Marine Mammal Commission

Annual Report to Congress 2002

Marine Mammal Commission
4340 East-West Highway, Room 905
Bethesda, Maryland 20814

31 March 2003

MARINE MAMMAL COMMISSION

Annual Report to Congress

2002

Marine Mammal Commission
4340 East-West Highway, Room 905
Bethesda, Maryland 20814

31 March 2003

The Marine Mammal Commission

Committee of Scientific Advisors on Marine Mammals

Members of the Staff

Commission Offices:
4340 East-West Highway, Room 905
Bethesda, Maryland 20814
Phone: 301-504-0087
Fax: 301-504-0099
E-mail: mmc@mmc.gov

Contents

List of Tables

List of Figures

Chapter I

INTRODUCTION

This is the 30th Annual Report of the Marine Mammal Commission, covering the period 1 January through 31 December 2002. 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 reviewing and making recommendations on domestic and international actions and policies of all federal agencies with respect to marine mammal protection and conservation and with carrying out a research program.

The purpose of this report is to provide timely information on management issues and events under purview of the Marine Mammal Commission in 2002. The report is provided to Congress, federal and state agencies, public interest groups, the academic community, private citizens, and the international community. When combined with past reports, it describes the evolution and progress of U.S. policies and programs to conserve marine mammals and their habitats. To ensure accuracy, report drafts were reviewed by federal and state agencies and knowledgeable individuals.

The Commission Chairman, after consultation with the Council on Environmental Quality, the National Science Foundation, and the National Academy of Sciences/National Research Council and with the concurrence of other Commissioners, appoints persons to the nine-member Committee of Scientific Advisors on Marine Mammals. The Marine Mammal Protection Act requires that committee members be scientists who are knowledgeable in marine ecology and marine mammal affairs.

Appropriations to the Marine Mammal Commission in the past five fiscal years have been as follows: FY 1998, $1,185,000; FY 1999, $1,240,000; FY 2000, $1,265,000; FY 2001, $1,696,260; and FY 2002, $1,956,000. The Commission's appropriation for the current fiscal year, FY 2003, is $3,050,000.

Thirty Years of the Marine Mammal Protection Act

October 2002 marked the 30th anniversary of the Marine Mammal Protection Act. The Act was the first of a series of landmark environmental laws enacted in the early 1970s that included the Clean Air Act, Clean Water Act, the Endangered Species Act, the Magnuson Fisheries Conservation and Management Act, the Coastal Zone Management Act, the National Forest Management Act, and others.

The Marine Mammal Protection Act was the first legislation to call for an ecosystem approach to natural resource management and conservation. It prohibited the hunting, killing, capture, and/or harassment of marine mammals unless the proponent of an activity could demonstrate that the activity would not cause the affected animals to be reduced below their optimum sustainable population level. In effect, this new requirement shifted the burden of proof from government conservation/management agencies to resource users to demonstrate that taking of a marine mammal would not be detrimental to the affected species or stocks. The Act also established the Marine Mammal Commission and its Committee of Scientific Advisors to oversee and advise federal agencies on measures needed to meet the Act's goals and provisions.

Although the United States was still engaged in the commercial harvest of some marine mammals in 1971, the general public was clearly inter-

ested then, as now, in the protection of these species. Three issues provided a major impetus for the enactment of the Act:

(1) the failure of the International Whaling Commission (IWC) to prevent the overexploitation and near extinction of stocks of large whales throughout the world;

(2) the killing of hundreds of thousands of dolphins each year in the eastern tropical Pacific Ocean by tuna fishermen; and

(3) the clubbing and skinning of tens of thousands of newborn harp seals each spring in ice fields of the North Atlantic for the fur market.

Since Congress passed the Act, many new concerns related to marine mammal conservation have demanded attention. These include the following—

- the unintentional take of many marine mammals incidental to commercial fisheries;
- mortality and injury from ship strikes;
- offshore oil and gas development;
- point and nonpoint source pollution;
- human sources of ocean noise; and
- climate change.

Scientists and managers have made significant progress over the last 30 years in understanding marine mammal populations and addressing the issues that affect them and the ecosystems of which they are a part. Most marine mammal stocks in U.S. waters and many stocks elsewhere around the world are in better condition now than in 1972 when Congress passed the Act. Table 1 gives examples of how Americans and others around the world have changed their perspectives on marine mammal conservation. Congress has amended the Act periodically in response to changing biological/ecological knowledge and socioeconomic conditions. The following briefly describes some of the accomplishments scientists and managers have made since 1972 and challenges that lie ahead.

Commercial Whaling

In 1986 the IWC adopted a moratorium on commercial whaling pending review of the status of the exploited whale stocks and revision of procedures for determining and enforcing catch limits. Subsequently, the IWC Scientific Committee assessed the status of various whale stocks and recommended a revised procedure for estimating catch levels that could be sustained at levels that would lead to recovering and/or maintaining affected stocks at their maximum net productivity levels. The IWC has been unable to agree on an observation and inspection regime to ensure compliance with catch levels that might be authorized. Consequently the moratorium remains in place. However, in 1993 Norway, which had objected to and therefore was not bound to the moratorium, resumed commercial exploitation of minke whales in the North Atlantic. Also, Japan has authorized the taking of minke whales in the Antarctic and minke, sperm, sei, and Bryde's whales in the western North Pacific under a provision of the International Whaling Convention that allows IWC members to take whales for scientific research.

