicle Launches from Vandenberg Air Force Base, California

On 10 May 1995 the National Marine Fisheries Service published in the *Federal Register* a notice of receipt of an application from the Lockheed Environmental Systems and Technology Company for authorization to take small numbers of harbor seals by harassment incidental to launches of space vehicles from Vandenberg Air Force Base in California. The *Federal Register* notice indicated that the Service proposed to issue a one-year authorization, with prescribed requirements for monitoring and reporting.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, reviewed the information provided in the proposed authorization and forwarded comments to the National Marine Fisheries Service on 14 June 1995. The Commission noted that, although information provided by the applicant indicated that young seals possibly could be harmed or killed as a result of startle responses, the Service apparently had concluded that taking other than by harassment was extremely unlikely. Because the authorization was being requested pursuant to section 101(a)(5)(D) of the Marine Mammal Protection Act (which allows for issuance of small-take authorizations for taking by harassment only), the Commission advised the Service to ensure the applicant was aware that taking by means other than harassment would not be covered by the authorization and would constitute a violation of the Act.

The Commission also noted that information provided in the *Federal Register* indicated that, in addition to harbor seals, other pinniped species, several species of cetaceans, and sea otters are known to occur in areas where they could be exposed to noise from vehicle launches. The Commission recommended that the Service consult with the applicant to determine whether additional species should be included in the request for a small-take authorization.

The Commission further noted that the applicant proposed to monitor the effects of vehicle launches by simultaneously measuring noise levels and videotaping harbor seal behavior. However, the proposal did not indicate where the monitoring would be done or why the planned monitoring program was believed sufficient to verify that any taking would be by harassment only. The Commission pointed out that monitoring should be done in all areas where taking might occur, not just at harbor seal haul-out sites near Vandenberg.

The requested authorization was issued 19 July 1995 authorizing the incidental harassment of a small but unspecified number of Pacific harbor seals during Lockheed's vehicle launches from Vandenberg. It required monitoring of harbor seals and noise-level measurements on San Miguel Island, as well as the Rocky Point haul-out site near Vandenberg, prior to, during, and following launches. The Service provided its reasons for not authorizing small takes of other species in a 26 July 1995 *Federal Register* notice.

Delta II Rocket Launches from Vandenberg Air Force Base

On 12 July 1995 the National Marine Fisheries Service received an application from the U.S. Air

Force requesting authorization to harass small numbers of harbor seals and possibly other pinniped species incidental to launches of McDonnell Douglas Aerospace Delta II rockets from Vandenberg Air Force Base, California. The application was forwarded to the Commission for review and comment on 15 August 1995. A notice of receipt of the application and the Service's proposed response was published in the *Federal Register* on 18 August 1995.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, forwarded comments on the application to the Service on 18 September 1995. The Commission concurred with the Service's determination that small numbers of harbor seals, California sea lions, and northern elephant seals might be harassed incidentally as a consequence of some Delta II launches and that any such harassment likely would have negligible effects. The Commission questioned the Service's determination that there was little possibility that other species might be harassed and recommended that the Service consult with the applicant to determine whether additional species should be included in the authorization.

The Commission also noted that the monitoring program being proposed by the Service was not described in sufficient detail to judge whether it would be capable of verifying that the authorized harassment, by itself and in combination with harassment from other vehicle launches from Vandenberg Air Force Base, has negligible effects on the affected marine mammal stocks. Noting that launches of a variety of rockets from Vandenberg were likely to continue for an indefinite period of time, the Commission recommended that the Service consult with the Air Force to determine whether it would make more sense to seek a collective five-year authorization for harassment and perhaps other types of taking pursuant to section 101(a)(5)(A) of the Marine Mammal Protection Act rather than separate, one-year authorizations under section 101(a)(5)(D) of the Act for each type of rocket launched from Vandenberg.

The requested authorization was issued by the Service on 19 September 1995. The authorization reflected some, but not all of the recommendations made by the Commission. The Service explained its rationale for not adopting all of the Commission's recommendations in a 10 October 1995 *Federal Register* notice describing the incidental harassment authorization. The Service concurred with the Commission's recommendation that the Air Force be consulted to determine whether it might be preferable to seek a five-year authorization for taking marine mammals incidental to launches of all rockets from Vandenberg rather than a series of one-year authorizations for each type of launch vehicle.

Seismic Surveys in the Santa Barbara Channel

On 11 May 1995 the National Marine Fisheries Service received an application from the Exxon Company USA requesting authorization to harass small numbers of cetaceans incidental to three-dimensional seismic surveys in the western portion of the Santa Barbara Channel off southern California. Notice of the application and the Service's proposed response were published in the *Federal Register* on 7 June 1995.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, reviewed and by letter of 25 July 1995 provided comments and recommendations on the application and the Service's proposed response. The Commission questioned whether all species that might be affected by the planned seismic surveys had been identified. The Commission also questioned the estimates of the numbers of the different species that might be affected; whether taking would be by acoustic harassment only; and whether the proposed monitoring program would be sufficient to document the species and numbers of animals taken and to verify that any taking is by harassment only and has negligible effects. The Commission recommended that the Service include in its authorization all cetacean and pinniped species known to occur in the Santa Barbara Channel; that the authorization require the immediate suspension of operations if taking occurs by means other than harassment; and, unless a more compelling case could be made to justify the Service's "negligible effects" determination, that the requested incidental-take authorization not be provided until the Service, in consultation with the Commission, was satisfied that the monitoring program would be sufficient to verify that only the authorized species and numbers of marine mammals were taken and that the taking was

by harassment only. In addition, the Commission recommended that the authorization specify that the seismic surveys be completed before the beginning of the annual southward migration of gray whales through the Santa Barbara Channel and adjacent areas.

On 24 September 1995 the Environmental Defense Center, Inc., a public-interest environmental law firm, wrote to the Director of the National Marine Fisheries Service's Office of Protected Resources and the Director of the Minerals Management Service, questioning whether there had been adequate opportunity for public participation in the review of the Exxon application. The letter, written on behalf of the Environmental Coalition of Santa Barbara (composed of the Environmental Defense Center, the Sierra Club Los Padres Chapter, League of Women Voters of Santa Barbara, Get Oil Out, and Citizens Planning Association), expressed the view that approval of Exxon's application would violate the National Environmental Policy Act, the Marine Mammal Protection Act, and the Coastal Zone Management Act.

After sending the letter, representatives of several public- interest groups met with representatives of the Minerals Management Service and Exxon Company USA to discuss possible means for resolving the concerns raised in the letter. By letter of 28 September 1995, the League for Coastal Protection, on behalf of the Natural Resources Defense Council, the Sierra Club Legal Defense Fund, the Environmental Defense Center, the American Oceans Campaign, and others, transmitted a proposed monitoring and mitigation program to the Minerals Management Service and Exxon for consideration. Among other things, the proposal called for terminating the seismic surveys when 100 gray whales had been sighted at Granite Canyon or on 31 December, whichever occurs first; conducting on-site acoustic measurements to verify predictions concerning sound transmission loss at different distances from the seismic array; and modifying the marine mammal observer program to better document the species and number of animals taken incidental to the planned seismic surveys.

The requested incidental harassment authorization was issued on 11 October 1995 and expired on 31 December 1995. It incorporated most of the Commission's recommendations and the monitoring/mitigation measures proposed by the public-interest groups. The rationale for recommended measures not included in the authorization was explained by the Service in a 17 October 1995 *Federal Register* notice.

Oil and Gas Exploration in the Beaufort and Chukchi Seas

As discussed in previous annual reports, a rule governing the take of walruses and polar bears incidental to oil and gas exploration activities in the Chukchi Sea was published by the Fish and Wildlife Service on 14 June 1991. Similar regulations governing the take of these two species incidental to oil and gas operations in and adjacent to the Beaufort Sea were issued by the Service on 16 November 1993. Areas within the Arctic National Wildlife Refuge were specifically excluded from coverage under the small-take authorization. During 1995 the Fish and Wildlife Service issued nine letters of authorization to companies engaged in oil and gas exploration under these regulations.

Rather than the five-year period of validity generally given such regulations, the regulations for activities in the Beaufort Sea area were effective for only 18 months (until 16 June 1995). During this period, the Service, in order to "comport with, and to meet more fully the intent of" the Agreement on the Conservation of Polar Bears, committed itself to developing and beginning to implement a strategy for the identification and protection of important polar bear habitats. Extension of the rule beyond the initial 18-month period was made contingent on the development and implementation of the strategy.

The Fish and Wildlife Service made available for public review and comment its draft Habitat Conservation Strategy for Polar Bears in Alaska on 28 February 1995. The draft strategy identified important polar bear feeding and denning areas, identified threats to the bears and their habitat, and proposed conservation measures to be taken. The draft strategy also identified research needs concerning polar bear habitat use and the effects of contaminants and industrial activities on polar bears. Believing that a final habitat conservation strategy would be in place by June, the Service on 17 March published a proposed

rule to extend the incidental-take regulations for an additional 42 months, through 15 December 1998.

The Marine Mammal Commission provided comments on the draft habitat conservation strategy by letter of 16 May 1995. The Commission found the draft strategy to provide a thorough and objective assessment of important polar bear habitats and how various human activities may affect those habitats. The Commission also noted that the draft strategy appropriately drew on Native knowledge of polar bear habitats and habitat-use patterns and reported much of that information for the first time. Although the draft strategy provided a detailed discussion of important polar bear habitats, the Commission expressed doubt that the conservation measures proposed by the Service would be effective in protecting those habitats.

The Commission also took issue with the implication in the draft strategy that the small-take provisions of the Marine Mammal Protection Act would be applicable only in identified important habitat areas. The Commission noted that authorization was necessary for any taking of polar bears. However, inasmuch as polar bears are more likely to be abundant in important habitat areas and to be engaged in biologically significant activities (*e.g.*, hunting, feeding, and denning) in these areas, the Commission concurred that proposals to conduct activities in such areas warranted heightened scrutiny. The Commission noted in this regard that human activities in important habitat areas could have non-negligible effects on polar bears or unmitigable adverse impacts on the availability of polar bears for Native subsistence, precluding the issuance of a small-take authorization. In such cases, incidental taking could only be authorized by a waiver of the Marine Mammal Protection Act's moratorium, a lengthier and more complex procedure.

To ensure that oil and gas activities are carried out in accordance with the Marine Mammal Protection Act and the Agreement on the Conservation of Polar Bears, the Commission recommended that the Fish and Wildlife Service advise the Minerals Management Service that each environmental impact statement concerning a proposed lease sale in the Beaufort and Chukchi Seas explicitly consider how exploration and development might affect important habitat areas described in the habitat conservation strategy. The Commission recommended further that, prior to completing an environmental impact statement, the Fish and Wildlife Service be consulted to determine measures that should be taken to prevent the degradation or destruction of important polar bear habitat or other adverse effects on polar bears. Possible conservation measures identified by the Commission included deleting known denning areas from oil and gas lease sales, prohibiting exploration and development activities near known denning or feeding areas at certain times of the year, requiring roads and pipelines to be constructed perpendicular to the coastline to minimize the effect on migrating polar bears, requiring aircraft to avoid known denning and feeding areas or maintain a conservative minimum altitude over such areas, and prohibiting on-ice road construction and seismic profiling during the pupping season of ringed seals, an important polar bear prey species. The Commission advised that such measures, as appropriate, should be incorporated into regulations or letters of authorization for the incidental taking of polar bears.

Because of extensive public comment on the draft habitat conservation strategy, the Service was unable to complete the final strategy by 16 June when the incidental-take regulations were to expire. Explaining in a 14 June 1995 *Federal Register* notice that "Beaufort Sea oil and gas activities continue to pose no more than a negligible impact to polar bear and walrus," the Service opted to extend the effectiveness of the incidental-take regulations for an additional 60 days to enable it to complete the final habitat conservation strategy.

The Service on 17 August 1995 published a final rule extending the incidental-take regulations through 15 December 1998. That *Federal Register* notice also announced the availability of the final habitat conservation strategy for polar bears in Alaska.

Rather than adopt specific protective measures, as many commenters suggested, the Service in the final strategy preferred to address habitat conservation on a case-by-case basis. The Service will advise those seeking letters of authorization to submit information as to whether the planned activities will occur in or near areas identified as important habitat, to describe

how the habitat might be affected, and describe the steps planned to prevent or minimize such impacts. After its review, the Service may include conditions in any authorization it issues to prohibit certain activities in certain areas or at certain times of the year, establish buffer zones, *etc.*

The Service acknowledged that no incidental taking of polar bears would be permissible without an authorization regardless of whether or not it occurred in an area identified as important habitat. Because of the greater likelihood that polar bears may be taken in important habitat areas, the Service considered making a letter of authorization mandatory before oil and gas activities could be conducted in these areas. It concluded, however, that the habitat conservation strategy did not provide proper authority for issuing such a requirement. Instead, the Service indicted that it would consider requiring letters of authorization for activities in important habitat areas through a separate rulemaking or amendment of the Marine Mammal Protection Act.

The final strategy also addressed several comments that had recommended that the Service afford special protection to polar bear habitat within the Arctic National Wildlife Refuge. The Service noted that the refuge is currently closed to oil and gas activity by statute. Thus, the Service believed that additional protective measures were not warranted at this time. It did, however, commit to re-examining the need for special measures for this area, should legislation be enacted that would open the refuge to oil and gas operations.

The Service noted in the draft strategy the dietary importance of ringed seals to polar bears and the need to restrict activities that may displace seals. In the final habitat conservation strategy, the Service proposed coordinating its efforts with those of the National Marine Fisheries Service, which has authorized the incidental taking of ringed seals.

In 1982, 1987, and again in 1993 the National Marine Fisheries Service issued regulations to authorize the taking of small numbers of ringed seals incidental to on-ice seismic activities associated with oil and gas exploration over the outer continental shelf of the Beaufort Sea. The current authorization expires at the end of 1997.

As noted in the previous annual report, four letters of authorization for the taking of ringed seals incidental to on-ice seismic exploration in the Beaufort Sea were issued by the Service during 1994. Three of these authorizations remained valid through 1 December 1995. New letters of authorization covering activities from 1 January to 31 May 1996 were issued to BP Exploration, Western Geophysical, and Geco-Prakla on 1 December 1995.

On 18 July 1990 the National Marine Fisheries Service published regulations authorizing the non-lethal take of six species of marine mammals (bowhead, gray, and beluga whales and bearded, ringed, and spotted seals) incidental to oil and gas exploration in the Beaufort and Chukchi Seas from 1990 to 1995. As discussed in previous annual reports, the incidental taking of marine mammals under this authorization has been contentious, particularly with respect to the adequacy of the associated monitoring programs. However, interest in conducting oil and gas exploration in the Beaufort Sea has waned in recent years, and no letters of authorization were requested in 1994 or 1995. It is expected that some oil and gas operators will seek authority to take marine mammals by harassment incidental to exploratory activities in the Beaufort Sea during 1996 under section 101(a)(5)(D) of the Marine Mammal Protection Act.

Removal of Oil and Gas-Related Structures in the Gulf of Mexico

In 1989 the American Petroleum Institute, representing operators who remove offshore oil and gas drilling and production structures and related facilities in the Gulf of Mexico, sought a small-take authorization from the National Marine Fisheries Service. The American Petroleum Institute estimated that 670 structures will be removed from Gulf waters during the first five years of the proposed operations and that about 5,500 structures will be removed within a 35-year period. Explosives used to sever pilings, well conductors, and supporting structures as part of the removal process may expose dolphins and other

marine mammals to sound and pressure waves that, depending on an animal's distance from the explosion, may result in harassment, injury, or death.

The Service published a proposed rule on 17 June 1993 to authorize the incidental taking of bottlenose and spotted dolphins for five years. The Marine Mammal Commission commented on the proposed rule on 16 August 1993 and generally concurred with the Service's conclusion that the removal operations would have negligible impacts on bottlenose and spotted dolphins, provided no animals were within ranges that tissue and hearing damage could occur when the explosives were detonated. However, the Commission recommended that additional justification be provided for the Service's determination that pressure waves generated by the explosives would dissipate to safe levels within 3,000 feet in all cases. Also, the Commission noted that many marine mammals other than bottlenose and spotted dolphins could potentially be affected and recommended that the rule also authorize the incidental taking of any marine mammal that reasonably can be expected to occur in the northern Gulf of Mexico. The Commission also questioned a proposal to allow Service officials to authorize the use of explosives when darkness or weather conditions would impair the ability to detect marine mammals in the vicinity of the structure.

In addition, the Commission expressed concern about the proposed monitoring and reporting requirements. It recommended that requests for letters of authorization be required to provide more specific information on how marine mammals near a structure being removed would be detected and on the steps to verify that no marine mammals were killed or injured by the blasts. The Commission suggested that in addition to visual surveys, acoustic monitoring might help detect marine mammals in the blast area. With respect to post-explosion monitoring, it suggested that the Service periodically compare reports from holders of letters of authorization with marine mammal stranding data to check for possible correlations between strandings and structure removals.

Finally, the Commission noted that marine mammals could be affected indirectly as well as directly by structure removals. For example, hazardous substances deposited in sediments beneath oil platforms could be resuspended in the water column by explosions and thus enter the marine food web. As top-level carnivores, dolphins would be particularly susceptible to the accumulation of such substances.

The Service published a final rule authorizing the take of bottlenose and spotted dolphins on 12 October 1995. The authorization is for five years and allows harassment of up to 200 dolphins per year. Some, but not all, of the Commission's recommendations were incorporated into the final rule.

The Service believed that mathematical modeling provided by the applicant was adequate to show that injuries to marine mammals from the planned explosions were highly unlikely and that further experiments were unnecessary. The final rule, however, limits the explosives that may be used to a pressure level equivalent to a 50-pound charge. The Service concluded that the probability of affecting cetaceans other than bottlenose and spotted dolphins is remote, given marine mammal survey data, and that other species need not be covered by the authorization. The final rule was expanded, however, to include both species of spotted dolphins that occur in the Gulf, *Stenella frontalis* and *S. attenuata*. It also was modified to limit detonations to daylight hours and to prohibit detonations when visibility prevented a predetonation survey. The Service did not adopt the recommendation that applicants provide additional data on site-specific monitoring but did agree to compare data from monitoring reports with marine mammal stranding data. The Service also believed that visual surveys were sufficient to detect marine mammals in the vicinity of oil rigs and declined to require acoustical monitoring. The Service concluded that possible effects of resuspended hydrocarbons would be temporary, localized, and unlikely to impact marine mammals and their habitat.

As of the end of 1995 only one letter of authorization had been issued under the regulations. By *Federal Register* notice of 5 December 1995, the National Marine Fisheries Service announced that it had issued a letter of authorization to the Murphy Exploration and Production Company on 27 November, authorizing the taking of small numbers of bottlenose and spotted dolphins incidental to rig removal activities.

Chapter XII

MARINE MAMMALS IN CAPTIVITY

Under the Marine Mammal Protection Act, permits to take marine mammals for public display, scientific research, or to enhance the survival or recovery of a species or stock may be issued by the Secretary of Commerce or the Secretary of the Interior, depending on the species of marine mammal involved. Prior to the 1994 amendments, the Act required that such permits specify the methods of capture, supervision, care, and transportation to be followed pursuant to and after taking or importation, including requirements for maintaining the animals in captivity.

The 1994 amendments greatly limited the authority of the National Marine Fisheries Service and Fish and Wildlife Service over marine mammals once they are removed from the wild. While no corresponding amendments to the Animal Welfare Act were enacted, the practical effect was an increase in the prominence of the Department of Agriculture's Animal and Plant Health Inspection Service in matters concerning the care and maintenance of captive marine mammals.

Since its inception, the Marine Mammal Commission has worked with the responsible agencies to ensure the safety and well-being of marine mammals in captivity. Noting the shift in agency responsibilities resulting from the 1994 amendments, the Commission on 6 August 1994 offered to convene an interagency panel to review how the amendments affect the Animal and Plant Health Inspection Service's marine mammal program and to identify the resources needed for the Service to meet its responsibilities. By letter of 12 September 1994 the Service responded favorably to the Commission's offer and agreed with terms of reference the Commission had drafted.

Subsequently a preliminary draft report was developed by the Commission to serve as background for the review. That report noted that the Animal and Plant Health Inspection Service would need sufficient personnel and funding to (1) strengthen the inspection program by establishing a corps of marine mammal inspectors with specialized training and knowledge; (2) strengthen enforcement to ensure that problems are corrected promptly and, when warranted, licenses are suspended or revoked in a timely manner; (3) increase oversight of post-capture maintenance of animals; (4) inspect foreign facilities to ensure that they meet standards comparable to those applicable to U.S. facilities; (5) regulate interactive displays of marine mammals, such as swim-with-a-dolphin programs, to ensure the welfare of the animals and the safety of human participants; (6) establish a special class of license for exhibitors of marine mammals; (7) establish a system for maintaining and reviewing necropsies and other records concerning the health and condition of captive marine mammals; and (8) develop improved methods for marking and identifying captive marine mammals.

By letter of 1 February 1995 the Animal and Plant Health Inspection Service advised the Commission that it could not support the conclusions set forth in the draft report. The Service noted that its responsibility had not increased significantly with amendment of the Marine Mammal Protection Act. Although it did acquire direct responsibility for swim-with-the-dolphin programs, which the National Marine Fisheries Service previously had overseen, no other changes in its mandate or jurisdiction had occurred. The Service also took the position that it has no authority or mandate to inspect foreign facilities, that no necropsy reports or annual reports are required under the Animal Welfare Act, and that separation of inspectors by facility type, *e.g.*, by establishing a team of marine mammals inspectors, is not practical in the current economic climate.

The Commission by letter of 5 May 1995 responded to the points raised by the Service. The Commission noted that, while technically the 1994 amend-

ments to the Marine Mammal Protection Act did not place additional burdens on the Service, as a practical matter, agency responsibilities had been increased due to the elimination of the authority of the National Marine Fisheries Service and the Fish and Wildlife Service to regulate most aspects of the care and maintenance of captive marine mammals. With this in mind, the Commission recommended that the Service develop a more comprehensive regulatory program and strengthen its oversight and enforcement capabilities as they relate to marine mammals by obtaining additional inspectors, additional technical and clerical help, and additional training programs.

Subsequently the Animal and Plant Health Inspection Service announced its intention to proceed with a review of the regulations governing the care and maintenance of captive marine mammals. The Commission hopes to raise many of these issues in the context of that review.

Care and Maintenance Standards

The Animal and Plant Health Inspection Service regulates the humane handling, housing, care, treatment, and transportation of marine mammals under the Animal Welfare Act. The marine mammal standards, adopted in 1979 and amended in 1984, have not been updated to reflect advances in animal husbandry and marine mammal science. Therefore, on 29 May 1990 the Marine Mammal Commission invited representatives of the Animal and Plant Health Inspection Service, the National Marine Fisheries Service, and the Fish and Wildlife Service to meet to discuss the need to revise the standards. All agreed that a review of the standards was desirable and that an interagency approach should be followed. As a first step, the Commission on 31 July 1991 provided the Animal and Plant Health Inspection Service with a comprehensive discussion paper identifying shortcomings in the current standards and raising questions to be addressed in reviewing those standards.

In response, the Animal and Plant Health Inspection Service on 23 July 1993 published an advance notice of proposed rulemaking, indicating that it was considering revising its marine mammal standards. Based in part on the Commission's discussion paper, the Service solicited public comment on certain elements of the standards including water quality, water and air temperatures, noise levels, the allowance of swim-with-the-dolphin programs, recordkeeping requirements with regard to husbandry, and maintaining marine mammals in isolation. The Commission provided comments on 5 October 1993, reiterating the suggestions made in its 31 July 1991 letter.

The Animal and Plant Health Inspection Service subsequently indicated its intention to use negotiated rulemaking to review and revise its marine mammal standards and guidelines. The first meeting of the negotiated rulemaking advisory committee was held on 25-26 September 1995. The Committee comprises a broad cross-section of the public display and animal welfare communities. Representatives of the Commission, the National Marine Fisheries Service, and the Fish and Wildlife Service attended the meeting as observers. At the initial meeting, the participants established an organizational protocol to guide the negotiations and, in anticipation that the process might not be fully funded, discussed in broad terms the key topics to be considered. These included requirements related to space, isolation/separation, water quality, noise, temperature, transportation, recordkeeping, food preparation, necropsies, personnel qualifications and training, lighting, petting and feeding pools, and traveling exhibits.

Based on these discussions and previously submitted comments, the Animal and Plant Health Inspection Service in late December distributed a draft revision of the regulations setting forth "Specifications for the Humane Handling, Care, Treatment, and Transportation of Marine Mammals." The Service intends to use the draft as a starting point for discussion during the negotiated rulemaking process.

The draft addresses some, but not all, of the Commission's concerns as outlined in the 1991 discussion paper. Among the amendments proposed by the Service are establishment of new standards for allowable ambient and peak environmental noise levels; regulation of indoor and outdoor water and air temperatures to reflect the natural habitat of the species; a requirement that artificial lighting at indoor

facilities be full spectrum; a requirement that enclosures subject to tidal action meet minimum space requirements at low tide; a general increase in space requirements; a training requirement for new employees; and a requirement that captive animals be given access to conspecific or related, compatible animals.

Points raised in the Commission's discussion paper that were not addressed in the proposed regulations include prohibiting release of animals from captivity unless the facility is specifically authorized to do so; prohibiting withholding of food for training purposes; requiring necropsy reports to be maintained for a period of five years; that transport enclosures clearly be marked as containing live animals; that adequate lighting be available to enable attendants to inspect marine mammals being transported; and that carriers inform the crew of the transport craft as to the presence of the marine mammals and take necessary actions for the welfare of the animals if delays occur.

A second meeting of the negotiated rulemaking advisory committee is scheduled for 1-3 April 1996. Due to funding constraints, this is to be the final meeting of the committee. By compressing the negotiated rulemaking process into two meetings, the ability of the advisory committee to reach consensus on all outstanding issues may have been compromised.

Foreign Facilities

Section 102(a)(4) of the Marine Mammal Protection Act as amended in 1994 prohibits the export of marine mammals except for purposes of public display, scientific research, or species enhancement. Foreign facilities are allowed to export marine mammals from U.S. facilities as long as they meet requirements pertaining to education or conservation programs, Animal and Plant Health Inspection Service licensure, and public accessibility, or comparable requirements. Because foreign facilities are not subject to licensing or registration requirements under the Animal Welfare Act, it is only through the Marine Mammal Protection Act's comparability requirement that adequate care of marine mammals transferred from the United States to foreign facilities can be assured. How best to determine and enforce comparability with the Animal and Plant Health Inspection Service licensing requirements is an issue still being reviewed by the responsible agencies.

By letter of 26 August 1994 the Animal and Plant Health Inspection Service requested the Commission's comments on a document outlining the information to be submitted by a foreign facility to enable the Service to determine that comparable standards have been met. By letter of 8 September 1994 the Commission provided its views on the determinations that must be made before marine mammals can be exported to foreign facilities. The Commission noted that marine mammals may only be exported to foreign facilities that meet requirements comparable to those applicable to U.S. facilities. The Commission concluded that such determinations can only reliably be made by conducting an inspection of the foreign facility.

In 1995 the National Marine Fisheries Service requested the Commission's comments on four applications from foreign facilities requesting authorization to export from the United States unreleasable stranded marine mammals for purposes of public display. The Commission wrote to the Service on 26 May 1995 to state that it continued to believe that an on-site inspection, conducted by a qualified individual (*e.g.*, an Animal and Plant Health Inspection Service inspector familiar with marine mammals), is the only reliable way to ensure that a facility meets comparable standards. The Commission noted that, while the Animal and Plant Health Inspection Service does not have authority under the Animal Welfare Act to compel a foreign facility to consent to an inspection, it is within the authority of the National Marine Fisheries Service to require a foreign facility to submit to such an inspection as a condition of obtaining animals under the Marine Mammal Protection Act. Thus, for a facility wishing to obtain marine mammals from the United States, inspection could be made mandatory. The Commission further noted that it would not be difficult to imagine circumstances in which an animal would be better off being euthanized than being transferred to an unacceptable foreign facility.

Swim-with-the-Dolphin Programs

As discussed in the previous annual report, four marine mammal facilities were authorized by the National Marine Fisheries Service under the Marine Mammal Protection Act to conduct swim-with-the-dolphin programs in which members of the public are allowed to enter the water and interact with captive bottlenose dolphins. Because of possible health and safety risks to both dolphin and human participants, these programs were considered experimental and were authorized on a provisional basis.

As a consequence of the 1994 amendments to the Marine Mammal Protection Act, the National Marine Fisheries Service is no longer authorized to regulate or otherwise control swim programs. The Animal and Plant Health Inspection Service, under authority of the Animal Welfare Act, subsequently assumed responsibility for the programs. On 23 January 1995 the Animal and Plant Health Inspection Service published a proposed rule in the *Federal Register* to regulate swim-with-the-dolphin programs. The proposed regulations, for the most part, are based on the requirements that had been put in place by the National Marine Fisheries Service. Among other things, the regulations would require that only bottlenose dolphins be used in swim programs and that every program employ a full-time manager, primary behaviorist, supervising attendant, and attending veterinarian.

With regard to handling, the regulations would require that an individual dolphin's interaction with humans not exceed two hours per day and that each dolphin is permitted at least 10 continuous hours with no public interaction every 24 hours. In addition, the ratio of humans to dolphins is not to exceed 3:1 and all sessions must have at least two attendants. The proposed regulations also specify that if a program has more than two incidents that are dangerous or harmful to either dolphins or humans, one attendant must be positioned in the water, and animals exhibiting unsatisfactory behaviors be removed from the interactive session.

With regard to recordkeeping, the regulations would require that a description of each program be provided to the Service, including descriptions of the facility, the training each dolphin has undergone, the behavior patterns of each dolphin, the veterinary care program, and the monitoring program.

With regard to veterinary care, the regulations would require that the attending veterinarian conduct on-site evaluations at least once a month of each dolphin used in a swim program and a complete physical examination at least once every six months.

By letter of 17 March 1995 the Commission commented on the proposed swim program regulations. The Commission recommended that the Service conduct on-site inspections of current and proposed facilities to determine compliance with the applicable care and maintenance standards and guidelines and the special requirements applicable to swim programs; clarify its authority to suspend a swim program's authorization if the facility is found to be deficient or is not adhering to the applicable regulations; clarify what constitutes adequate training for dolphins in swim programs; allow only controlled swims, as defined in the 1994 National Marine Fisheries Service-sponsored report, "Quantitative Behavioral Study of Bottlenose Dolphins in Swim-with-the-Dolphin Programs in the United States"; adopt the National Marine Fisheries Service's human to dolphin ratio of 2:1 for swim programs; define what constitutes prohibited "dangerous or harmful behavior"; and specify that aggressive contact (*e.g.*, biting, hitting, or ramming) that results in human injury is cause for removing a dolphin permanently from a swim program.

The Animal and Plant Health Inspection Service anticipates publishing a final rule to govern swim-with-the-dolphin programs in 1996.

APPENDIX A

MARINE MAMMAL COMMISSION RECOMMENDATIONS IN 1995

3 January	Commerce, modification of scientific research permit, Andrew W. Trites.
4 January	Commerce, scientific research permit, University of Hawaii/Manoa.
23 January	Interior, scientific research permit, California Department of Fish and Game.
23 January	Interior, scientific research permit, Carle Foundation Hospital.
23 January	Interior, scientific research permit, Glenn R. VanBlaricom.
23 January	Interior, public display permit, Indianapolis Zoological Society.
27 January	Defense, commenting to the Advanced Research Projects Agency on the draft environmental impact statement/environmental impact report for the California Acoustic Thermometry of Ocean Climate Project (California ATOC Project) and its associated marine mammal research program; recommending, among other things, that the statement be expanded to explicitly note the relevant provisions of the Marine Mammal Protection Act and to explain the rationale for the conclusion that the marine mammal research program will provide the information necessary to determine whether marine mammals may be taken incidental to the California ATOC Project, and, if so, whether the taking can be authorized by a small-take exemption; further recommending that the statement propose criteria for judging possible non-negligible impacts on marine mammals and that these criteria be used to assess the possible effects of the proposed ATOC project on marine mammals.
3 February	Commerce, modification of scientific research permit, National Marine Mammal Laboratory.
3 February	Commerce, modification of scientific research permit, Stephen J. Insley.
3 February	Commerce, modification of scientific research permit, James H.W. Hain.
13 February	Commerce, modification of scientific research permit, National Marine Mammal Laboratory.
15 February	Commerce, modification of scientific research permit, Ronald J. Schusterman.
22 February	Commerce, modification of scientific research permit, Southwest Fisheries Science Center.
22 February	Commerce, modification of scientific research permit, National Marine Mammal Laboratory.
24 February	Interior, commenting to the Fish and Wildlife Service on the technical/agency draft Florida manatee recovery plan (*Trichechus manatus*) second revision; recommending, among other things, that the plan explicitly call for the formation of a population assessment working group to (a) develop and review an appropriate population model to detect and monitor population trends, and (b) review relevant data pertaining to key population parameters; and recommending the plan be expanded to call for the convening of a workshop to identify and evaluate needed fundamental changes in the recovery program and to evaluate future recovery strategies.
7 March	Commerce, scientific research permit, Randall S. Wells.

8 March	Commerce, scientific research permit, Carol A. Conway.
9 March	Marine Acoustics, Inc., commenting on the draft environmental impact statement for the Kauai Acoustic Thermometry of Ocean Climate Project (Kauai ATOC Project) and its associated marine mammal research program; recommending, among other things, that the statement be expanded and revised to explicitly note the relevant provisions of section 101(a)(5) of the Marine Mammal Protection Act and the rationale for considering the proposed action to be scientific research that can be authorized under section 104 of the Act; and further recommending that the statement be expanded to explain the rationale for the conclusion that the marine mammal research program will provide the information necessary to determine whether marine mammals may be taken incidental to the project and, if so, whether the taking can be authorized by a small-take exemption.
14 March	Commerce, modification of scientific research permit, Center for Coastal Studies.
17 March	Commerce, modification of scientific research permit, William A. Watkins.
17 March	Agriculture, commenting to the Animal and Plant Health Inspection Service on a proposed rule regarding the issuance of permits for swim-with-the-dolphin programs; recommending that the Service conduct on-site inspections of current and proposed facilities with respect to the provisions applicable to swim programs as well as to the applicable care and maintenance standards and guidelines; recommending that the Service clarify if it can suspend a swim program if a facility is found to be deficient or is not adhering to the guidelines set forth in the applicable regulations; recommending that the Service require the attending veterinarian to have two years of experience with marine mammals over a five-year period; recommending that the Service clarify what constitutes adequate training for dolphins in swim programs; recommending that the Service allow only controlled swims, as defined in the 1994 National Marine Fisheries Service-sponsored report; and recommending that the term "dangerous or harmful behavior" be defined and that aggressive contact that results in human injury be considered cause for removing a dolphin permanently from a swim program.
21 March	Commerce, commenting to the National Marine Fisheries Service on the revised draft of the National Contingency Plan for Response to Unusual Marine Mammal Mortality Events; suggesting additional points that should be recognized and addressed in the plan and an alternative format for the plan.
22 March	Commerce, modification of scientific research permit, Brent Stewart.
24 March	Commerce modification of scientific research permit, Bruce R. Mate and Randall W. Davis.
29 March	Commerce, modification of scientific research permit, Norihisa Baba.
29 March	Commerce, modification of scientific research permit, Fred A. Sharpe.
29 March	Commerce, modification of scientific research permit, John Calambokidis.
29 March	Commerce, modification of scientific research permit, Craig O. Matkin
4 April	Commerce, scientific research permit, Graham A.J. Worthy and Alan Abend.
4 April	Commerce, scientific research permit, Graham A.J. Worthy and Lisl K.M. Shoda.
4 April	Commerce, modification of scientific research permit, Alaska Department of Fish and Game.
10 April	Commerce, recommending approval of the transfer of a captive marine mammal from the U.S. Navy, San Diego, California, to ZooQuarium, Yarmouth, Massachusetts.

13 April	Interior, commenting to the Minerals Management Service on the draft environmental impact statement for the Cook Inlet planning area oil and gas lease sale #149; recommending, among other things, that (1) the statement more fully describe what is being or will be done to meet the monitoring requirements of section 20 of the Outer Continental Shelf Lands Act and to ensure that lessees are aware of the Marine Mammal Protection Act's general moratorium on taking marine mammals and of the Act's provisions to obtain a small-take exemption or waiver of the Act's moratorium on taking marine mammals, (2) the Service revise the statement to ensure that it incorporates the best available information on the natural history, size, status, and sources and levels of human-related mortality of the marine mammal stocks that could potentially be affected by the proposed action, and (3) the statement be expanded to provide a more thorough assessment of how the proposed action, by itself and in combination with other sources of human-caused mortality, injury, and habitat degradation, might affect the marine mammal populations in Cook Inlet.
14 April	Commerce, scientific research permit, Bradford E. Brown.
14 April	Commerce, modification of scientific research permit, Sherman C. Jones, III.
14 April	Commerce, modification of scientific research permit, Robin Brown.
18 April	Commerce, scientific research permit, Michael A. Castellini.
18 April	Commerce, scientific research permit, National Marine Mammal Laboratory.
18 April	Commerce, public display permit, Emil Popescu.
18 April	Commerce, modification of scientific research permit, Southwest Fisheries Science Center.
18 April	Commerce, modification of scientific research permit, Southwest Fisheries Science Center.
18 April	Interior, public display permit, The Seattle Aquarium.
1 May	Commerce, scientific research permit, Mason Weinrich.
15 May	Commerce, scientific research permit, Continental Shelf Associates, Inc.
16 May	Interior, commenting to the Fish and Wildlife Service on the draft habitat conservation strategy for polar bears in Alaska; recommending that the strategy be revised to provide a clearer, more accurate description of the relevant provisions of the Marine Mammal Protection Act and the 1973 Agreement on the Conservation of Polar Bears; and suggesting that the Service advise the Minerals Management Service that (1) environmental impact statements regarding proposed oil and gas lease sales in the Beaufort and Chukchi Seas should explicitly consider how exploration and development activities might affect important habitat areas described in the strategy, (2) prior to completing environmental impact statements, the Minerals Management Service consult with the Fish and Wildlife Service to determine measures that should be taken to prevent degradation or destruction of important polar bear habitat areas or other adverse effects on polar bears, (3) Wrangel Island is an important polar bear denning area and that a simultaneous lease offering would be contrary to the provisions of the 1973 Agreement on the Conservation of Polar Bears if subsequent exploration or development activities would affect denning sites or the bears' access to and use of denning sites on the island.
19 May	Commerce, scientific research permit, Alaska Department of Fish and Game.
25 May	Interior, scientific research permit, National Biological Service.

25 May	Commerce, modification of scientific research permit, National Marine Mammal Laboratory.
13 June	Commerce, scientific research permit, National Marine Mammal Laboratory.
14 June	Agriculture, conveying to the Animal and Plant Health Inspection Service copies of test results from water samples from Sugarloaf Dolphin Sanctuary's lagoon and its adjacent waters; recommending that the Service take steps to ensure that the animals are examined and cared for by an experienced veterinarian, and that, if the animals are to be transferred from the sanctuary, they be examined prior to transfer.
14 June	Commerce, commenting to the National Marine Fisheries Service regarding Lockheed Environmental Systems and Technologies Company's request for authority under section 101(a)(5)(D) of the Marine Mammal Protection Act to harass small numbers of harbor seals in the vicinity of Vandenberg Air Force Base, California, incidental to launches of Lockheed's launch vehicles; noting that many marine mammal species other than harbor seals occur in the area, and recommending that the Service consult with the applicant to determine whether additional species should be included in the request; noting that the applicant or the Service should provide a rationale for the conclusion that only "small numbers" of seals will be taken; and suggesting that the Service advise Lockheed that if a taking other than by harassment (*e.g.*, a mortality) occurs, it would not be covered by the authorization and the taking would constitute a violation of the Act.
15 June	Commerce, modification of scientific research permit, Daniel P. Costa and Michael Goebel.
15 June	Commerce, modification of scientific research permit, Northeast Fisheries Science Center.
20 June	Defense, commenting to the U.S. Army Corps of Engineers on the draft project modification report and environmental assessment for altering 20 water control structures in central and southern Florida; commending the Corps for its efforts to develop and implement technology to protect endangered West Indian manatees; and recommending that the Corps adopt a flexible approach in implementing its proposed plan so that construction schedules may be altered if experience gained as new devices come on line should indicate that additional technical modifications are warranted.
23 June	Commerce, scientific research permit, University of Hawaii/Manoa.
30 June	Commerce, scientific research permit, Scripps Institution of Oceanography.
7 July	Commerce, modification of scientific research permit, Bruce R. Mate.
10 July	Commerce, modification of scientific research permit, S. Jonathan Stern.
11 July	Commerce, scientific research permit, Donald B. Siniff.
11 July	Commerce, modification of scientific research permit, National Marine Mammal Laboratory.
11 July	Commerce, modification of scientific research permit, Janice Straley.
11 July	Commerce, modification of scientific research permit, Northwest and Alaska Fisheries Science Center.
13 July	Commerce, modification of scientific research permit, Fred Sharpe.
13 July	Commerce, scientific research permit, Scripps Institution of Oceanography.

14 July	Interior, commenting to the Minerals Management Service on the draft environmental impact statement for the Gulf of Mexico oil and gas lease sales #157 and #161, central and western planning areas; recommending, among other things, that the critical uncertainties, research needs, and recommendations identified by the August 1989 workshop on sea turtles and marine mammals of the Gulf of Mexico be considered and incorporated, as appropriate, into the statement; recommending that, if it has not already done so, the Service consult with the National Marine Fisheries Service and the Fish and Wildlife Service to (a) obtain the best available information on the distribution, abundance, relative population discreteness, diet, and important calving/breeding/feeding areas (and related uncertainties) of sperm whales, West Indian manatees, bottlenose dolphins, spotted dolphins, and other marine mammals known or thought to occur commonly in the northern Gulf of Mexico, and (b) ascertain the types of site-specific and population monitoring programs needed to verify that marine mammals and their habitats are not adversely affected by offshore oil and gas activities in the northern Gulf of Mexico.
18 July	Commerce, scientific research permit, National Marine Mammal Laboratory.
19 July	Commerce, scientific research permit, James T. Harvey.
25 July	Commerce, modification of scientific research permit, National Marine Mammal Laboratory.
27 July	Interior, commenting to the Minerals Management Service on the call for information regarding gas and oil lease sales #166 in the central and #168 in the western Gulf of Mexico planning areas; noting that the Environmental Impact Statement should identify and assess the possible cumulative effects on the various marine mammal species and populations of (a) unusual high mortality events, (b) incidental take in fisheries, (c) oil and gas exploration and development in other parts of the northern Gulf, and (d) other human activities that may be affecting the various species and populations of marine mammals throughout their ranges; and recommending that the Service, if it has not already done so, consult with the National Marine Fisheries Service and the Fish and Wildlife Service to identify long-term monitoring programs that may be necessary or desirable to ensure that oil and gas exploration and development do not disadvantage marine mammals.
27 July	Commerce, modification of scientific research permit, Southwest Fisheries Science Center.
27 July	Commerce, modification of scientific research permit, Southwest Fisheries Science Center.
31 July	Commerce, commenting to the National Marine Fisheries Service regarding a proposal to expand a commercial salt operation in the El Vizcaino Biosphere Reserve, Mexico, a principal calving/breeding area for the eastern Pacific gray whale population; recommending that the Service (1) do everything possible to assist the Mexican Government's review of the possible environmental impacts of the proposed expansion of the commercial salt operation, and (2) give the highest possible priority within its gray whale research program to identifying and determining how to prevent or mitigate threats to essential gray whale habitats in Baja California.
1 August	Commerce, modification of scientific research permit, National Marine Mammal Laboratory.
4 August	Commerce, commenting to the National Marine Fisheries Service regarding the Hawaiian monk seal recovery program; recommending that the Service (1) if it has not already done so, take immediate steps to provide veterinary and data management expertise to the program through its cooperative university program, (2) retain the current recovery team leader's position within the program and, if it has not already done so, immediately initiate a search for a replacement, (3) prepare a long-term rehabilitation and release plan similar to that completed in 1987 to address the adult male "mobbing" problem, (4) proceed with efforts to work with the Navy on plans to begin a Midway Islands monk seal restoration project in 1996, (5) suspend lobster fishing around French Frigate Shoals so that, if the

regional lobster fishery reopens, potentially important prey resources for young seals at this site will not be reduced, and (6) establish a Hawaiian monk seal implementation team to periodically review and evaluate progress on ongoing activities and agency contributions to the recovery program; and recommending that the Service increase its efforts to apply foundation funding and university expertise to address priority research needs in the recovery program.

4 August — Defense, commenting to the Navy regarding its role in the recovery of the endangered Hawaiian monk seal; commending the Navy for its cooperation with other Federal and state agencies and for its contribution to the National Marine Fisheries Service's Midway Islands Monk Seal Restoration Program; and further commending the Navy for its role in the cleanup of the Midway Islands.

4 August — Defense, commending the Coast Guard for its role in the recovery of the endangered Hawaiian monk seal, including the cleanup of Kure Atoll and the Midway Islands.

4 August — Interior, commenting to the Fish and Wildlife Service regarding its role in the recovery of the endangered Hawaiian monk seal; recommending that the Service continue to seek the transfer of ownership of the Midway Islands from the Navy to the Service for its use as a National Wildlife Refuge; and recommending that the Service, in consultation with the Navy, the National Marine Fisheries Service, and other relevant parties, immediately review all possible funding and construction options for the restoration of the deteriorating sea wall at Tern Island, French Frigate Shoals, and proceed with restoration as soon as possible.

14 August — New England Fishery Management Council, commenting on the results of recent field tests to determine the potential effectiveness of acoustic alarms in reducing the incidental take of harbor porpoises in gillnets; suggesting that the Council consider (1) expanding the three existing seasonal gillnet closures established in 1994 to better bracket the months and areas in which available observer data indicate most incidental take of harbor porpoises has occurred, and (2) establishing controlled fishing opportunities within those areas based on a sampling design to further test the effectiveness of acoustic alarms.

15 August — Commerce, commenting to the National Marine Fisheries Service on a proposed rule to implement the new regime to govern the taking of marine mammals incidental to commercial fishing operations; recommending that the fishery categorization system adopted by the Service under section 118 of the Marine Mammal Protection Act be made more flexible, not only by considering the number of mortalities and serious injuries relative to a stock's potential biological removal level, but also by including some of the elements of the categorization system under the interim exemption (section 114) that look at the number of mortalities and serious injuries per vessel-day; noting that the proposed rule does not appear to include a reliable means for estimating fishing effort, and recommending that the Service, in the final rule, explain how it will obtain reliable effort data for the fisheries; recommending that the Service either (a) expand the reporting provisions to require the submission of information sufficient to enable it to determine whether or not a marine mammal injury is serious, or (b) otherwise adopt a mechanism to determine what proportion of reported injuries will be considered to be serious; further recommending that the Service pursue cooperative agreements with representatives of Native American tribes to obtain reliable incidental take data from tribal fisheries; further recommending that the Service consider ways in which it can tailor its monitoring and reporting programs to obtain data on the age, sex, and reproductive condition, as well as the numbers, of marine mammals that are killed or injured incidental to commercial fishing operations; and recommending that, before authorizing the take of endangered or threatened marine mammals incidental to commercial fishing operations, the Service publish for public review and comment a separate *Federal Register* notice that clearly describes the stocks and fisheries for which it proposes to make a negligibility finding, and that clearly explains the basis for the proposed determinations.

17 August — Interior, scientific research permit, National Biological Service.

18 August	Commerce, scientific research permit, Children's Museum, Canadian Museum of Civilization.
24 August	Interior, commenting to the Superintendent of Glacier Bay National Park and Preserve on the vessel management plan and environmental assessment; concurring with the conclusion that the proposed action is not likely to jeopardize the continued existence of humpback whales or Steller sea lions, and with the National Marine Fisheries Service's recommendations that monitoring be continued to document the number, individual identity, reproductive status, and length of residence of humpback whales in the bay, and that studies be done to document the distribution, abundance, and movement patterns of humpback whales within the park and in adjacent areas; and recommending that the National Park Service, if it has not already done so, consult with the National Marine Fisheries Service and the cruise ship industry to determine (a) the monitoring program or programs that would be required to detect and determine causes of any significant declines in the use of Park waters by humpback whales, (b) the funding, personnel, special equipment, and logistic support that would be required to carry out the necessary monitoring programs(s), and (c) possible alternative means for funding the required program(s).
30 August	Commerce, commenting to the National Marine Fisheries Service on proposed regulations and guidelines for the deterrence of marine mammals under section 101(a)(4) of the Marine Mammal Protection Act; noting that the proposed regulations do little to clarify some of the uncertainties inherent in the statute; requesting that the Service provide more precise guidance on what it would consider to be a "serious injury" to a marine mammal; and noting concern about the proposed allowing of unrestricted use of noisemakers as deterrence measures.
31 August	Commerce, scientific research permit, Adam Frankel.
31 August	Commerce, public display permit, Oregon Coast Aquarium.
13 September	Commerce, modification of scientific research permit, Dena Matkin.
13 September	Commerce, modification of scientific research permit, University of Hawaii.
13 September	Commerce, modification of scientific research permit, Institute of Marine Science, University of California, Santa Cruz.
13 September	Commerce, modification of scientific research permit, Northwest and Alaska Fisheries Science Center.
5 October	Agriculture, commenting to the Animal and Plant Health Inspection Service, recommending that the Service invite the Fish and Wildlife Service to participate in the negotiated rulemaking process; and recommending that the Service expedite publication of the final report from the water quality workshop and the final rule governing the swim-with-the-dolphin programs so they can be factored into the rulemaking process.
10 October	Commerce, commenting to the National Marine Fisheries Service on the New England Fishery Management Council's draft proposals for amendment #7 to the Northeast Multispecies Fishery Management Plan; noting that amendment 7 does not address the adequacy of harbor porpoise bycatch reduction measures under amendment 5; requesting information on the Service's schedule for analysis of 1994 and 1995 harbor porpoise bycatch data, and the Service's plans to identify and evaluate appropriate changes in area closures to reduce harbor porpoise bycatch; and requesting, among other things, information on the status of (a) the establishment of a harbor porpoise take reduction team, and (b) the final decision on the Service's 1993 proposal to designate harbor porpoises as threatened under the Endangered Species Act.
11 October	Commerce, modification of scientific research permit, Dan R. Salden.

11 October Commerce, modification of scientific research permit, Marsha Green.

11 October Commerce, modification of scientific research permit, Richard Coleman.

19 October Commerce, scientific research permit, Brent S. Stewart.

20 October Commerce, scientific research permit, Whale Conservation Institute.

27 October Commerce, modification of scientific research permit, Frank Cipriano.

9 November Interior, commenting to the Fish and Wildlife Service on proposed regulations to authorize the importation of polar bear trophies from Canada under section 104(c)(5)(A) of the Marine Mammal Protection Act; suggesting that the Service's position could be strengthened considerably by, among other things, incorporating the following clarifications: (1) indicate whether or not the Service concurs with Canada's interpretation of Article III.1.(d) and explain whether this exception is limited to taking by local people or whether it would include taking by non-nationals, (2) provide more information on how aircraft are used in the hunting of polar bears and better explain the rationale for its view that such use is consistent with the Agreement on the Conservation of Polar Bears, (3) provide additional justification for the determination that the 12 management units used by Canada constitute separate population stocks as defined in the Act, and (4) add to the final rule that no import permits be issued for polar bears taken from populations for which the hunting season begins prior to 1 December.

20 November Commerce, modification of scientific research permit, Hiroyuki Suganuma.

20 November Interior, commenting to the Minerals Management Service regarding the Draft Environmental Impact Statement for the Beaufort Sea Planning Area Oil and Gas Lease Sale #144; recommending that the statement be expanded to more fully describe what is being or will be done to meet the monitoring requirements of section 20 of the Outer Continental Shelf Lands Act and to ensure that lessees are aware of the Marine Mammal Protection Act's general moratorium on taking marine mammals and the Act's provisions for obtaining a small-take exemption or waiver of the Act's moratorium on taking marine mammals; recommending that the Service, if it has not already done so, obtain and use the stock assessment reports for marine mammal species and populations that occur in and near the Beaufort Sea planning area to help ensure that the environmental impact statement (1) incorporates the best available information on the natural history, size, status, and sources and levels of human-related mortality of the stocks that potentially could be affected by the proposed action, and (2) describes any uncertainties in this regard and what is being done or planned to resolve them; and recommending that the Service, if it has not already done so, consult with the National Marine Fisheries Service, the Fish and Wildlife Service, the Environmental Protection Agency, the Alaska Department of Fish and Game, and other organizations to obtain the best available information concerning both the direct and indirect effects of the *Exxon Valdez* oil spill on cetaceans and other marine mammals.

22 November State, commenting to the Office of Oceans and Polar Affairs regarding the draft Charter [Declaration] on the Establishment of the Arctic Council forwarded from Canada and the 26 U.S. discussion paper concerning sustainable development; noting that the draft declaration incorporates few of the points raised by the United States during the 6-8 September 1995 meeting of senior Arctic officials; noting that certain provisions indicate that one of the goals of the Arctic Council will be to create wage-paying jobs for Arctic Natives, and thus replace the traditional subsistence economy, and further noting that it is not clear that consideration has been given to the possibility or likelihood that promoting transition from a subsistence to a monetary economy could jeopardize maintenance of the long-established cultures of Arctic indigenous peoples; suggesting that, if it has not been done already, a study should be done to determine whether this transition is what the majority of Arctic Natives want and, if so, how it can be done without unduly affecting long-standing cultural values; and recommending that the position paper on sustainable development be expanded to provide more explicit instruc-

tions to the delegation in order to clarify that the United States must indicate that it cannot agree to a charter or declaration that would commit it to seek amendment of the Marine Mammal Protection Act to allow resumption of commercial sealing and whaling, and which would establish the Arctic Council as the appropriate body for resolving trade and other disputes that arise among Arctic states.

22 November — Defense, commenting to the Navy's Naval Facilities Engineering Command regarding the development of plans to bring its ships into compliance with established provisions for regulating the disposal of garbage from ships; and suggesting that the Navy's Center for Naval Analyses, if it is not already doing so, (a) estimate the range of waste storage needs for different solid waste categories for all types of Navy vessels, taking into account provisioning and processing steps to minimize waste volumes, and (b) identify the best possible way to make available the storage space necessary to handle those volumes on a vessel-by-vessel basis;

28 November — Commerce, permit to take marine mammals for educational/commercial purposes, Michael Kundu.

1 December — Commerce, commenting to the National Marine Fisheries Service regarding the Hawaiian monk seal recovery program; recommending (1) that the Service immediately re-initiate consultation under section 7 of the Endangered Species Act to consider the effect of reopening the lobster fishery in the Northwestern Hawaiian Islands on Hawaiian monk seals at French Frigate Shoals and other colonies, monk seal prey preferences, and the species' distribution and movement at sea, should such an action be proposed, and (2) that all lobster fishing at French Frigate Shoals be suspended until such time as there is sufficient information to indicate that the availability of lobsters and/or local lobster fishing are not contributing to the decline or compromising the potential for recovery of this seal colony; recommending that the Service ensure that the planned scat sampling and telemetry work be supplemented to include sampling of newly weaned pups and yearlings; further recommending that the Service consider the potential use of a new research technique, analysis of fatty acid signatures in seal blubber samples, to resolve uncertainties about monk seal prey species; and recommending that the Service convene a broadly representative implementation team of officials from involved agencies and organizations to improve communication, periodically review recovery program activities and progress, and identify cooperative actions that should be taken to further recovery program objectives.

1 December — Interior, commenting to the Fish and Wildlife Service regarding its role in the Hawaiian monk seal recovery program; recommending that the staff of the Pacific/Remote Island National Wildlife Refuges contact appropriate officials in both the Fish and Wildlife Service and the National Marine Fisheries Service to establish a schedule for meeting the consultation requirements of section 7 of the Endangered Species Act regarding the effect of human activities planned at the Midway Islands under the Service's refuge management program.

6 December — Commerce, scientific research permit, The Burke Museum.

6 December — Commerce, scientific research permit, Pacific Whale Foundation.

7 December — Commerce, modification of scientific research permit, Scott D. Kraus.

8 December — Agriculture, commenting to the Animal and Plant Health Inspection Service regarding the care of captive marine mammals at the Sugarloaf Dolphin Sanctuary, Florida; noting that the facility has not taken the steps necessary to come into compliance with the Animal Welfare Act; recommending that the Animal and Plant Health Inspection Service and the National Marine Fisheries Service immediately undertake consultations to consider action under section 104(c)(2)(D)(i) of the Marine Mammal Protection Act to revoke the applicable permit and seize the dolphins for placement at an alternative facility.

11 December	Interior, commenting to the Fish and Wildlife Service regarding the draft "Principles of Conservation and Management of the Alaska-Chukotka Polar Bear Population"; noting, among other things, that there has been insufficient consultation with the Marine Mammal Commission and others and that it would be appropriate to involve all interested parties; recommending reorganization of the draft with suggested headings and inclusion of language which refers to the intrinsic value of polar bears as a common resource shared by all people.
11 December	Interior, commenting to the Fish and Wildlife Service on the Commission's wish to remain involved in the development and negotiation of a bilateral agreement between the United States and the Russian Federation on the conservation and management of walruses, expressly requesting to be advised as to the drafting schedule for the agreement.
14 December	Commerce, modification of scientific research permit, Bruce R. Mate.
15 December	Interior, public display permit, Point Defiance Zoo.
15 December	Interior, scientific research permit, Denver Zoological Gardens.

APPENDIX B

REPORTS OF COMMISSION-SPONSORED ACTIVITIES AVAILABLE FROM THE NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)[1]

Ainley, D.G., H.R. Huber, R.P. Henderson, and T.J. Lewis. 1977. Studies of marine mammals at the Farallon Islands, California, 1970-1975. Final report for MMC contract MM4AC002. NTIS PB-274 046. 42 pp. (A03)

Ainley, D.G., H.R. Huber, R.P. Henderson, T.J. Lewis, and S.H. Morrell. 1977. Studies of marine mammals at the Farallon Islands, California, 1975-1976. Final report for MMC contract MM5AC020. NTIS PB-266 249. 32 pp. (A03)

Ainley, D.G., H.R. Huber, S.H. Morrell, and R.R. LeValley. 1978. Studies of marine mammals at the Farallon Islands, California, 1976-1977. Final report for MMC contract MM6AC027. NTIS PB-286 603. 44 pp. (A03)

Allen, S.G. 1991. Harbor seal habitat restoration at Strawberry Spit, San Francisco Bay. Final report for MMC contract MM2910890-9. NTIS PB91-212332. 44 pp. (A03)

Allen, S.G., D.G. Ainley, and G.W. Page. 1980. Haul out patterns of harbor seals in Bolinas Lagoon, California. Final report for MMC contract MM8AC012. NTIS PB80-176910. 31 pp. (A03)

Anderson, D.M., and A.W. White. 1989. Toxic dinoflagellates and marine mammal mortality: Proceedings of an expert consultation held at Woods Hole Oceanographic Institution. Final report for MMC contract T6810848-1. NTIS PB90-160755. 71 pp. (A04)

Baker, C.S., J.M. Straley, and A. Perry. 1990. Population characteristics of humpback whales in southeastern Alaska: summer and late-season, 1986. Final report for MMC contract MM3309822-5. NTIS PB90-252487. 23 pp. (A03)

Balcomb, K.C., J.R. Boran, R.W. Osborne, and N.J. Haenel. 1980. Observations of killer whales (*Orcinus orca*) in greater Puget Sound, State of Washington. Final report for MMC contract MM1300731-7. NTIS PB80-224728. 42 pp. (A03)

Baur, D.C. 1995. Reconciling the legal mechanisms to protect and manage polar bears under United States laws and the international agreement for the conservation of polar bears. Final report for MMC contract T94071388. NTIS PB95-272092. 103 pp. (A07)

Bean, M.J. 1984. United States and international authorities applicable to entanglement of marine mammals and other organisms in lost or discarded fishing gear and other debris. Final report for MMC contract MM2629994-7. NTIS PB85-160471. 56 pp. (A04)

Beddington, J.R., and H.A. Williams. 1980. The status and management of the harp seal in the north-west Atlantic. A review and evaluation. Final report for MMC contract MM1301062-1. NTIS PB80-206105. 127 pp. (A07)

Bengtson, J.L. 1978. Review of information regarding the conservation of living resources of the Antarctic marine ecosystem. Final report for MMC contract MM8AD055. NTIS PB-289 496. 148 pp. (A08)

Bishop, J.B. 1985. Summary report of gill and trammel net (set-net) observations in the vicinity of Morro Bay, California, 1 November 1983 - 31 August 1984. Final report for MMC contract MM2629900-2. NTIS PB85-150076. 14 pp. (A02)

Bockstoce, J. 1978. A preliminary estimate of the reduction of the western Arctic bowhead whale (*Balaena mysticetus*) population by the pelagic whaling industry: 1848-1915. Final report for MMC contract MM7AD111. NTIS PB-286 797. 32 pp. (A08)

Brownell, R.L., Jr., C. Schonewald, and R.R. Reeves. 1978. Preliminary report on world catches of marine mammals 1966-1975. Final report for MMC contract MM6AC002. NTIS PB-290 713. 353 pp. (A16)

Buckland, S.T., and K.L. Cattanach. 1990. Review of current population abundance estimates of small cetaceans in the Black Sea. Final report for MMC contract T75133135. NTIS PB91-137257. 5 pp. (A02)

Carr, T. 1994. The manatees and dolphins of the Miskito Coast Protected Area, Nicaragua. Final report for MMC contract T94070376. NTIS PB94-170354. 19 pp. (A03)

Chapman, D.G., L.L. Eberhardt, and J.R. Gilbert. 1977. A review of marine mammal census methods. Final report for MMC contract MM4AC014. NTIS PB-265 547. 55 pp. (A04)

Contos, S.M. 1982. Workshop on marine mammal-fisheries interactions. Final report for MMC contract MM207934-1-0. NTIS PB82-189507. 64 pp. (A04)

Cornell, L.H., E.D. Asper, K.N. Osborn, and M.J. White, Jr. 1979. Investigations on cryogenic marking procedures for marine mammals. Final report for MMC contract MM6AC003. NTIS PB 291 570. 24 pp. (A03)

Dayton, P.K., B.D. Keller, and D.A. Ven Tresca. 1980. Studies of a nearshore community inhabited by sea otters.

[1] **Price codes for printed reports (including postage) are shown in parentheses at the end of each citation. The key to the codes and ordering information can be found at the end of Appendix B.**

Final report for MMC contracts MM6AC026 and MM13-00702-9. NTIS PB81-109860. 91 pp. (A06)
DeBeer, J. 1980. Cooperative dedicated vessel research program on the tuna-porpoise problem: overview and final report. Final report for MMC contract MM8AC006. NTIS PB80-150097. 43 pp. (A03)
Dedina, S., and E. Young. 1995. Conservation and development in the gray whale lagoons of Baja California Sur, Mexico. Final report for MMC contract T10155592. NTIS PB96-113154. 56 pp. (A04)
Dohl, T.P. 1981. Remote laser branding of marine mammals. Final report for MMC contract MM4AC011. NTIS PB81-213449. 34 pp. (A03)
Dowling, T.E., and W.M. Brown. 1992. Population structure of the Atlantic bottlenose dolphin as determined by restriction endonuclease analysis of mitochondrial DNA. Final report for MMC contract MM3309818-6. NTIS PB93-128411. 46 pp. (A03)
Erickson, A.W. 1978. Population studies of killer whales (*Orcinus orca*) in the Pacific Northwest: a radio-marking and tracking study of killer whales. Final report for MMC contract MM5AC012. NTIS PB-285 615. 34 pp. (A03)
Fay, F.H., H.M. Feder, and S.W. Stoker. 1977. An estimation of the impact of the Pacific walrus population on its food resources in the Bering Sea. Final report for MMC contracts MM4AC006 and MM5AC024. NTIS PB-273 505. 38 pp. (A03)
Fay, F.H., B.P. Kelly, and B.A. Fay (eds). 1990. The ecology and management of walrus populations -- report of an international workshop. Final report for MMC contract T68108850. NTIS PB91-100479. 186 pp. (A09)
Forestell, P.H. 1989. Assessment and verification of abundance estimates, seasonal trends, and population characteristics of the humpback whale in Hawaii. Final report for MMC contract MM2911014-6. NTIS PB90-190273. 66 pp. (A04)
Foster, M.A. 1981. Identification of ongoing and planned fisheries in the Northwestern Hawaiian Islands. Final report for MMC contract MM1801069-7. NTIS PB81-207 516. 90 pp. (A05)
Foster, M.S., C.R. Agegian, R.K. Cowen, R.F. Van Wagenen, D.K. Rose, and A.C. Hurley. 1979. Toward an understanding of the effects of sea otter foraging on kelp forest communities in central California. Final report for MMC contract MM7AC023. NTIS PB-293 891. 60 pp. (A04)
Fowler, C.W., W.T. Bunderson, M.B. Cherry, R.J. Ryel, and B.B. Steele. 1980. Comparative population dynamics of large mammals: a search for management criteria. Final report for MMC contract MM7AC013. NTIS PB80-178 627. 330 pp. (A15)
Fowler, C.W., R.J. Ryel, and L.J. Nelson. 1982. Sperm whale population analysis. Final report for MMC contract MM8AC009. NTIS PB82-174335. 35 pp. (A03)
Fox, W.W., Jr., *et al.* 1990. Statement of concerned scientists on the reauthorization of the Magnuson Fishery Conservation and Management Act. NTIS PB91-127647. 6 pp. (A02)
Fraker, M.A. 1994. California sea lions and steelhead trout at the Chittenden Locks, Seattle, Washington. Final report for MMC contract T10156766. NTIS PB94-188059. 42 pp. (A05)
Freeman. J., and H. Quintero. 1990. The distribution of West Indian manatees (*Trichechus manatus*) in Puerto Rico: 1988-1989. Final report for MMC contract T5360348-3. NTIS PB91-137240. 38 pp. (A03)
Gaines, S.E., and D. Schmidt. 1978. Laws and treaties of the United States relevant to marine mammal protection policy. Final report for MMC contract MM5AC029. NTIS PB-281 024. 668 pp. (A99)
Gard, R. 1978. Aerial census, behavior, and population dynamics study of gray whales in Mexico during the 1974-75 calving and mating season. Final report for MMC contract MM5AC006. NTIS PB-275 295. 18 pp. (A02)
Gard, R. 1978. Aerial census and population dynamics study of gray whales in Baja California during the 1976 calving and mating season. Final report for MMC contract MM6AC014. NTIS PB-275 297. 20 pp. (A03)
Geraci, J.R., and D.J. St. Aubin. 1979. Biology of marine mammals: insights through strandings. Final report for MMC contract MM7AC020. NTIS PB-293 890. 343 pp. (A16)
Geraci, J.R., S.A. Testaverde, D.J. St. Aubin, and T.H. Loop. 1978. A mass stranding of the Atlantic white-sided dolphin, *Lagenorhynchus acutus*: a study into pathobiology and life history. Final report for MMC contract MM5AC008. NTIS PB-289 361. 141 pp. (A08)
Gerrodette, T. 1983. Review of the California sea otter salvage program. Final report for MMC contract MM2629677-5. NTIS PB83-262949. 23 pp. (A03)
Gilbert, J.R., V.R. Schurman, and D.T. Richardson. 1979. Grey seals in New England: present status and management alternatives. Final report for MMC contract MM7AC002. NTIS PB-295 599. 40 pp. (A03)
Glockner-Ferrari, D.A., and M.J. Ferrari. 1985. Individual identification, behavior, reproduction, and distribution of humpback whales, *Megaptera novaeangliae*, in Hawaii. Final report for MMC contract MM262975-5. NTIS PB85-200772. 36 pp. (A03)
Gold, J. 1981. Marine mammals: a selected bibliography. Final report for MMC contract MM1801254-3. NTIS PB 82-104282. 91 pp. (A05)
Gonsalves, J.T. 1977. Improved method and device to prevent porpoise mortality: application of polyvinyl panels to purse seine nets. Final report for MMC contract MM6AC007. NTIS PB-274 088. 28 pp. (A03)
Goodman, D. 1978. Management implications of the mathematical demography of long lived animals. Final report for MMC contract MM8AD008. NTIS PB-289 678. 80 pp. (A05)
Green, K.A. 1977. Antarctic marine ecosystem modeling revised Ross Sea model, general Southern Ocean budget, and seal model. Final report for MMC contract MM6AC032. NTIS PB-270 375. 111 pp. (A06)
Green-Hammond, K.A. 1980. Fisheries management under the Fishery Conservation and Management Act, the Marine Mammal Protection Act, and the Endangered Species Act. Final report for MMC contract MM1300885-3. NTIS PB80-180 599. 186 pp. (A09)
Green-Hammond, K.A. 1981. Requirements for effective implementation of the Convention on the Conservation of Antarctic Marine Living Resources. Final report for MMC contract MM2079173-9. NTIS PB82-123571. 36 pp. (A03)
Green-Hammond, K.A. 1982. Environmental aspects of potential petroleum exploration and exploitation in Antarctica: forecasting and evaluating risks. Final report for MMC contract MM2079173-9. NTIS PB82-169772. 28 pp. (A03)
Green-Hammond, K.A., D.G. Ainley, D.B. Siniff, and N.S. Urquhart. 1983. Selection criteria and monitoring requirements for indirect indicators of changes in the availability of Antarctic krill applied to some pinniped and seabird information. Final report for MMC contract MM2324753-6. NTIS PB83-263 293. 37 pp. (A03)
Hain, J.H.W. 1992. Airships for marine mammal research: evaluation and recommendations. Final report for MMC contract T68108863. NTIS PB92-128271. 37 pp. (A03)
Hain, J.H.W., S.L. Ellis, and P.E. Seward. 1994. Characterization of vessel traffic at the St. Johns and St. Marys channel entrances, northeast Florida, January 1993. Final

report for MMC contract T94070460. NTIS PB94-204229. 56 pp. (A04)

Hatfield, B.B. 1991. Summary report of observations of coastal gill and trammel net fisheries in central California - October 1, 1984 - March 31, 1985. Final report for MMC contract MM2910891-2. NTIS PB91-191908. 17 pp. (A03)

Heneman, B., and Center for Environmental Education. 1988. Persistent marine debris in the North Sea, northwest Atlantic Ocean, wider Caribbean area, and the west coast of Baja California. Final report for MMC contract MM3309598-5. NTIS PB89-109938. 161 pp. (A08)

Henry, M.E. 1987. Observations of gill and trammel net fishing activity between Pt. Buchon and Pt. Sur, California, June-October 1985. Final report for MMC contract MM3309511-8. NTIS PB87-184024. 30 pp. (A03)

Herman, L.M., P.H. Forestell, and R.C. Antinoja. 1980. The 1976/77 migration of humpback whales into Hawaiian waters: composite description. Final report for MMC contracts MM7AC014 and MM1300907-2. NTIS PB80-162 332. 55 pp. (A04)

Hofman, R.J. (ed). 1979. A workshop to identify new research that might contribute to the solution of the tuna-porpoise problem. Proceedings of a Marine Mammal Commission-sponsored workshop held on 8-9 December 1975 at the University of California, Santa Cruz. NTIS PB-290 158. 17 pp. (A02)

Hofman, R.J. 1982. Identification and assessment of possible alternative methods for catching yellowfin tuna. NTIS PB83-138 993. 243 pp. (A11)

Hofman, R.J. (ed). 1985. Workshop to assess methods for regulating the distribution and movements of sea otters. Report of a Marine Mammal Commission-sponsored workshop held 25-26 October 1984 in San Francisco, California. NTIS PB85-229250. 39 pp. (A03)

Hoover-Miller, A. 1992. Assessment of the possible use of a cooperative/coordinated geographic information system (GIS) to facilitate access to, and integration and analysis of, data bearing upon the conservation of marine mammals in Alaska. Final report for MMC contract T75136297. NTIS PB93-128429. 59 pp. (A04)

Hoover-Miller, A.A. 1994. Harbor seal (*Phoca vitulina*) biology and management in Alaska. Final report for MMC contract T75134749. NTIS PB95-166195. 45 pp. (A03)

Hoover-Miller, A. 1995. Report of the workshop on enhancing methods for locating, accessing, and integrating population and environmental data related to marine resources in Alaska. Final report for MMC contract T10155550. NTIS PB95-199097. 93 pp. (A06)

Huber, H.R., D.G. Ainley, R.J. Boekelheide, R.P. Henderson, and B. Bainbridge. 1981. Studies of marine mammals at the Farallon Islands, California, 1979-1980. Final report for MMC contract MM1533599-3. NTIS PB81-167082. 51 pp. (A04)

Huber, H.R., D.G. Ainley, S.H. Morrell, R.J. Boekelheide, and R.P. Henderson. 1980. Studies of marine mammals at the Farallon Islands, California, 1978-1979. Final report for MMC contract MM1300888-2. NTIS PB80-178197. 46 pp. (A04)

Huber, H.R., D.G. Ainley, S.H. Morrell, R.R. LeValley, and C.S. Strong. 1979. Studies of marine mammals at the Farallon Islands, California, 1977-1978. Final report for MMC contract MM7AC025. NTIS PB80-111602. 50 pp. (A04)

Hui, C.A. 1978. Reliability of using dentin layers for age determination in *Tursiops truncatus*. Final report for MMC contract MM7AC021. NTIS PB-288444. 25 pp. (A03)

Irvine, A.B., M.D. Scott, R.S. Wells, J.H. Kaufmann, and W.E. Evans. 1979. A study of the activities and movements of the Atlantic bottlenosed dolphin, *Tursiops truncatus*, including an evaluation of tagging techniques. Final report for MMC contracts MM4AC004 and MM5AC018. NTIS PB-298 042. 54 pp. (A04)

Jameson, G.L. 1986. Trial systematic salvage of beach-cast sea otter, *Enhydra lutris*, carcasses in the central and southern portion of the sea otter range in California: one year summary of results: October 1983-September 1984. Final report for MMC contract MM2629849-8. NTIS PB87-108288. 60 pp. (A04)

Jefferson, T.A., and B.E. Curry. 1994. Review and evaluation of potential acoustic methods of reducing or eliminating marine mammal-fishery interactions. Final report for MMC contract T10155628. NTIS PB95-100384. 59 pp. (A05)

Jeffries, S.J. 1986. Seasonal movement and population trends of harbor seals (*Phoca vitulina richardsi*) in the Columbia River and adjacent waters of Washington and Oregon, 1976-1982. Final report for MMC contract MM2079357-5. NTIS PB86-200243. 41 pp. (A03)

Jeffries, S.J., and M.L. Johnson. 1990. Population status and condition of the harbor seal, *Phoca vitulina richardsi*, in the waters of the State of Washington: 1975-1980. Final report for MMC contract MM7AC030. NTIS PB90-219197. 70 pp. (A05)

Johnson, B.W., and P.A. Johnson. 1978. The Hawaiian monk seal on Laysan Island: 1977. Final report for MMC contract MM7AC009. NTIS PB-285 428. 38 pp. (A03)

Johnson, B.W., and P.A. Johnson. 1981. Estimating the Hawaiian monk seal population on Laysan Island. Final report for MMC contract MM1533701-4. NTIS PB82-106 113. 29 pp. (A05)

Johnson, B.W., and P.A. Johnson. 1981. The Hawaiian monk seal on Laysan Island: 1978. Final report for MMC contract MM8AC008. NTIS PB82-109661. 17 pp. (A02)

Johnson, M.L., and S.J. Jeffries. 1977. Population evaluation of the harbor seal (*Phoca vitulina richardi*) in the waters of the State of Washington. Final report for MMC contract MM5AC019. NTIS PB-270 376. 27 pp. (A03)

Johnson, M.L., and S.J. Jeffries. 1983. Population biology of the harbor seal (*Phoca vitulina richardsi*) in the waters of the State of Washington: 1976-1977. Final report for MMC contract MM6AC025. NTIS PB83-159715. 53 pp. (A04)

Jones, M.L., and S.L. Swartz. 1986. Demography and phenology of gray whales and evaluation of human activities in Laguna San Ignacio, Baja California Sur, Mexico, 1978-1982. Final report for MMC contract MM2324713-8. NTIS PB86-219078. 69 pp. (A05)

Jones, M.L., S.L. Swartz, and M.E. Dahlheim. 1994. Census of gray whale abundance in San Ignacio lagoon: a follow-up study in response to low whale counts recorded during an acoustic playback study of noise-effects on gray whales. Final report for MMC contract MM2911023-0. NTIS PB94-195062. 32 pp. (A03)

Kasuya, T., and Y. Izumizawa. 1981. The fishery-dolphin conflict in the Iki Island area of Japan. Final report for MMC contract MM1533791-7. NTIS PB81-171357. 31 pp. (A03)

Katona, S.K. 1983. The Gulf of Maine whale sighting network: 1976. Final report for MMC contract MM6AC018. NTIS PB83-151290. 32 pp. (A03)

Katona, S.K., and S. Kraus. 1979. Photographic identification of individual humpback whales (*Megaptera novaeangliae*): evaluation and analysis of the technique. Final

report for MMC contract MM7AC015. NTIS PB-298 740. 29 pp. (A03)

Kooyman, G.L. 1982. Development and testing of a time-depth recorder for marine mammals. Final report for MMC contract MM6AC019. NTIS PB82-257932. 10 pp. (A02)

Kraus, S.D. 1985. A review of the status of right whales (*Eubalaena glacialis*) in the western North Atlantic with a summary of research and management needs. Final report for MMC contract MM2910905-0. NTIS PB86-154143. 61 pp. (A04)

Kraus, S.D., and R.D. Kenney. 1991. Information on right whales (*Eubalaena glacialis*) in three proposed critical habitats in United States waters off the western North Atlantic Ocean. Final report for MMC contracts T75133740 and 75133753. NTIS PB91-194431. 65 pp. (A04)

Lefebvre, L.W., and J.A. Powell. 1990. Manatee grazing impacts on seagrasses in Hobe Sound and Jupiter Sound in southeast Florida during the winter of 1988-89. Final report for MMC contracts T62239152, T68108782. NTIS PB90-271883. 36 pp. (A03)

Lentfer, J.W. (ed). 1988. Selected marine mammals of Alaska: species accounts with research and management recommendations. Final report for MMC contract MM2910798-4. NTIS PB88-178462. 275 pp. (A013)

Lentfer, J.W. 1990. Workshop on measures to assess and mitigate the adverse effects of arctic oil and gas activities on polar bears. Final report. NTIS PB91-127241. 43 pp. (A03)

Loughlin, T. 1978. A telemetric and tagging study of sea otter activities near Monterey, California. Final report for MMC contract MM6AC024. NTIS PB-289 682. 64 pp. (A04)

Marine Mammal Commission. 1974. Annual report of the Marine Mammal Commission, calendar year 1973. Report to Congress. NTIS PB-269 709. 14 pp. (A03)

Marine Mammal Commission. 1975. Annual report of the Marine Mammal Commission, calendar year 1974. Report to Congress. NTIS PB-269 710. 27 pp. (A04)

Marine Mammal Commission. 1976. Annual report of the Marine Mammal Commission, calendar year 1975. Report to Congress. NTIS PB 269-711. 50 pp. (A04)

Marine Mammal Commission. 1977. Annual report of the Marine Mammal Commission, calendar year 1976. Report to Congress. NTIS PB-269 713. 71 pp. (A06)

Marine Mammal Commission. 1978. Annual report of the Marine Mammal Commission, calendar year 1977. Report to Congress. NTIS PB-281 564. 101 pp. (A06)

Marine Mammal Commission. 1979. Annual report of the Marine Mammal Commission, calendar year 1978. Report to Congress. NTIS PB80-106784. 108 pp. (A06)

Marine Mammal Commission. 1980. Humpback whales in Glacier Bay National Monument, Alaska. Final report for an interagency review meeting. NTIS PB80-141 559. 44 pp. (A03)

Marine Mammal Commission. 1981. Annual report of the Marine Mammal Commission, calendar year 1979. Report to Congress. NTIS PB81-247 892. 100 pp. (A06)

Marine Mammal Commission. 1981. Annual report of the Marine Mammal Commission, calendar year 1980. Report to Congress. NTIS PB81-247 884. 114 pp. (A06)

Marine Mammal Commission. 1982. Annual report of the Marine Mammal Commission, calendar year 1981. Report to Congress. NTIS PB82-221 425. 102 pp. (A06)

Marine Mammal Commission. 1982. Report of a meeting to review on-going and planned research concerning humpback whales in Glacier Bay and surrounding waters in southeast Alaska. Final report of an interagency meeting. NTIS PB82-201039. 20 pp. (A02)

Marine Mammal Commission. 1983. Annual report of the Marine Mammal Commission, calendar year 1982. Report to Congress. NTIS PB84-132 216. 106 pp. (A06)

Marine Mammal Commission. 1984. Annual report of the Marine Mammal Commission, calendar year 1983. Report to Congress. NTIS PB84-199 389. 118 pp. (A06)

Marine Mammal Commission. 1986. Habitat protection needs for the subpopulation of West Indian manatees in the Crystal River area of northwest Florida. NTIS PB86-200 250. 46 pp. (A04)

Marine Mammal Commission. 1986. Annual report of the Marine Mammal Commission, calendar year 1985. Report to Congress. NTIS PB86-216 249. 180 pp. (A09)

Marine Mammal Commission. 1987. Annual report of the Marine Mammal Commission, calendar year 1984. Report to Congress. NTIS PB87-209573. 173 pp. (A09)

Marine Mammal Commission. 1987. Annual report of the Marine Mammal Commission, calendar year 1986. Report to Congress. NTIS PB87-154092. 193 pp. (A09)

Marine Mammal Commission. 1988. Annual report of the Marine Mammal Commission, calendar year 1987. Report to Congress. NTIS PB88-168984. 209 pp. (A10)

Marine Mammal Commission. 1989. Preliminary assessment of habitat protection needs for West Indian manatees on the east coast of Florida and Georgia. Final report for MMC contracts T6223950-5, T6223954-7, T6223970-9, and T6224008-6. NTIS PB89-162 002. 120 pp. (A06)

Marine Mammal Commission. 1989. Annual report of the Marine Mammal Commission, calendar year 1988. Report to Congress. NTIS PB89-166 524. 237 pp. (A11)

Marine Mammal Commission. 1990. Annual report of the Marine Mammal Commission, calendar year 1989. Report to Congress. NTIS PB90-196361. 239 pp. (A11)

Marine Mammal Commission. 1991. Annual report of the Marine Mammal Commission, calendar year 1990. Report to Congress. NTIS PB91-164236. 280 pp. (A13)

Marine Mammal Commission. 1992. Annual report of the Marine Mammal Commission, calendar year 1991. Report to Congress. NTIS PB92-139930. 228 pp. (A11)

Marine Mammal Commission. 1993. Annual report of the Marine Mammal Commission, calendar year 1992. Report to Congress. NTIS PB95-154530. 241 pp. (A11)

Marine Mammal Commission. 1994. Annual report of the Marine Mammal Commission, calendar year 1994. Report to Congress. NTIS PB95-173233. 270 pp. (A13)

Marmontel, M., T.J. O'Shea, and S.R. Humphrey. 1990. An evaluation of bone growth-layer counts as an age-determination technique in Florida manatees. Final report for MMC contract T6223918-1. NTIS PB91-103564. 94 pp. (A06)

Mate, B.R. 1977. Aerial censusing of pinnipeds in the eastern Pacific for assessment of population numbers, migratory distributions, rookery stability, breeding effort, and recruitment. Final report for MMC contract MM5AC001. NTIS PB-265 859. 67 pp. (A04)

Mate, B.R. 1980. Workshop on marine mammal-fisheries interactions in the northeastern Pacific. Final report for MMC contract MM8AC003. NTIS PB80-175144. 48 pp. (A04)

Mathiesen, O.A. 1980. Methods for the estimation of krill abundance in the Antarctic. Final report for MMC contract MM7AC032. NTIS PB80-175151. 26 pp. (A03)

Matkin, C.O., and F.H. Fay. 1980. Marine mammal-fishery interactions on the Copper River and in Prince William Sound, Alaska, 1978. Final report for MMC contract MM8AC013. NTIS PB80-159536. 71 pp. (A05)

Matkin, C.O., and E.L. Saulitis. 1994. Killer whale (*Orcinus orca*) biology and management in Alaska. Final report for

MMC contract T75135023. NTIS PB95-166203. 46 pp. (A03)

Mayo, C.A. 1982. Observations of cetaceans: Cape Cod Bay and southern Stellwagen Bank, Massachusetts 1975-1979. Final report for MMC contract MM1800925-5. NTIS PB82-186263. 68 pp. (A05)

Medway, W. 1983. Evaluation of the safety and usefulness of techniques and equipment used to obtain biopsies from free-swimming cetaceans. Final report for MMC contract MM2324809-8. NTIS PB83-263269. 14 pp. (A02)

Miller, L.K. 1978. Energetics of the northern fur seal in relation to climate and food resources of the Bering Sea. Final report for MMC contract MM5AC025. NTIS PB-275 296. 27 pp. (A03)

Montgomery, S. 1986. Workshop on measures to address marine mammal/fisheries interactions in California. Final report for MMC contract MM3309746-2. NTIS PB86-219 060. 123 pp. (A07)

Montgomery, S. 1987. Report on the 24-27 February 1987 workshop to assess possible systems for tracking large cetaceans. Final report for MMC contract MM4465764-2. NTIS PB87-182135. 61 pp. (A04)

Nolan, R.S. 1981. Shark control and the Hawaiian monk seal. Final report for MMC contract MM1801065-5. NTIS PB81-201808. 45 pp. (A03)

Norris, K.S., and J.D. Hall. 1979. Development of techniques for estimating trophic impact of marine mammals. Final report for MMC contract MM4AC013. NTIS PB-290 399. 16 pp. (A02)

Norris, K.S., and R.R. Reeves (eds). 1978. Report on a workshop on problems related to humpback whales (*Megaptera novaeangliae*) in Hawaii. Final report for MMC contract MM7AC018. NTIS PB-280 794. 90 pp. (A05)

Norris, K.S., W.E. Stuntz, and W. Rogers. 1978. The behavior of porpoises and tuna in the eastern tropical Pacific yellowfin tuna fishery: preliminary studies. Final report for MMC contract MM6AC022. NTIS PB-283 970. 86 pp. (A05)

Northridge, S. Environmental mismanagement on the high seas: a retrospective analysis of the squid and tuna driftnet fisheries of the North Pacific. Final report for MMC contract T75136200. NTIS PB95-238945. 76 pp. (A05)

Odell, D.K. 1979. A preliminary study of the ecology and population biology of the bottlenose dolphin in southeast Florida. Final report for MMC contract MM4AC003. NTIS PB-294 336. 26 pp. (A03)

Odell, D.K., and J.E. Reynolds, III. 1980. Abundance of the bottlenose dolphin, *Tursiops truncatus*, on the west coast of Florida. Final report for MMC contract MM5AC026. NTIS PB80-197650. 47 pp. (A04)

Odell, D.K., D.B. Siniff, and G.H. Waring. 1979. *Tursiops truncatus* assessment workshop. Final report for MMC contract MM5AC021. NTIS PB-291 161. 141 pp. (A04)

Packard, J.M. 1982. Potential methods for influencing the movements and distribution of sea otters: assessment of research needs. Final report for MMC contract MM2079342-3. NTIS PB83-109926. 51 pp. (A04)

Payne, R., O. Brazier, E. Dorsey, J. Perkins, V. Rowntree, and A. Titus. 1981. External features in southern right whales (*Eubalaena australis*) and their use in identifying individuals. Final report for MMC contract MM6AC017. NTIS PB81-161093. 77 pp. (A05)

Pitcher, K.W. 1977. Population productivity and food habits of harbor seals in the Prince William Sound-Copper River Delta area, Alaska. Final report for MMC contract MM5AC011. NTIS PB-266 935. 36 pp. (A03)

Pitcher, K.W. 1989. Harbor seal trend count surveys in southern Alaska, 1988. Final report for MMC contract MM4465853-1. NTIS PB90-208828. 17 pp. (A03)

Prescott, J.H., and P.M. Fiorelli. 1980. Review of the harbor porpoise (*Phocoena phocoena*) in the U.S. northwest Atlantic. Final report for MMC contract MM8AC016. NTIS PB80-176928. 64 pp. (A04)

Prescott, J.H., P. Fiorelli, G. Early, and P.J. Boyle. 1990. Marine mammal strandings: the New England Aquarium Stranding Network. Final report for MMC contract MM6AC015. NTIS PB90-259177. 119 pp. (A07)

Prescott, J.H., S.D. Kraus, and J.R. Gilbert. 1980. East Coast/Gulf Coast cetacean and pinniped research workshop. Final report for MMC contract MM1533558-2. NTIS PB80-160 104. 142 pp. (A07)

Ray, G.C., R.V. Salm, and J.A. Dobbin. 1979. Systems analysis mapping: an approach towards identifying critical habitats of marine mammals. Final report for MMC contract MM6AC011. NTIS PB80-111594. 27 pp. (A03)

Reeves, R.R. 1977. Exploitation of harp and hooded seals in the western North Atlantic. Final report for MMC contract MM6AD055. NTIS PB-270 186. 57 pp. (A04)

Reeves, R.R. 1977. The problem of gray whale (*Eschrichtius robustus*) harassment: at the breeding lagoons and during migration. Final report for MMC contract MM6AC021. NTIS PB-272 506 (Spanish translation PB-291 763). 60 pp. (A04)

Reynolds, J.E., III. 1986. Evaluation of the nature and magnitude of interactions between bottlenose dolphins, *Tursiops truncatus*, and fisheries and other human activities in coastal areas of the southeastern United States. Final report for MMC contract MM2910892-5. NTIS PB86-162203. 38 pp. (A03)

Reynolds, J.E., III, and C.J. Gluckman. 1988. Protection of West Indian manatees (*Trichechus manatus*) in Florida. Final report for MMC contract MM4465868-3 and MM3309741-7. NTIS PB88-222922. 85 pp. (A06)

Ridgway, S.H., and K. Benirschke (eds). 1977. Breeding dolphins: present status, suggestions for the future. Final report for MMC contract MM6AC009. NTIS PB-273 673. 308 pp. (A14)

Ridgway, S.H., and W.F. Flanigan, Jr. 1981. An investigation of a potential method for the humane taking of certain whales and seals used for food. Final report for MMC contract MM6AC030. NTIS PB81-161101. 12 pp. (A02)

Risebrough, R.W. 1978. Pollutants in marine mammals: a literature review and recommendations for research. Final report for MMC contract MM7AD035. NTIS PB-290 728. 64 pp. (A04)

Risebrough, R.W. 1989. Accumulation patterns of heavy metals and chlorinated hydrocarbons by sea otters, *Enhydra lutris*, in California. Final report for MMC contract MM2910790-0. NTIS PB89-230551. 51 pp. (A04)

Risebrough, R.W., D. Alcorn, S.G. Allen, V.C. Anderlini, L. Booren, R.L. DeLong, L.E. Fancher, R.E. Jones, S.M. McGinnis, and T.T. Schmidt. 1980. Population biology of harbor seals in San Francisco Bay, California. Final report for MMC contract MM6AC006. NTIS PB81-107963. 67 pp. (A04)

Rough, V. 1995. Gray seals in Nantucket Sound, Massachusetts, winter and spring, 1994. Final report for MMC contract T10155615. NTIS PB95-191391. 28 pp. (A03)

Sawyer-Steffan, J.E., and V.L. Kirby. 1980. A study of serum steroid hormone levels in captive female bottlenose dolphins, their correlation with reproductive status, and their application to ovulation induction in captivity. Final report for MMC contract MM7AC016. NTIS PB80-177 199. 21 pp. (A03)

Schmidly, D.J., and S.H. Shane. 1978. A biological assessment of the cetacean fauna of the Texas coast. Final report for MMC contract MM4AC008. NTIS PB-281 763. 38 pp. (A03)

Scott, G.P., and H.E. Winn. 1980. Comparative evaluation of aerial and shipboard sampling techniques for estimating the abundance of humpback whales (*Megaptera novaeangliae*). Final report for MMC contract MM7AC029. NTIS PB81-109852. 96 pp. (A06)

Shallenberger, E.W. 1981. The status of Hawaiian cetaceans. Final report for MMC contract MM7AC028. NTIS PB82-109398. 79 pp. (A05)

Shane, S.H., and D.J. Schmidly. 1978. The population biology of the Atlantic bottlenose dolphin, *Tursiops truncatus*, in the Aransas Pass area of Texas. Final report for MMC contract MM6AC028. NTIS PB-283 393. 130 pp. (A07)

Silber, G.K., R.S. Wells, and K.S. Norris. 1990. A preliminary assessment of techniques for catching and radio-tagging harbor porpoises. Final report for MMC contract MM33098157. NTIS PB90-239609. 34 pp. (A03)

Smith, T.D., and T. Polacheck. 1979. Uncertainty in estimating historical abundance of porpoise populations. Final report for MMC contract MM7AC006. NTIS PB-296 476. 59 pp. (A04)

Smultea, M.A. 1992. Habitat utilization patterns of humpback whales (*Megaptera novaeangliae*) off the island of Hawaii. Final report for MMC contracts T62239259 and T68109257. NTIS PB92-182484. 79 pp. (A05)

Stoker, S.W. 1977. Report on a subtidal commercial clam fishery proposed for the Bering Sea. Final report for MMC contract MM7AD076. NTIS PB-269 712. 33 pp. (A03)

Stuntz, W.E. 1980. Preliminary investigations of the possible relationship between passive behavior by spotted dolphins, *Stenella attenuata*, and capture stress. Final report for MMC contract MM7AC027. NTIS PB81-111569. 13 pp. (A02)

Swartz, S.L. 1986. A review of the status of gray whales (*Eschrichtius robustus*) with a summary of research and management needs. Proceedings of a Marine Mammal Commission sponsored workshop held on 16-18 October 1985 in Monterey, California. Final report for MMC contract MM2911098-4. NTIS PB87-125035. 30 pp. (A03)

Swartz, S.L., and W.C. Cummings. 1978. Gray whales, *Eschrichtius robustus*, in Laguna San Ignacio, Baja California, Mexico. Final report for MMC contract MM7AC008. NTIS PB-276 319 (Spanish translation PB-288 636). 38 pp. (A03) (A04 Spanish)

Swartz, S.L., and R.J. Hofman. 1991. Marine mammal and habitat monitoring: requirements; principles; needs; and approaches. NTIS PB91-215046. 18 pp. (A03)

Swartz, S.L., and M.L. Jones. 1978. The evaluation of human activities on gray whales, *Eschrichtius robustus*, in Laguna San Ignacio, Baja California, Mexico. Final report for MMC contract MM8AC005. NTIS PB-289 737 (Spanish translation PB-299 598). 34 pp. (A03)

Swartz, S.L., and M.L. Jones. 1980. Gray whales, *Eschrichtius robustus*, during the 1977-1978 and 1978-1979 winter seasons in Laguna San Ignacio, Baja California Sur, Mexico. Final report for MMC contract MM1533497-8. NTIS PB80-202989. 35pp. (A03)

Swartz, S.L., and M.L. Jones. 1981. Demographic studies and habitat assessment of gray whales, *Eschrichtius robustus*, in Laguna San Ignacio, Baja California Sur, Mexico. Final report for MMC contract MM2079219-4. NTIS PB82-123373. 56 pp. (A04)

Swartzman, G.L. 1984. Factors bearing on the present status and future of the eastern Bering Sea fur seal population with special emphasis on the effect of terminating the subadult male harvest on St. Paul Island. Final report for MMC contract MM2629737-6. NTIS PB84-172329. 77 pp. (A05)

Swartzman, G., and R. Haar. 1980. Exploring interactions between fur seal populations and fisheries in the Bering Sea. Final report for MMC contract MM1800969-5. NTIS PB81-133688. 60 pp. (A04)

Swartzman, G.L., and R.J. Hofman. 1991. Uncertainties and research needs regarding the Bering Sea and Antarctic marine ecosystems. Final report for MMC contracts T75133669 and T75134820. NTIS PB91-201731. 111 pp. (A06)

Taylor, L.R. and G. Naftel. 1978. Preliminary investigations of shark predation on the Hawaiian monk seal at Pearl and Hermes Reef and French Frigate Shoals. Final report for MMC contract MM7AC011. NTIS PB-285 626. 34 pp. (A03)

Tinney, R.T., Jr. 1983. Assessment of past, present, and future risks of oil spills in and near the present sea otter range in California. Final report for MMC contract MM2324944-0. NTIS PB83-216069. 208 pp. (A10)

Tinney, R.T., Jr. 1984. Some factors affecting the oil spill risk to sea otters in California. Final report for MMC contract MM2910765-4. NTIS PB85-174035. 68 pp. (A04)

Tinney, R.T., Jr. 1988. Review of information bearing upon the conservation and protection of humpback whales in Hawaii. Final report for MMC contract MM3309689-0. NTIS PB88-195359. 56 pp. (A04)

Townsend, R.T. 1991. Conservation and protection of humpback whales in Hawaii -- an update. Final report for MMC contract T75132495. NTIS PB91-215087. 54 pp. (A04)

Treacy, S.D. 1985. Ingestion of salmonids and gastrointestinal passage in captive harbor seals (*Phoca vitulina*). Final report for MMC contract MM2079357-5. NTIS PB86-200 235. 35 pp. (A03)

Villa Ramírez, B. 1993. Recovery plan for the vaquita, *Phocoena sinus*. Final report for MMC contract T94070800. NTIS PB93-169415. 40 pp. (A03)

Waring, G.H. 1981. Survey of federally-funded marine mammal research and studies FY70-FY79. Final report for MMC contract MM1533588-3. NTIS PB81-174336. 265 pp. (A11)

Waring, G.H. 1981. Survey of federally-funded marine mammal research and studies FY70-FY80. Final report for MMC contract MM1801196-8. NTIS PB81-242059. 50 pp. (A03)

Waring, G.H. 1982. Survey of federally-funded marine mammal research and studies FY70-FY81. Final report for MMC contract MM2079243-6. NTIS PB82-227570. 74 pp. (A04)

Waring, G.H. 1983. Survey of federally-funded marine mammal research and studies FY70-FY82. Final report for MMC contract MM2324754-9. NTIS PB83-262998. 90 pp. (A05)

Waring, G.H. 1984. Survey of federally-funded marine mammal research and studies FY70-FY83. Final report for MMC contract MM2629857-9. NTIS PB84-215086. 92 pp. (A05)

Waring, G.H. 1985. Survey of federally-funded marine mammal research and studies FY70-FY84. Final report for MMC contract MM2910918-6. NTIS PB85-225613. 106 pp. (A06)

Waring, G.H. 1986. Survey of federally-funded marine mammal research and studies FY70-FY85. Final report for

MMC contract MM3309688-7. NTIS PB86-235637. 117 pp. (A06)
Waring, G.H. 1987. Survey of federally-funded marine mammal research and studies FY70-FY86. Final report for MMC contract MM4465754-5. NTIS PB87-217386. 127 pp. (A07)
Waring, G.H. 1988. Survey of federally-funded marine mammal research and studies FY70-FY87. Final report for MMC contract MM4465836-6. NTIS PB88-212782. 140 pp. (A07)
Waring, G.H. 1989. Survey of federally-funded marine mammal research and studies, FY70-FY88. Final report for MMC contract MM6223905-5. NTIS PB90-104050. 152 pp. (A08)
Waring, G.H. 1990. Survey of federally-funded marine mammal research and studies FY 70-89. Final report for MMC contract T68108504. NTIS PB90-272097. 163 pp. (A08)
Waring, G.H. 1991. Survey of federally-funded marine mammal research and studies FY 74-90. Final report for MMC contract T75133766. NTIS PB91-212217. 51 pp. (A04)
Waring, G.H. 1992. Survey of federally-funded marine mammal research and studies FY74-FY91. Final report for MMC contract T75136103. NITS PB92-190222. 63 pp. (A04)
Waring, G.H. 1993. Survey of federally-funded marine mammal research and studies FY74-FY92. Final report for MMC contract T94070994. NTIS PB93-227189. 73 pp. (A04)
Waring, G.H. 1994. Survey of federally-funded marine mammal research and studies FY74-FY93. Final report for MMC contract T10155275. NTIS PB94-195021. 76 pp. (A05)
Waring, G.H. 1995. Survey of federally-funded marine mammal research and studies, FY74-FY94. Final report for MMC contract T30916452. NTIS PB95-238929. 90 pp. (A05)
Wartzok, D., and G.C. Ray. 1980. The hauling-out behavior of the Pacific walrus. Final report for MMC contract MM5AC028. NTIS PB80-192578. 46 pp. (A04)
Weber, M.L., and F. Spivy-Weber. 1995. Proposed elements for international regimes to conserve living marine resources. Final report for MMC contract T30916119. NTIS PB96-119078. 95 pp. (A06)
Wells, R.S., B.G. Würsig, and K.S. Norris. 1981. A survey of the marine mammals of the upper Gulf of California, Mexico, with an assessment of the status of *Phocoena sinus*. Final report for MMC contract MM1300958-0. NTIS PB81-168791. 51 pp. (A04)
Whitehead, H., K. Chu, P. Harcourt, and A. Alling. 1982. The humpback whales off west Greenland: summer 1981, with notes on other marine mammals and seabirds sighted. Final report MMC contract MM2079259-2. NTIS PB82-243924. 25 pp. (A03)
Whitehead, H., and R. Payne. 1981. New techniques for measuring whales from the air. Final report for MMC contract MM6AC017. NTIS PB81-161143. 36 pp. (A03)
Williams, T.D. 1978. Chemical immobilization, baseline hematological parameters and oil contamination in the sea otter. Final report for MMC contract MM7AD094. NTIS PB-283969. 27 pp. (A03)
Wilson, S.C. 1978. Social organization and behavior of harbor seals, *Phoca vitulina concolor*, in Maine. Final report for MMC contract MM6AC013. NTIS PB-280 188. 103 pp. (A06)
Winn, H.E. 1984. Development of a right whale sighting network in the southeastern U.S. Final report for MMC contract MM2324805-6. NTIS PB84-240548. 12 pp. (A01)
Winn, H.E., E.A. Scott, and R.D. Kenney. 1985. Aerial surveys for right whales in the Great South Channel, spring 1984. Final report for MMC contract MM2910792-6. NTIS PB85-207926. 14 pp. (A02)
Woodhouse, C.D., Jr., R.K. Cowen, and L.R. Wilcoxon. 1977. A summary of knowledge of the sea otter *Enhydra lutris*, L., in California and an appraisal of the completeness of the biological understanding of the species. Final report for MMC contract MM6AC008. NTIS PB-270 374. 71 pp. (A04)
Woods, C.A. 1987. An investigation of possible sightings of Caribbean monk seals, (*Monachus tropicalis*), along the north coast of Haiti. Final report for MMC contract MM3309519-2. NTIS PB87-164307. 10 pp. (A02)
Wray, P. 1978. The West Indian manatee (*Trichechus manatus*) in Florida: a summary and analysis of biological, ecological, and administrative problems affecting preservation and restoration of the population. Final report for MMC contract MM8AD054. NTIS PB-285 410. 89 pp. (A05)
Yellin, M.B., C.R. Agegian, and J.S. Pearse. 1977. Ecological benchmarks in the Santa Cruz County kelp forests before the re-establishment of sea otters. Final report for MMC contract MM6AC029. NTIS PB-272 813. 125 pp. (A07)

NATIONAL TECHNICAL INFORMATION SERVICE CURRENT PRICE LIST

Price List	U.S./Canada/Mexico	All Other Countries
A01	$6.00	$12.00
A02	9.00	18.00
A03	17.50	35.00
A04 - A05	19.50	39.00
A06 - A09	27.00	54.00
A10 - A13	36.50	73.00
A14 - A17	44.50	89.00
A18 - A21	52.00	104.00
A22 - A25	61.00	122.00
A99	Write to NTIS for price quotation.	

Reports are also available on microfiche; call or write NTIS for price quotation. All prices include postage and are given in U.S. currency. In addition, there is a $3.00 handling charge on domestic orders ($4.00 on foreign orders). When ordering, include the NTIS accession number (*e.g.*, PB 265-547). Make checks and money orders payable to the National Technical Information Service. Address: 5285 Port Royal Road, Springfield, Virginia 22161, U.S.A. For telephone orders, call (703) 487-4650.

APPENDIX C

SELECTED LITERATURE PUBLISHED ELSEWHERE RESULTING FROM COMMISSION-SPONSORED ACTIVITIES

Abbott, S.B., and W.S. Benninghoff. 1990. Orientation of environmental change studies to the conservation of Antarctic ecosystems. Pp. 394-403. *In* K.R. Kerry and G. Hempel (eds). Antarctic Ecosystems: Ecological Change and Conservation. Springer-Verlag, Berlin.

Ainley, D.G., R.P. Henderson, H.R. Huber, R.J. Boekelheide, S.G. Allen, and T.L. McElroy. 1985. Dynamics of white shark/pinniped interactions in the Gulf of the Farallones. Memoirs, Southern California Academy of Sciences 9:109-122. (MMC contracts MM4AC002, MM5AC020, MM6AC027, MM7AC025, and MM1300888-2)

Ainley, D.G., H.R. Huber, and K.M. Bailey. 1982. Population fluctuations of California sea lions and the Pacific whiting off central California. Fishery Bulletin (NOAA) 80(2):253-258. (MMC contracts MM4AC002, MM5AC020 MM6AC027, MM7AC025, and MM1300888-2)

Ainley, D.G., C.S. Strong, H.R. Huber, T.J. Lewis, and S.H. Morrell. 1981. Predation by sharks on pinnipeds at the Farallon Islands, California. Fishery Bulletin (NOAA) 78(4):941-945. (MMC contracts MM4AC002, MM5AC020, MM6AC027, MM7AC025, and MM1300888-2)

Alexander, L.M., and L.C. Hanson (eds). 1985. Antarctic politics and marine resources: critical choices for the 1980s. Proceedings from the Eighth Annual Conference, June 17-20, 1984, Center for Ocean Management Studies, University of Rhode Island, Kingston, Rhode Island. 262 pp. (MMC contract MM2910791-3)

Allen, S.G., D.G. Ainley, G.W. Page, and C.A. Ribic. 1984. The effect of disturbance on harbor seal haul out behavior patterns at Bolinas Lagoon, California. Fishery Bulletin (NOAA) 82(3):493-500. (MMC contract MM8AC012)

Allen, S.G., H.R. Huber, C.A. Ribic, and D.G. Ainley. 1989. Population dynamics of harbor seals in the Gulf of the Farallones, California. California Fish and Game 75(4):224-232. (MMC contracts MM7AD110 and MM8AD059)

Alverson, D.L., M.H. Freeberg, S.A. Murawski, and J.G. Pope. 1994. A global assessment of fisheries bycatch and discards. FAO Fisheries Technical Paper 339. Rome, Italy. 233 pp. (MMC contract T10153921)

Ashwell-Erickson, S., and R. Elsner. 1981. The energy cost of free existence for Bering Sea harbor and spotted seals. Pp. 869-899. *In* D.W. Hood and J.A. Calder (eds). The eastern Bering Sea shelf: oceanography and resources. Vol. II. U.S. Department of Commerce, Office of Marine Pollution Assessment, Washington, D.C. (MMC contracts MM5AC012 and MM7AD011)

Bailey, K.M., and D.G. Ainley. 1982. The dynamics of California sea lion predation on Pacific hake. Fisheries Research 1:163-176. (MMC contracts MM4AC002, MM5AC020, MM6AC027, MM7AC025, and MM1300888-2)

Baker, C.S., and L.M. Herman. 1981. Migration and local movement of humpback whales (*Megaptera novaeangliae*) through Hawaiian waters. Canadian Journal of Zoology 59(3):460-469. (MMC contract MM7AC014)

Baker, C.S., and L.M. Herman. 1989. Behavioral responses of summering humpback whales to vessel traffic: experimental and opportunistic observations. Technical report NPS-NR-TRS-89-01 to the National Park Service. 50 pp. (MMC contract MM7AC014)

Baker, C.S., J.M. Straley, and A. Perry. 1992. Population characteristics of individually marked humpback whales in southeastern Alaska: Summer and fall 1986. Fishery Bulletin (NOAA) 90:429-437. (MMC contract MM3309822-5)

Balcomb, K.C., III, and M.A. Bigg. 1986. Population biology of the three resident killer whale pods in Puget Sound and off southern Vancouver Island. Pp. 85-95. *In* B.C. Kirkevold and J.S. Lockard (eds). Behavioral biology of killer whales. Zoo Biology Monographs, Vol. 1. Alan R. Liss, Inc, New York. (MMC contract MM1300731-7)

Balcomb, K.C., III, J.R. Boran, and S.L. Heimlich. 1982. Killer whales in greater Puget Sound. Report of the International Whaling Commission 32:681-685. (MMC contract MM1300731-7)

Barham, E.G., J.C. Sweeney, S. Leatherwood, R.K. Beggs, and C.L. Barham. 1979. Aerial census of the bottlenose dolphin, *Tursiops truncatus*, in a region of the Texas coast. Fishery Bulletin (NOAA) 77(3):585-595. (MMC contract MM8AC011)

Beach, R.J., A.C. Geiger, S.J. Jeffries, and S.D. Treacy. 1981. Marine mammal-fishery interactions on the Columbia River and adjacent waters, 1981. NOAA, National Marine Fisheries Service, Processed Report 82-04. 186 pp. (MMC contract MM2079357-5)

Beach, R.J., A.C. Geiger, S.J. Jeffries, S.D. Treacy, and B.L. Troutman. 1985. Marine mammals and their interactions with fisheries of the Columbia River and adjacent waters, 1980-1982. NOAA, NMFS, NWAFC processed report 85-04, 316 pp. (MMC contracts MM2079221-7 and MM2324788-2)

Bean, M.J. 1987. Legal strategies for reducing persistent plastics in the marine environment. Marine Pollution Bulletin 18:357-360. (MMC contract MM2629994-7)

Bengtson, J.L. 1985. Review of Antarctic marine fauna. Pp. 1-226. *In* Selected papers presented to the Scientific Committee of CCAMLR 1982-1984 (Part I), Commission for the Conservation of Antarctic Marine Living Resources, Hobart, Australia. (MMC contract MM2629914-1)

Bengtson, J.L. 1985. Monitoring indicators of possible ecological changes in the Antarctic marine ecosystem. Pp. 43-153. *In* Selected papers presented to the Scientific Committee of CCAMLR 1982-1984 (Part II), Commission for the Conservation of Antarctic Marine Living Resources, Hobart, Australia. (MMC contract MM2629914-1)

Blix, A.S., L.K. Miller, M.C. Keyes, H.J. Grau, and R. Elsner. 1979. Newborn northern fur seals (*Callorhinus ursinus*) — do they suffer from the cold? American Journal of Physiology, 236(5):R322-327. (MMC contract MM5AC025)

Bockstoce, J.R. 1980. A preliminary estimate of the reduction of the western Arctic bowhead whale population by the pelagic whaling industry: 1848-1915. Marine Fisheries Review 42(9-10):20-27. (MMC contract MM7AD111)

Bockstoce, J.R. 1986. Whales, ice and men. The history of whaling in the western Arctic. University of Washington Press, Seattle. 394 pp. (MMC contract MM7AD111)

Breiwick, J.M. 1978. Reanalysis of Antarctic sei whale stocks. Report of the International Whaling Commission 28:345-368. (MMC contract MM7AC012)

Breiwick, J.M., E.D. Mitchell, and D.G. Chapman. 1981. Estimated initial population size of the Bering Sea stock of bowhead whale, *Balaena mysticetus*: an iterative method. Fishery Bulletin (NOAA) 78(4):843-853. (MMC contract MM8AC007)

Brown, R.F., and B.R. Mate. 1983. Abundance, movements, and feeding habits of harbor seals, *Phoca vitulina*, at Netarts and Tillamook Bays, Oregon. Fishery Bulletin (NOAA) 91(2):291-301. (MMC contract MM8AC003)

Brownell, R.L., P.B. Best, and J.H. Prescott (eds). 1986. Right whales: past and present status. Proceedings of the workshop on the status of right whales, Boston, Massachusetts, 15-23 June 1983. Report of the International Whaling Commission (Special Issue 10. 289 pp). (MMC contract MM2911051-5)

Brownell, R.L., Jr., L.T. Findley, O. Vidal, A. Robles, and S. Manzanilla N. 1987. External morphology and pigmentation of the vaquita, *Phocoena sinus* (Cetacea: Mammalia). Marine Mammal Science 3(1):22-30. (MMC contract MM3-309558-7)

Buckland, S.T., T.D. Smith, and K.L. Cattanach. 1992. Status of small cetacean populations in the Black Sea: review of current information and suggestions for future research. Report of the International Whaling Commission 42:513-516. (MMC contract T75133135)

Burns, J.J., and F.H. Fay. 1974. New data on taxonomic relationships among North Pacific harbor seals, genus *Phoca (sensu stricto)*. Translation of the 1st International Theriological Congress (Moscow) 1:99. (MMC contract MM4AC005)

Burns, J.J., F.H. Fay, and G.A. Fedoseev. 1984. Craniological analysis of harbor and spotted seals of the North Pacific region. Pp. 5-16. *In* F.H. Fay and G.A. Fedoseev (eds). Soviet — American cooperative research on marine mammals. Vol. I-Pinnipeds. NOAA Tech. Report NMFS-12. (MMC contract MM4AC005)

Cetacean Specialist Group. 1994. The Pilot: newsletter of the Marine Mammal Action Plan. Number 9. 16 pp. (MMC contract T94071605)

Clapham, P.J., and D.K. Mattila. 1993. Reactions of humpback whales to skin biopsy sampling in the West Indies. Marine Mammal Science 9(4):382-391. (MMC contract T75136349)

Clapham, P.J., and C.A. Mayo. 1987. The attainment of sexual maturity in two female humpback whales. Marine Mammal Science 3(3):279-283. (MMC contract MM1800-925-5)

Clapham, P.J., P.J. Palsbøll, and D.K. Mattila. 1993. High-energy behaviors in humpback whales as a source of sloughed skin for molecular analyses. Marine Mammal Science 9:(4)213-220. (MMC contract T75136349)

Clark, W.G. 1981. Restricted least-squares estimates of age composition from length composition. Canadian Journal of Fisheries and Aquatic Science 38:297-307. (MMC contracts MM1533439-2 and MM1801114-6)

Clark, W.G. 1982. Early changes in the recruitment rates of Antarctic minke whales inferred from recent age distributions. Report of the International Whaling Commission 32:889-895. (MMC contracts MM1533439-2 and MM1801114-6)

Clark, W.G. 1982. Historical rates of recruitment to Southern Hemisphere fin whale stocks. Report of the International Whaling Commission 32:305-324. (MMC contracts MM1533439-2 and MM1801114-6)

Clark, W.G. 1983. Apparent inconsistencies among countries in measurements of fin whale lengths. Report of the International Whaling Commission 33:431-434. (MMC contracts MM1533439-2 and MM1801114-6)

Clark, W.G. 1984. Analysis of variance of photographic and visual estimates of dolphin school size. Southwest Fisheries Center Administration Report LJ-84-11C. National Marine Fisheries Service, La Jolla, California. 36 pp. (MMC contract MM2324792-1).

Clark, W.G. 1984. Recruitment rates of Antarctic fin whales, *Balaenoptera physalus*, inferred from cohort analysis. Report of the International Whaling Commission (Special Issue 6):411-415. (MMC contract MM1533439-2)

Coe, J.M., and W.E. Stuntz. 1980. Passive behavior by the spotted dolphin, *Stenella attenuata*, in tuna purse seine nets. Fishery Bulletin (NOAA) 78(2):535-537. (MMC contract MM6AC022)

Costa, D.P. 1978. The sea otter: its interaction with man. Oceanus 21(2):24-30. (MMC contract MM6AA053)

Costa, D.P. 1982. Energy, nitrogen, and electrolyte flux and sea water drinking in the sea otter, *Enhydra lutris*. Physiological Zoology 55(1):35-44. (MMC contract MM6AA053)

Cowen, R.K., C.R. Agegian, and M.S. Foster. 1982. The maintenance of community structure in a central California giant kelp forest. Journal of Experimental Marine Biology and Ecology 64:189-201. (MMC contract MM7AC023)

Crone, M.J., and S.D. Kraus (eds). 1990. Right whales (*Eubalaena glacialis*), in the western North Atlantic: a catalog of identified individuals. New England Aquarium, Boston, Massachusetts. 243 pp. (MMC contract T6223913-6)

Dayton, P.K. 1984. Processes structuring some marine communities: are they general? Pp. 181-197. *In* D.R. Strong, *et al.* (eds). Ecological communities: conceptual issues and the evidence. Princeton University Press, Princeton, N.J. (MMC contract MM1300702-9)

Dayton, P.K., V. Currie, T. Gerrodette, B.D. Keller, R. Rosenthal, and D. Van Tresca. 1984. Patch dynamics and stability of some California kelp communities. Ecological Monographs 54(3):253-289. (MMC contract MM1300702-9)

Dayton, P.K., and M.J. Tegner. 1984. The importance of scale in community ecology: a kelp forest example with terrestrial analogs. Pp. 457-481. *In* P.W. Price, *et al.* (eds). A new ecology: novel approaches to interactive systems. John Wiley & Sons, Inc., New York. (MMC contract MM1300702-9)

Deiter, R.L. 1990. Recovery and necropsy of marine mammal carcasses in and near the Point Reyes National Seashore, May 1982 - March 1987. Pp. 123-141. *In* J.E. Reynolds, III, and D.K. Odell (eds). Marine mammal strandings in the United States. Proceedings of the second marine mammal stranding workshop, 3-5 December 1987, Miami, Florida. National Oceanic and Atmospheric Administration Technical Report No. 98, National Marine Fisheries Service. (MMC contract MM2911030-8)

Delaney, J., W. Hale, and R. Stone. 1989. Manatees: an educator's guide. Second edition (by M. Lamphear). Save the Manatee Club. 34 pp. (MMC contract T5360304-3)

DeMaster, D.P., and J.K. Drevenak. 1988. Survivorship patterns in three species of captive cetaceans. Marine Mammal Science 4(4):297-311.

Domning, D.P. (ed). 1984-Present. *Sirenews*, Newsletter of the IUCN/Species Survival Commission, Sirenian Specialist Group. Howard University, Washington, D.C.

Dowling, T.E., and W.M. Brown. 1993. Population structure of the bottlenose dolphin (*Tursiops truncatus*) as deter-

mined by restriction endonuclease analysis of mitochondrial DNA. Marine Mammal Science 9(2):138-155. (MMC contract MM3309818-6)

Duignan, P.J., J.R. Geraci, J.A. Raga, and N. Calzada. 1992. Pathology of morbillivirus infection in striped dolphins (*Stenella coeruleoalba*) from Valencia and Murcia, Spain. Canadian Journal of Veterinary Research 56:242-248. (MMC contract T75133818)

Eberhardt, L.L., D.G. Chapman, and J.R. Gilbert. 1979. A review of marine mammal census methods. Wildlife Monographs, No. 63. 46 pp. (MMC contract MM4AC014)

Everitt, R.D., and R.J. Beach. 1982. Marine mammal-fisheries interactions in Oregon and Washington: an overview. Pp. 265-277. *In* Transactions of the 47th North American Wildlife and Natural Resources Conference. Wildlife Management Institute, Washington, D.C. (MMC contracts MM2079345-2 and MM2079357-5)

Fay, F.H. 1982. Ecology and biology of the Pacific walrus, *Odobenus rosmarus divergens* Illiger. U.S. Fish and Wildlife Service. North American Fauna, No. 74. 279 pp. (MMC contract MM1533576-0)

Fay, F.H. 1984. Walrus. Pp. 264-269. *In* D. Macdonald (ed). Encyclopedia of Mammals. Equinox Ltd., Oxford, England. (MMC contract MM1533576-0)

Fay, F.H. 1984. Foods of the Pacific walrus, winter and spring in the Bering Sea. Pp. 81-88. *In* F.H. Fay and G.A. Fedoseev (eds). Soviet-American cooperative research on marine mammals. Vol. I-Pinnipeds. NOAA Technical Report NMFS-12. (MMC contracts MM4AC005, MM4AC006, MM5AC024, MM8AC013, and MM1533576-0)

Fay, F.H. 1985. *Odobenus rosmarus*. Mammalian Species 238:1-7. (MMC contract MM1533576-0)

Fay, F.H., B.P. Kelly, and J.L. Sease. 1989. Managing the exploitation of Pacific walruses: a tragedy of delayed response and poor communication. Marine Mammal Science 5(1):1-16. (MMC contracts MM4AC005, MM4AC006, MM5AC024, MM8AC013, and MM1533576-0)

Felleman, F.L., J.R. Heimlich-Boran, and R.S. Osborne. 1991. The feeding ecology of killer whales (*Orcinus orca*) in the Pacific Northwest. *In* K. Pryor and K.S. Norris (eds). Dolphin societies: discoveries and puzzles. University of California Press, Berkeley. (MMC contract MM1300731-7).

Ford, J.K.B., G.M. Ellis, and K.C. Balcomb. 1994. Killer whales. University of British Columbia Press, Vancouver. 102 pp. (MMC contract MM1300731-7)

Foster, M. 1982. The regulation of macroalgal associations in kelp forests. Pp. 185-205. *In* L. Srivastava (ed). Synthetic and degradative processes in marine macrophytes. W. de Gruyter & Company, Berlin. (MMC contract MM7AC023)

Fowler, C.W. 1980. A rationale for modifying effort by catch, using the sperm whale of the North Pacific as an example. Report of the International Whaling Commission (Special Issue 2):99-102. (MMC contract MM8AC009)

Fowler, C.W. 1981. Comparative population dynamics in large mammals. Pp. 437-455. *In* C.W. Fowler and T.D. Smith (eds). Dynamics of large mammal populations. John Wiley & Sons, Inc., New York. (MMC contract MM1300730-4)

Fowler, C.W. 1981. Density dependence as related to life history strategy. Ecology 62(3):602-610. (MMC contract MM7AC013)

Fowler, C.W. 1987. A review of density dependence in populations of large mammals. Pp. 401-441. *In* H.H. Genoways (ed). Current Mammalogy, Vol. I. Plenum Press, New York. (MMC contract MM7AC013)

Fox, W.W., Jr. 1990. Statement of concerned scientists on the reauthorization of the Magnuson Fishery Conservation and Management Act. Natural Resources Modeling 4(2):133-142.

Gaines, S.E., and D. Schmidt. 1976. Wildlife management under the Marine Mammal Protection Act of 1972. Pp. 50096-50114. *In* Environmental Law Reporter, Vol. 6. (MMC contract MM5AC029)

Gentry, R.L., and G.L. Kooyman. 1986. Fur seals: maternal strategies on land and at sea. Princeton University Press, Princeton, New Jersey. 291 pp. (MMC contract MM6AC019)

Georgia Conservancy, The. 1986. Report of the southeastern U.S. right whale workshop, 18-20 February 1986, Jekyll Island, Georgia. 41 pp. (MMC contract MM3309690-0)

Geraci, J.R. 1978. The enigma of marine mammal strandings. Oceanus 21(2):38-47. (MMC contracts MM5AC008, MM6AD070, MM7AD069, and MM7AC020)

Geraci, J.R. 1989. Clinical investigations of the 1987-88 mass mortality of bottlenose dolphins along the U.S. central and south Atlantic coast. Final report to the U.S. National Marine Fisheries Service, Office of Naval Research, and the Marine Mammal Commission, Washington, D.C. 63 pp. (MMC contracts MM4465826-9, T5360275-6, T5360277-2, and T5360286-6)

Geraci, J.R., D.M. Anderson, R.J. Timperi, D.J. St. Aubin, G.A. Early, J.H. Prescott, and C.A. Mayo. 1989. Humpback whales (*Megaptera novaeangliae*) fatally poisoned by dinoflagellate toxin. Canadian Journal of Fisheries and Aquatic Science 46(11):1895-1898. (MMC contract T5306271-4)

Geraci, J.R., M.D. Daily, and D.J. St. Aubin. 1978. Parasitic mastitis in the Atlantic white-sided dolphin, *Lagenorhynchus acutus*, as a probable factor in herd productivity. Journal of the Fisheries Research Board of Canada 35(10):1350-1355. (MMC contract MM5AC008)

Geraci, J.R., and V.J. Lounsbury. 1993. Marine mammals ashore: a field guide for strandings. Texas A&M Sea Grant Publications, Galveston, Texas. 305 pp. (MMC contract T94071618)

Geraci, J.R., and D.J. St. Aubin. 1980. Offshore petroleum resource development and marine mammals: a review and research recommendations. Marine Fisheries Review 42(11):1-12. (Requested by the Marine Mammal Commission)

Glockner-Ferrari, D.A., and M.J. Ferrari. 1987. Identification, reproduction, and distribution of humpback whales in Hawaiian waters, 1984 and 1985. Report to National Marine Fisheries Service, National Marine Mammal Laboratory, Seattle. 33 pp. (MMC contract MM2629752-5)

Goodman, D. 1980. Demographic intervention for closely managed populations. Pp. 171-195. *In* M.E. Soule and B.A. Wilcox (eds). Conservation biology: an evolutionary-ecological perspective. Sinaur Associates, Inc., Sunderland, Massachusetts. (MMC contract MM8AD-008)

Goodman, D. 1981. Life history analysis of large mammals. Pp. 415-436. *In* C.W. Fowler and T.D. Smith (eds). Dynamics of large mammal populations. John Wiley & Sons, Inc., New York. (MMC contract MM8AD-008)

Haenel, N.J. 1986. General notes on the behavioral ontogeny of Puget Sound killer whales and the occurrence of allomaternal behavior. Pp. 285-300. *In* B.C. Kirkevold and J.S. Lockard (eds). Behavioral biology of killer whales. Zoo Biology Monographs, Vol. 1. Alan R. Liss, Inc., New York. (MMC contract MM1300731-7)

Hain, J.H.W., G.R. Carter, S.D. Kraus, C.A. Mayo, and H.E. Winn. 1982. Feeding behavior of the humpback whale, *Megaptera novaeangliae*, in the western North

Atlantic. Fishery Bulletin (NOAA) 80(2):259-268. (MMC contract MM1800925-5)

Hall, J.D. 1977. A non-lethal lavage device for sampling stomach contents of small marine mammals. Fishery Bulletin (NOAA) 75(3):653-656. (MMC contract MM4AC013)

Harvey, J.T., R.F. Brown, and B.R. Mate. 1990. Abundance and distribution of harbor seals (*Phoca vitulina*) in Oregon, 1975-1983. Northwestern Naturalist 71(3):65-71. (MMC contract MM5AC001)

Harvey, J.T., and B.R. Mate. 1984. Dive characteristics and movements of radio-tagged gray whales in San Ignacio Lagoon, Baja California Sur, Mexico. Pp. 561-575. *In* M.L. Jones, S.L. Swartz, and S. Leatherwood (eds). The gray whale *Eschrichtius robustus*. Academic Press, Inc., Orlando, Florida. (MMC contract MM1533416-9)

Heimlich-Boran, J.R. 1986. Photogrammetric analysis of growth in Puget Sound *Orcinus orca*. Pp. 97-111. *In* B.C. Kirkevold and J.S. Lockard (eds). Behavioral biology of killer whales. Zoo Biology Monographs. Alan R. Liss, Inc., New York. Vol. 1. (MMC contract MM1300731-7)

Heimlich-Boran, J.R. 1986. Fishery correlations with the occurrence of killer whales in greater Puget Sound. Pp. 113-131. *In* B.C. Kirkevold and J.S. Lockard (eds). Behavioral biology of killer whales. Zoo Biology Monographs. Alan R. Liss, Inc., New York. Vol. 1. (MMC contract MM1300731-7)

Heimlich-Boran, S.L. 1986. Cohesive relationships among Puget Sound killer whales. Pp. 251-284. *In* B.C. Kirkevold and J.S. Lockard (eds). Behavioral biology of killer whales. Zoo Biology Monographs. Alan R. Liss, Inc., New York. Vol. 1. (MMC contract MM1300731-7)

Herman, L.M. 1979. Humpback whales in Hawaiian waters: a study in historical ecology. Pacific Science 33(1):1-16. (MMC contract MM7AC014)

Herman, L.M., and R.C. Antinoja. 1977. Humpback whales in the Hawaiian breeding waters: population and pod characteristics. Scientific Report of the Whales Research Institute, No. 29:59-85. (MMC contract MM7AC014)

Heyning, J.E., and T.D. Lewis. 1990. Entanglements of baleen whales in the fishing gear off southern California. Report of the International Whaling Commission 40:427-431. (MMC contract T6223923-3)

Heyning, J.E., and W.F. Perrin. 1991. Re-examination of two forms of common dolphins (genus *Delphinus*) from the eastern north Pacific; evidence for two species. National Marine Fisheries Service Administrative Report LJ-91-28. 37 pp. (MMC contract T6223923-3)

Heyning, J.E., and W.F. Perrin. 1994. Evidence for two species of common dolphins (Genus *Delphinus*) from the eastern north Pacific. Contributions in Science, Natural History Museum of Los Angeles County 442:1-35. (MMC contract T6223923-3)

Hoelzel, A.R., and R.W. Osborne. 1986. Killer whale call characteristics: implications for cooperative foraging strategies. Pp. 373-403. *In* B.C. Kirkevold and J.S. Lockard (eds). Behavioral biology of killer whales. Zoo Biology Monographs. Alan R. Liss, Inc., New York. Vol. 1. (MMC contract MM1300731-7)

Hofman, R.J. 1985. The Convention on the Conservation of Antarctic Marine Living Resources. Pp. 113-122. *In* L.M. Alexander and L.C. Hanson (eds). Antarctic politics and marine resources: critical choices for the 1980s. Center for Ocean Management Studies, University of Rhode Island, Kingston, Rhode Island.

Hofman, R.J., and W.N. Bonner. 1985. Conservation and protection of marine mammals: past, present and future. Marine Mammal Science 1(2):109-127.

Huber, H.R. 1987. Natality and weaning success in relation to age of first reproduction in northern elephant seals. Canadian Journal of Zoology 65(6):1311-1316. (MMC contracts MM4AC002, MM5AC020, MM6AC027, MM7AC025, MM1300888-2, MM1533599-3)

Huber, H.R. 1991. Changes in distribution of California sea lions north of the breeding rookeries during the 1982-83 El Niño. Pp. 129-137. *In* F. Trillmich and K.A. Ono (eds). Pinnipeds and El Niño: responses to environmental stress. Ecological Studies, Vol. 88. Springer-Verlag, Berlin. (MMC contracts MM4AC002, MM5AC020, MM6AC027, MM7AC025, MM1300888-2, MM1533599-3)

Huber, H.R., C. Beckham, and J. Nisbet. 1991. Effects of the 1982-83 El Niño on northern elephant seals on the South Farallon Islands, California. Pp. 219-233. *In* F. Trillmich and K.A. Ono (eds). Pinnipeds and El Niño: responses to environmental stress. Ecological Studies, Vol. 88. Springer-Verlag, Berlin. (MMC contracts MM4AC0-02, MM5AC020, MM6AC027, MM7AC025, MM1300888-2, MM1533599-3)

Huber, H.R., D.G. Ainley, and S.H. Morrell. 1982. Sightings of cetaceans in the Gulf of the Farallones, California, 1971-1979. California Fish and Game 68(3):183-189. (MMC contract MM1300888-2)

Huber, H.R., A.C. Rovetta, L.A. Fry, and S. Johnston. 1991. Age-specific natality of northern elephant seals at the South Farallon Islands, California. Journal of Mammalogy 72(3):525-534.

Hui, C.A. 1980. Variability of dentin deposits in *Tursiops truncatus*. Canadian Journal of Fisheries and Aquatic Science 37(4):712-716. (MMC contract MM7AC021)

Irvine, A.B., M.D. Scott, R.S. Wells, and J.H. Kaufman. 1981. Movements and activities of the Atlantic bottlenose dolphin, *Tursiops truncatus*, near Sarasota, Florida. Fishery Bulletin (NOAA) 79(4):671-688. (MMC contracts MM4AC004 and MM5AC018)

Irvine, A.B., R.S. Wells, and M.D. Scott. 1982. An evaluation of techniques for tagging small odontocete cetaceans. Fishery Bulletin (NOAA) 80(1):135-143. (MMC contracts MM4AC004 and MM5AC018)

Johnson, P.A., B.W. Johnson, and L.R. Taylor. 1981. Interisland movement of a young Hawaiian monk seal between Laysan Island and Maro Reef. 'Elepaio, 41(11):113-114. (MMC contracts MM7AC009 and MM8AC008)

Jones, M.L. 1985. Evaluation of the potential impact of whale-watching activities on gray whales in Laguna San Ignacio, Baja California Sur, Mexico, 1978 to 1982. Master's thesis, Moss Landing Marine Laboratory, San Jose State University, San Jose, California. 73 pp. (MMC contracts MM7AC008, MM8AC005, MM1533497-8, MM2079219-4, MM2324713-8, and MM2911098-4)

Jones, M.L. 1990. The reproductive cycle in gray whales based on photographic resightings of females on the breeding grounds from 1977-82. Report of the International Whaling Commission (Special Issue 12):177-182. (MMC contracts MM7AC008, MM8AC005, MM1533497-8, MM2079219-4, MM2324713-8, and MM2911098-4)

Jones, M.L., and S.L. Swartz. 1984. Demography and phenology of breeding gray whales in Laguna San Ignacio, Baja California Sur, Mexico: 1978-1982. Pp. 309-374. *In* M.L. Jones, S.L. Swartz, and S. Leatherwood (eds). The gray whale *Eschrichtius robustus*. Academic Press, Inc., Orlando, Florida. 602 pp. (MMC contracts MM7AC008, MM8AC005, MM1533497-8, MM2079219-4, MM2324713-8, and MM2911098-4)

Jones, M.L., S.L. Swartz, and S. Leatherwood (eds). 1984. The gray whale *Eschrichtius robustus*. Academic Press, Inc., Orlando, Florida. 602 pp. (MMC contracts MM7AC-

008, MM8AC005, MM1533497-8, MM2079219-4, MM2324713-8, MM2911098-4)

Kenney, R.D., H.E. Winn, and M.C. Macaulay. 1995. Cetaceans in the Great South Channel, 1979-1989: right whale (*Eubalaena glacialis*). Continental Shelf Research 45:385-414. (MMC contract T94070648)

Kirby, V. 1983. Progesterone and estrogens in pregnant and nonpregnant dolphins (*Tursiops truncatus*) and the effects of induced ovulation. Biology of Reproduction 28:897-901. (MMC contract MM7AC016)

Kooyman, G.L., J.O. Billups, and W.D. Farwell. 1983. Two recently developed recorders for monitoring diving activity of marine birds and mammals. Pp. 197-214. *In* A.G. MacDonald and I.G. Priede (eds). Experimental biology at sea. Academic Press, New York. (MMC contract MM6AC019)

Kooyman, G.L., and L.H. Cornell. 1981. Flow properties of expiration and inspiration in a trained bottle-nosed porpoise. Physiological Zoology 54(1):55-61. (MMC contract MM4AC012)

Kooyman, G.L., R.L. Gentry, and D.L. Urquhart. 1976. Northern fur seal diving behavior: A new approach to its study. Science 193:411-412. (MMC contract MM6AC019)

Kooyman, G.L., K.S. Norris, and R.L. Gentry. 1975. Spout of the gray whale: its physical characteristics. Science 190:908-910. (MMC contract MM4AC012)

Kooyman, G.L., and E.E. Sinnett. 1979. Mechanical properties of the harbor porpoise lung, *Phocoena phocoena*. Respiratory Physiology, 36:287-300. (MMC contract MM4AC012)

Kraus, S.D. 1990. Rates and potential causes of mortality in North Atlantic right whales (*Eubalaena glacialis*). Marine Mammal Science, 6(4):278-291. (MMC contract MM3309800-5)

Kraus, S.D., J.R. Gilbert, and J.H. Prescott. 1983. A comparison of aerial, shipboard and land-based survey methodology for the harbor porpoise, *Phocoena phocoena*. Fishery Bulletin (NOAA) 81:910-913, (MMC contract MM1801023-1)

Kraus, S.D., K.E. Moore, C.A. Price, M.J. Crone, W.A. Watkins, H.E. Winn, and J.H. Prescott. 1986. The use of photographs to identify individual North Atlantic right whales (*Eubalaena glacialis*). Report of the International Whaling Commission (Special Issue 10):145-151. (MMC contracts MM2079355-9 and MM3309800-5)

Kraus, S.D., J.H. Prescott, and A.R. Knowlton. 1988. Wintering right whales along the Southeastern United States: a primary calving ground. Pp. 148-157. *In* Proceedings of the third southeastern non-game and endangered wildlife symposium. Georgia Department of Natural Resources, pp. 148-157. (MMC contract MM3309800-5)

Kraus, S.D., J.H. Prescott, A.R. Knowlton, and G.S. Stone. 1986. Migration and calving of right whales (*Eubalaena glacialis*) in the western North Atlantic. Report of the International Whaling Commission (Special Issue 10):139-144. (MMC contracts MM2079355-9 and MM3309800-5)

Laist, D.W. 1987. An overview of the biological effects of lost and discarded plastic debris in the marine environment. Marine Pollution Bulletin 18(6B):319-326.

Laws, R.M. (ed.) 1994. Antarctic Seals: Research Methods and Techniques. Cambridge University Press. Cambridge, United Kingdom. 390 pp. (MMC contract T75133672)

Leatherwood, S. 1975. Some observations of feeding behavior of bottlenosed dolphins (*Tursiops truncatus*) in the northern Gulf of Mexico and (*Tursiops* cf. *T. gilli*) off Southern California, Baja California, and Nayarit, Mexico. Marine Fisheries Review 37(9):10-16. (MMC contract MM6AC001)

Leatherwood, S., J.R. Gilbert, and D.G. Chapman. 1978. An evaluation of some techniques for aerial censuses of bottlenosed dolphins. Journal of Wildlife Management 42(2):239-250. (MMC contract MM6AC001)

Leatherwood, J.S., R.A. Johnson, D.K. Ljungblad, and W.E. Evans. 1977. Broadband measurements of underwater acoustic target strengths of panels of tuna nets. Technical Report 126. Naval Ocean Systems Center, San Diego, California. 19 pp. (MMC contract MM6AC020)

LeBoeuf, B.J., and R.M. Laws (eds). 1994. Elephant seal: population ecology, behavior and physiology. University of California Press, Berkeley. 414 pp. (MMC contract T7-5133724)

Loughlin, T.R. 1979. Radio telemetric determination of the 24-hour feeding activities of sea otters, *Enhydra lutris*. Pp. 717-724. *In* C.J. Amlaner, Jr., and D.W. McDonald (eds). A handbook on biotelemetry and radio-tracking. Pergamon Press, Oxford and New York. (MMC contracts MM6AC004 and MM6AC024)

Loughlin, T.R. 1980. Home range and territoriality of sea otters near Monterey, California. Journal of Wildlife Management 44(3):576-582. (MMC contracts MM6AC004 and MM6AC024)

Lowry, L.F., and F.H. Fay. 1984. Seal eating by walruses in the Bering and Chukchi Seas. Polar Biology 3:11-18. (MMC contracts MM5AC006 and MMC5AC024)

Lowry, L.F., K.J. Frost, D.G. Calkins, G.L. Swartzman, and S. Hills. 1982. Feeding habits, food requirements, and status of Bering Sea marine mammals. North Pacific Fishery Management Council, Anchorage, AK. Doc. Nos. 19 and 19a. 574 pp. (MMC contract MM1533596-4)

Lowry, L.F., and K.J. Frost. 1985. Biological interactions between marine mammals and commercial fisheries in the Bering Sea. Pp. 41-61. *In* J.R. Beddington, R.J.L. Beverton, and D.M. Lavigne (eds). Marine Mammals and Fisheries. George Allen and Unwin, London. (MMC contract MM1533596-4)

Marine Mammal Commission. 1994. The Marine Mammal Commission compendium of selected treaties, international agreements, and other relevant documents on marine resources, wildlife, and the environment. Volumes 1-3. Government Printing Office, Washington, D.C. 3,547 pp. (MMC contracts T75135573, T94069358, T94069772, T94070240, T94070978, T94070981, T94071113, T94071-511, T94071647, T10154111, T10154124, T10154234, T10157257, and T10157639)

Marmontel, M. 1993. Age determination and population biology of the Florida manatee, *Trichechus manatus latirostris*. Ph.D. Dissertation. University of Florida. 408 pp. (MMC contract T6223918-1)

Mate, B.R., and J.T. Harvey. 1984. Ocean movements of radio-tagged gray whales. Pp. 577-589. *In* M.L. Jones, S.L. Swartz, and S. Leatherwood (eds). The gray whale *Eschrichtius robustus*. Academic Press, Inc., Orlando, Florida. (MMC contract MM1533416-9)

Mate, B.R., J.T. Harvey, L. Hobbs, and R. Maiefski. 1983. A new attachment device for radio-tagging large whales. Journal of Wildlife Management 47(3):868-872. (MMC contract MM1533416-9)

Mayo, C.A., C.A. Carlson, P.J. Clapham, and D.K. Mattila. 1985. Humpback whales of the southern Gulf of Maine. Shankpainter Press, Provincetown, Massachusetts. (MMC contract MM1800925-5)

Mead, J.G. 1977. Records of sei and Bryde's whales from the Atlantic Coast of the United States, the Gulf of Mexico and the Caribbean. Report of the International Whaling Commission (Special Issue I):113-116. (MMC contract MM6AD054)

Melteff, B.R., and D.H. Rosenberg (eds). 1984. Proceedings of the workshop on biological interactions among marine mammals and commercial fisheries in the southeastern Bering Sea, October 18-21, 1983, Anchorage, Alaska. Alaska Sea Grant College Program, University of Alaska, Fairbanks, Alaska. 300 pp. (MMC contract 7MM232480-2-7)

Merrell, T.R. 1985. Fish nets and other plastic litter on Alaska beaches. Pp. 160-182. *In* R.S. Shomura and H.O. Yoshida (eds). Proceedings of the workshop on the fate and impact of marine debris, 27-29 November 1984, Honolulu, Hawaii. U.S. Dept. Commerce, NOAA Technical Memorandum NMFS. (MMC contract MM2910786-1)

Mizroch, S.A., D.W. Rice, J.L. Bengtson, and S.W. Larson. 1985. Preliminary atlas of *Balaenopterid* whale distribution in the southern ocean based on pelagic catch data. Pp. 113-193. *In* Selected papers presented to the Scientific Committee of CCAMLR, 1985, Commission for the Conservation of Antarctic Marine Living Resources, Hobart, Australia. (MMC contract MM3309521-5)

Nafziger, J.A.R. 1978. The management of marine mammals after the fishery conservation and management act. Willamette Law Journal 14:153-215. (MMC contract MM7AC001)

National Research Council. 1981. An evaluation of Antarctic marine ecosystem research. Polar Research Board. National Academy Press, Washington, D.C. 99 pp. (MMC contract MM1800913-2)

National Research Council. 1988. Priorities in arctic marine science. Polar Research Board. National Academy Press, Washington, D.C. 73 pp. (MMC contracts MM2911056-0 and MM3309821-2)

Norris, K.S., R. Goodman, B. Villa-Ramirez, and L. Hobbs. 1977. The behavior of California gray whales (*Eschrichtius robustus*) in Southern Baja California, Mexico. Fishery Bulletin (NOAA) 75(1):159-172. (MMC contract MM5AC007)

Odell, D.K. 1975. Status and aspects of the life history of the bottlenose dolphin, *Tursiops truncatus*, in Florida. Journal of the Fisheries Research Board of Canada 32(7):1055-1058. (MMC contract MM4AC003)

Odell, D.K. 1976. Distribution and abundance of marine mammals in south Florida: Preliminary Results. Pp. 203-212. *In* A. Thorhaug (ed). Biscayne Bay: Past/Present/Future. Biscayne Bay symposium I, 2-3 April 1976. University of Miami Sea Grant Special Report No. 5. (MMC contract MM4AC003)

Odell, D.K. 1979. Distribution and abundance of marine mammals in the waters of the Everglades National Park. Proceedings of the first conference on research in national parks. USDI, NPS, Transactions proceedings series No. 5:673-678. (MMC contract MM4AC003)

Packard, J.M. 1981. Abundance, distribution, and feeding habits of manatees (*Trichechus manatus*) wintering between St. Lucie and Palm Beach Inlets, Florida. U.S. Fish and Wildlife Contract Report No. 14-16-004-80-105. 139 pp. (MMC contract MM1801025-7).

Packard, J.M. 1984. Impact of manatees, *Trichechus manatus*, on seagrass communities in eastern Florida. Acta Zoological Fennica. 172:21-22. (MMC contract MM1801025-7)

Packard, J.M. 1984. Proposed research/management plan for Crystal River manatees. Vols. 1-3. Technical Report No. 7. Florida Cooperative Fish and Wildlife Research Unit, University of Florida, Gainesville, Florida. Prepared for Fish and Wildlife Service, U.S. Department of the Interior, Washington, D.C. 31 pp. 235 pp. 346 pp. (MMC contract MM1801024-4)

Packard, J.M., R.K. Frohlich, J.E. Reynolds, III, and J.R. Wilcox. 1985. Manatee response to interrupted operation of the Fort Myers power plant, winter 1984/85. Manatee population research report No. 8. Technical Report No. 8-8. Florida Cooperative Fish and Wildlife Research Unit. University of Florida, Gainesville, Florida. 20 pp. (MMC contract MM3309522-8)

Packard, J.M., R.K. Frohlich, J.E. Reynolds, III, and J.R. Wilcox. 1989. Manatee response to interruption of a thermal effluent. Journal of Wildlife Management 53(3):692-700. (MMC contract MM2324650-8)

Packard, J.M., D.B. Siniff, and J.A. Cornell. 1986. Use of replicate counts to improve indices of trends in manatee abundance. Wildlife Society Bulletin 14:265-275. (MMC contract MM2324650-8)

Packard, J.M., and O.F. Wetterquist. 1986. Evaluation of manatee habitat on the northwestern Florida coast. Coastal Zone Management Journal 14(4):279-310. (MMC contract MM1801025-7)

Payne, R., O. Brazier, E.M. Dorsey, J.S. Perkins, V.J. Rowntree, and A. Titus. 1983. External features in southern right whales (*Eubalaena australis*) and their use in identifying individuals. Pp. 371-445. *In* R. Payne (ed). Communication and behavior of whales. AAAS Selected Symposium 76. Westview Press, Inc. Boulder, Colorado. (MMC contract MM6AC017)

Pearse, J.S., D.P. Costa, M.B. Yellin, and C.R. Agegian. 1977. Localized mass mortality of red sea urchin, *Strongylocentrotus franciscanus*, near Santa Cruz, California. Fishery Bulletin (NOAA) 75(3):645-648. (MMC contract MM6AC029)

Perrin, W.F., R.L. Brownell, Jr., and D.P. DeMaster (eds). 1984. Reproduction in whales, dolphins, and porpoises. Report of the International Whaling Commission (Special Issue 6. 495 pp.) (MMC contract MM2079356-2)

Perrin, W.F., R.L. Brownell, Jr., Z. Kaiya, and L. Jiankang (eds). 1989. Biology and conservation of the river dolphins. IUCN Species Survival Commission Occasional Paper No. 3. (MMC contract MM3309828-3)

Perrin, W.F., G.P. Donovan, and J. Barlow (eds). 1994. Gillnets and Cetaceans. Report of the International Whaling Commission (Special Issue 15), Cambridge, United Kingdom. 629 pp. (MMC contract T6810860-1)

Perrin, W.F., and A.C. Myrick, Jr. (eds). 1980. Age determination of toothed whales and sirenians. Report of the International Whaling Commission (Special Issue 3). 229 pp. (MMC contract MM8AC004)

Perry, A., C.S. Baker, and L.M. Herman. 1990. Population characteristics of individually identified humpback whales in the central and eastern North Pacific: A summary and critique. Report of the International Whaling Commission (Special Issue 12):307-317. (MMC contract MM7AC014)

Pierotti, R.J., D.G. Ainley, T.S. Lewis, and M.C. Coulter. 1977. Birth of a California sea lion on Southeast Farallon Island. California Fish and Game 63(1):64-65. (MMC contract MM4AC002)

Pitcher, K.W. 1980. Food of the harbor seal, *Phoca vitulina*, in the Gulf of Alaska. Fishery Bulletin (NOAA) 78(2):544-549. (MMC contract MM5AC011).

Pitcher, K.W. 1980. Stomach contents and feces as indicators of harbor seal, *Phoca vitulina*, foods in the Gulf of Alaska. Fishery Bulletin (NOAA) 78(3):797-798. (MMC contract MM5AC011)

Pitcher, K.W. 1986. Variation in blubber thickness of harbor seals in Southern Alaska. Journal of Wildlife Management 50(3):463-466. (MMC contract MM5AC011)

Pitcher, K.W. 1990. Major decline in the number of harbor seals, *Phoca vitulina*, on Tugidak Island, Gulf of Alaska.

Marine Mammal Science, 6(2):121-134. (MMC contract T75133261)

Ralls, K. 1989. A semi-captive breeding program for the Baiji, *Lipotes vexillifer*: genetic and demographic considerations. Pp. 150-156. *In* W.F. Perrin, R.L. Brownell, Jr., Z. Kaiya, and L. Jiankang (eds). Biology and conservation of the river dolphins. IUCN Species Survival Commission Occasional Paper No. 3. (MMC contract MM3309828-3)

Ralls, K., and J.D. Ballou (eds). 1986. Proceedings of the workshop on the genetic management of captive populations. Zoo Biology 5(2):81-239. (MMC contract MM2910864-0)

Ralls, K., and J.D. Ballou. 1986. Captive breeding programs for populations with a small number of founders. Trends Ecology and Evolution, 1:19-22. (MMC contract MM2910864-0)

Ralston, F. (ed). 1977. A workshop to assess research related to the porpoise/tuna problem, February 28, March 1-2. Southwest Fisheries Center Admin. Report LJ-77-15. Southwest Fisheries Service, National Marine Fisheries Service, La Jolla, California. 119 pp. 6 appendices. (MMC contract MM7AC022).

Ray, G.C., J.A. Dobbin, and R.V. Salm. 1978. Strategies for protecting marine mammal habitats. Oceanus 21(2):55-67. (MMC contract MM6AC011)

Reeves, R.R., D. Tuboku-Metzger, and R.A. Kapindi. 1988. Distribution and exploitation of manatees in Sierra Leone. Oryx 22(2):75-84. (MMC contract MM2911037-9)

Reijnders, P., S. Brasseur, J. van der Toorn, P. van der Wolf, I. Boyd, J. Harwood, D. Lavigne, and L. Lowry. 1993. Seals, fur seals, sea lions, and walrus. Status survey and conservation action plan. IUCN—The World Conservation Union, Species Survival Commission, Seal Specialist Group. Gland, Switzerland. 88 pp. (MMC contract T94070651)

Reynolds, III, J.E., and K.D. Haddad (eds). 1990. Report of the workshop on geographic information system as an aid to managing habitat for West Indian manatees in Florida and Georgia. Rep. No. 49. Florida Marine Research, Florida Department of Natural Resources, St. Petersburg, Florida. 57 pp. (MMC contract T6223916-5)

Roffe, T.J., and B.R. Mate. 1984. Abundances and feeding habits of pinnipeds in the Rogue River, Oregon. Journal of Wildlife Management 48(4):1262-1274. (MMC contract MM8AC003)

Scott, G.P., and H.E. Winn. 1978. Assessment of humpback whale (*Megaptera novaeangliae*) stocks using vertical photographs. Proceedings PECORA IV symposium, national wildlife science and technology series 3:235-243. (MMC contract MM7AC029)

Scott, M.D., R.S. Wells, and A.B. Irvine. 1990. A long-term study of bottlenose dolphins on the west coast of Florida. Pp. 235-244. *In* S. Leatherwood and R.R. Reeves (eds). The bottlenose dolphin. Academic Press, Inc., San Diego, California. (MMC contract MM4465739-6)

Sergeant, D.E., D.J. St. Aubin, and J.R. Geraci. 1980. Life history and northwest Atlantic status of the Atlantic white-sided dolphin, *Lagenorhynchus acutus*. Cetology 37:1-12. (MMC contract MM5AC008)

Shallenberger, E.W. 1977. Humpback whales in Hawaii: population and distribution. Oceans '77, marine technology society, institute of electrical and electronics engineers, p. Hawaii C-1-7. (MMC contract MM7AC014)

Shane, S.H. 1978. Suckerfish attached to a bottlenose dolphin. Journal of Mammalogy 59(2):4399-440. (MMC contract MM6AC028)

Shane, S.H. 1980. Occurrence, movements, and distribution of bottlenose dolphin, *Tursiops truncatus*, in southern Texas. Fishery Bulletin (NOAA) 78(3):593-601. (MMC contract MM6AC028)

Shane, S.H. 1990. Comparison of bottlenose dolphin behavior in Texas and Florida, with a critique of methods for studying dolphin behavior. Pp. 541-558. *In* J.S. Leatherwood and R.R. Reeves (eds). The bottlenose dolphin. Academic Press, Inc., San Diego, California. (MMC contract MM6AC028)

Shane, S.H., and D. McSweeney. 1990. Using photo-identification to study pilot whale social organization. Report of the International Whaling Commission (Special Issue 12):259-263. (MMC contracts MM2629899-3 and MM2910859-8)

Shane, S.H., and D.J. Schmidly. 1976. Bryde's whale (*Balaenoptera edeni*) from the Louisiana coast. Southwest Naturalist 21(3):409-410. (MMC contract MM4AC008).

Shaughnessy, P.D., and F.H. Fay. 1977. A review of the taxonomy and nomenclature of North Pacific harbour seals. Journal of Zoology, London 182:385-419. (MMC contract MM4AC005)

Sherman, K., and L.M. Alexander (eds). 1986. Variability and management of large marine ecosystems. AAAS Selected Symposium 99. Westview Press, Inc., Boulder, Colorado. 319 pp. (MM1300736-2)

Sherman, K., and L.M. Alexander (eds). 1989. Biomass yields and geography of large marine ecosystems. AAAS Selected Symposium 111. Westview Press, Inc., Boulder, Colorado. 493 pp. (MMC contracts MM4465739-6 and T6810861-4)

Sherman, K., L.M. Alexander, and B.D.Gold (eds). 1990. Large marine ecosystem: patterns, processes, and yields. American Association for the Advancement of Science, Washington, D.C. 242 pp. (MMC contract MM465739-6)

Sherman, K., L.M. Alexander, and B.D. Gold (eds). 1991. Food chains, yields, models and management of large marine ecosystems. Westview Press, Inc., Boulder, Colorado. 320 pp. (MMC contract MM4465739-6).

Sherman, K., L.M. Alexander, and B.D. Gold (eds). 1992. Stress, migration, and sustainability of large marine ecosystems. American Association for the Advancement of Science, Washington, D.C. (MMC contract MM4465739-6)

Shomura, R.S., and H.O. Yoshida (eds). 1985. Proceedings of the workshop on the fate and impact of marine debris, 27-29 November 1984, Honolulu, Hawaii. NOAA-TM-NMFS-SWFC-54. 580 pp. (MMC contract MM2629949-7)

Shomura, R.S., and M.L. Godfrey (eds). 1990. Proceedings of the second international conference on marine debris, 2-7 April 1989, Honolulu, Hawaii. NOAA-TM-NMFS-SWFSC-154. 1,274 pp. (MMC contract T6224086-6)

Silber, G.K., K.A. Waples, and P.A. Nelson. 1994. Response of free-ranging harbor porpoises to potential gillnet modifications. Pages 579-584. *In* W.F. Perrin, G.P. Donovan, and J. Barlow (eds). Gillnets and Cetaceans. Report of the International Whaling Commission (Special Issue 15). Cambridge, United Kingdom. (MMC contracts MM4465-854-4 and MM3309815-7)

Sirenia Project. 1993. Atlantic coast manatee telemetry 1986-1993 progress report. Volumes I and II. National Biological Survey, Gainesville, Florida. (MMC contract T6810889-2)

Siniff, D.B., T.D. Williams, A.M. Johnson, and D.L. Garshelis. 1982. Experiments on the response of sea otters (*Enhydra lutris*) to oil contamination. Biological Conservation 23(4):261-272. (MMC contract MM7AD-094)

Smith, T.D. 1981. The adequacy of the scientific basis for the management of sperm whales. Pp. 333-343. *In* Mammals in the Seas. FAO Fisheries Series No. 5, Vol. III. Food and Agriculture Organization of the United Nations. (MMC contract MM6AD047)

Smith, T.D., and T. Polacheck. 1979. Analysis of a simple model for estimating historical population sizes. Fishery Bulletin (NOAA) 76(4):771-779. (MMC contract MM7AC006)

Smultea, M.A. 1989. Humpback whales off west Hawaii. Whalewatcher 23(1):11-14. (MMC contract T6810925-7)

Smultea, M.A. 1994. Segregation by humpback whale (*Megaptera novaeangliae*) cows with a calf in coastal habitat near the island of Hawaii. Canadian Journal of Zoology 72:805-811. (MMC contract T6223925-9)

Society for Marine Mammalogy. 1994. Strategies for pursuing a career in marine mammal science. Supplement to Marine Mammal Science 10(2). 14 pp. (MMC contract T10157419)

Southern, S.O., P.J. Southern, and A.E. Dizon. 1988. Molecular characterization of a cloned dolphin mitochondrial genome. Journal of Molecular Evolution 28:32-42. (MMC contract MM2910998-2)

Species Survival Commission. 1994. Whales, dolphins, and porpoises, 1994-1998. (MMC contract T30916627)

Stone, G.S., S.D. Kraus, J.H. Prescott, and K.W. Hazard. 1988. Significant aggregations of the endangered right whale, *Eubalaena glacialis*, on the continental shelf of Nova Scotia. The Canadian Field-Naturalist 102(3):471-474. (MMC contract T6223913-6)

Straley, J.M. 1994. Seasonal characteristics of humpback whales (*Megaptera novaeangliae*) in southeastern Alaska. Master of Science thesis, University of Alaska, Fairbanks. 121 pp. (MMC contract MM3309822-5)

Straley, J.M., C.M. Gabriele, and C.S. Baker. 1994. Annual reproduction by individually identified humpback whales (*Megaptera novaeangliae*) in Alaskan waters. Marine Mammal Science 10(1):87-92. (MMC contract MM3309822-5)

Swartz, S.L. 1981. Cleaning symbiosis between topsmelt, *Atherinops affinis*, and gray whales, *Eschrichtius robustus*, in Laguna San Ignacio, Baja California Sur, Mexico. Fishery Bulletin (NOAA) 79(2):360. (MMC contracts MM8AC005 and MM1533497-8)

Swartz, S.L. 1986. Gray whale migratory, social and breeding behavior. Report of the International Whaling Commission (Special Issue 8):207-229. (MMC contracts MM7AC008, MM8AC005, MM1533497-8, MM2079219-4 and MM2324713-8).

Swartz, S.L. 1986. Demography, migration, and behavior of gray whales *Eschrichtius robustus* (Lilljeborg, 1861) in San Ignacio Lagoon, Baja California Sur, Mexico and in their winter range. Ph.D. Dissertation. University of California, Santa Cruz, California. 95 pp. (MMC contracts MM7AC008, MM8AC005, MM1533497-8, MM2079219-4, MM2324713-8, MM2911098-4)

Swartz, S.L., and M.K. Bursk. 1979. The gray whales of Laguna San Ignacio after two years. Whalewatcher 13(1):709. (MMC contracts MM7AC008 and MM8AC005)

Swartz, S.L., and M.L. Jones. 1983. Gray whale (*Eschrichtius robustus*) calf production and mortality in the winter range. Report of the International Whaling Commission 33:503-507. (MMC contracts MM7AC008, MM1533497-8 and MM2079219-4)

Swartz, S.L., and M.L. Jones. 1984. Gray whale mothers and their calves. Oceans 17(2):47-55. (MMC contracts MM7AC008, MM1533497-8 and MM2079219-4)

Swartz, S.L., and M.L. Jones. 1987. Gray whales at play in San Ignacio Lagoon. National Geographic 171(6):755-771. (MMC contract MM7AC008, MM8AC005, MM1533497-8, MM2079219-4 and MM2324713-8)

Swartzman, G.L. 1984. Present and future potential models for examining the effect of fisheries on marine mammal populations in the Eastern Bering Sea. Pp. 157-181. *In* B. Melteff (ed). Proceedings of the workshop on biological interactions among marine mammals and commercial fisheries in the Southeastern Bering Sea. Alaska Sea Grant Report 84-1. (MMC contract MM1800969-5).

Swartzman, G.L., and R.T. Haar. 1983. Interactions between fur seal populations and fisheries in the Bering Sea. Fishery Bulletin (NOAA) 81(1):121-132.. (MMC contracts MM1800969-5 and MM2629737-6)

Swartzman, G.L., and R.T. Haar. 1985. Interactions between fur seal populations and fisheries in the Bering Sea. Pp. 62-93. *In* J.R. Beddington, R.J.H. Beverton, and D.M. Lavigne (eds). Marine mammals and fisheries. George Allen and Unwin, London. 354 pp. (MMC contracts MM1800969-5 and MM2629737-6)

Sydeman, W.J., H.R. Huber, S.D. Emslie, C.A. Ribic, and N. Nur. 1991. Age-specific weaning success of northern elephant seals in relation to previous breeding experience. Ecology 72(6):2204-2217. (MMC contract MM3309858-4)

Tillman, M.F., and G.P. Donovan (eds). 1983. Special issue on historical whaling records. Report of the International Whaling Commission (Special Issue 5. 269 pp). (MMC contract MM7AC017)

Tolley, K.A., A.J. Read, R.S. Wells, K.W. Urian, M.D. Scott, A.B. Irvine, and A.A. Hohn. 1995. Sexual dimorphism in wild bottlenose dolphins (*Tursiops truncatus*) from Sarasota, Florida. Journal of Mammalogy 76(4):1190-1198. (MMC contract T75132864)

Tricas, T.C., L.R. Taylor, and G. Naftel. 1981. Diel behavior of the tiger shark, *Galeocerdo cuvier*, at French Frigate Shoals, Hawaiian Islands. Copeia 1981. pp. 904-908. (MMC contract MM7AC011)

Van Wagenen, R.F., M.S. Foster, and F. Burns. 1981. Sea otter predation on birds near Monterey, California. Journal of Mammalogy, 62(2):433-434. (MMC contract MM7AC023)

Villa-R., B. 1976. Report on the status of *Phocoena sinus*, Norris and McFarland 1958, in the Gulf of California. Anales de Instituto de Biologia, Universidad Nacional Autonoma de Mexico, Serie Zoologia 47(2):203-207. (MMC contract MM6AD052)

Wells, R.S. 1991. The role of long-term study in understanding the social structure of a bottlenose dolphin community. Pp. 199-225. *In* K. Pryor and K.S. Norris (eds). Dolphin societies: discoveries and puzzles. University of California Press, Berkeley. (MMC contract MM4465739-6)

Wells, R.S., A.B. Irvine, and M.D. Scott. 1980. The social ecology of inshore odontocetes. Pp. 263-317. *In* L.M. Herman (ed). Cetacean behavior: mechanisms and processes. John Wiley & Sons, Inc., New York. (MMC contracts MM4AC004 and MM5AC0018)

Whitehead, H., K. Chu, J. Perkins, P. Bryant, and G. Nichols. 1983. Population size, stock identity, and distribution of the humpback whales off West Greenland — summer 1981. Report of the International Whaling Commission 33:497-501. (MMC contract MM2079259-2).

Williams, T.D., and F.H. Kocher. 1978. Comparison of anaesthetic agents in the sea otter. Journal of American Veterinary Medical Association 173(9):1127-1130. (MMC contract MM7AD-094)

Williams, T.D., and L.T. Pulley. 1983. Hematology and blood chemistry in the sea otter (*Enhydra lutris*). Journal of Wildlife Diseases 19(1):44-47. (MMC contract MM7AD-094)

Williams, T.D., and D.B. Siniff. 1983. Surgical implantation of radiotelemetry devices in the sea otter. Journal of the American Veterinary Medical Association 183(11):1290-1291. (MMC contract MM7AD-094)

Williams, T.D., A.L. Williams, and D.B. Siniff. 1981. Fentanyl and azaperone produced neuroleptanalgesia in the

sea otter. Journal of Wildlife Diseases 17(3):337-342. (MMC contract MM7AD-094)
Würsig, B., and B. Tershy. 1989. The baiji: perhaps the most endangered of them all. Whalewatcher 23:3-5. (MMC contract T6223922-0)
Wynne, K. 1992. Guide to marine mammals in Alaska. Alaska Sea Grant College Program, Fairbanks. 75 pp. (MMC contract T75136394)
Young, N. (ed). 1993. Examining components of a revised management scheme. Center for Marine Conservation, Washington, D.C. 84 pp. (MMC contract T10154344)