The Tuna-Dolphin Problem

This has been one of the most contentious marine mammal conservation problems since Congress passed the Marine Mammal Protection Act in 1972. Litigation brought by both environmental groups and affected fishery groups has stymied Congressional and Executive branch efforts to find a long-lasting resolution. In its first five years of existence (1974–1978), the Marine Mammal Commission and its Committee of Scientific Advisors devoted more resources to assessing the effects of, and possible means for preventing, the mortality and injury of dolphins in the eastern tropical Pacific tuna fishery than to all other marine mammal conservation issues combined. Estimated mortality has been reduced from more than 400,000 in 1972 to fewer than 1,500 in 2002. However, the practice of setting purse seines around dolphin schools to catch tuna that associate with the dolphins continues and may be preventing recovery of at least three dolphin stocks that were severely depleted by the fishery before mortality rates were reduced. On the last day of 2002 the Department of Commerce announced that it had concluded that tuna purse seine fishing on dolphins posed no more than a negligible impact on three dolphin populations, thereby enabling imports of tuna from foreign countries into U.S. markets with "dolphin-safe" labels. Environmental groups immediately filed suit to prevent the tuna imports.

The Harp Seal Problem

The killing of newborn, whitecoat harp seals in Canada was controversial for two reasons: clubbing was believed by many environmental groups and scientists to be inhumane; and the level of take of both harp and hooded seals was thought by some

Table 1. Changes and accomplishments in marine mammal conservation during the first 30 years of the Marine Mammal Protection Act (MMPA) of 1972

Activity	Then (The Early 1970s)	Now (2002)
Whaling and whales	Japan, Norway, and Russia land in excess of 46,000 whales for commercial purposes.	IWC has a global moratorium on commercial whaling. Japan lands about 700 minke, sei, sperm, and Bryde's whales in its research whaling program; Norway lands 600–700 minke whales under objection to the moratorium.
	U.S. whalers landed 132 whales in 1971.	The United States has prohibited commercial whaling since 1972.
	Native Alaska bowhead whale harvest was not regulated.	The Alaska Eskimo Whaling Commission strictly regulates subsistence bowhead whale harvest pursuant to IWC quota and in cooperation with the U.S. government.
	The sperm, right, bowhead, gray, fin, sei, blue, and humpback whales were listed as endangered under the U.S. Endangered Species Act of 1973.	The eastern North Pacific (California) gray whale population has recovered and was removed from the endangered species list in 1994. Populations of many other whale species appear to be increasing.
Dolphins killed in the eastern tropical Pacific (ETP) tuna fishery	An esimated 400,000 dolphins from three species were killed annually in the ETP fishery and affected dolphin stocks were declining.	Dolphin mortality in the ETP tuna fishery was reduced to about 2,100 or less in recent years despite increased fishing effort. However, dolphin stocks are not rebounding as expected.
	A seven-member Inter-American Tropical Tuna Commission was in place for fishery management purposes, but did not have a marine mammal program.	Inter-American Tropical Tuna Commission has 12 member nations that limit overall mortality to no more than 5,000 dolphins per year and place observers on fishing vessels. Other requirements are in place under the International Dolphin Conservation Program.
Seal skins	Canadian harp seal pup harvest averaged 284,000 annually. Most skins were shipped to the United States and Europe.	Harp seal pup harvest is regulated by Canada with quota set at 275,000 pups in 2002. Europe continues to be the market for the skins. Imports into the United States are banned under the MMPA.
	Fouke Fur Company obtained a permit to import 100,000 fur seal skins from South Africa in 1973; the permit was invalidated by the courts as being inconsistent with MMPA standards.	No sales of marine mammal products are authorized in the United States (except northern fur seals taken under international treaty before 1985 and as items of Alaskan Native handicrafts).
Incidental catch of marine mammals in commmercial fisheries	Little or no documentation or requirements. Extent of the problem was unknown (other than ETP tuna fishery).	1988 MMPA amendments require fishermen to provide information on incidental bycatch. 1994 amendments establish a new incidental take regime.
	No authority for regulating incidental bycatch of marine mammals in commercial fishing operations.	The National Marine Fisheries Service monitors and regulates incidental bycatch in almost 200 domestic commercial fisheries. Take reduction plans have been adopted to reduce incidental bycatch of marine mammals in commercial fisheries. Current plans cover 12 fisheries and more than half (22) of all strategic stocks.
Research	Little direct federal funding existed for marine mammal research, and the abundance and distribution of marine mammal stocks in U.S. waters was very poorly understood.	More than 30 million dollars is spent annually on marine mammal research by federal and state agencies. Stock assessments have been completed for 60 species and more than 150 stocks of marine mammals in U.S. waters.

scientists and resource managers to be unsustainable and causing substantial population declines. The Marine Mammal Protection Act prohibited import into the United States of marine mammals and products from marine mammals that were nursing or less than eight months old when taken from the wild. This stopped the importation of whitecoat furs into the United States.

Substantial markets for seal skins remained in Europe. By 1981 more than 200,000 mostly newborn harp seals were being killed annually in Canada. In 1983 the European Union banned importation of furs from harp and hooded seals. Catches plummeted to a low of 25,934 harp seals and 33 hooded seals in 1986. Between 1983 and 1995 harvests averaged fewer than 55,000 harp seals and 1,000 hooded seals, far below the annual catch levels of 186,000 harp seals and 2,340 to 15,000 hooded seals authorized by Canada. At the same time, catastrophic declines in cod catches occurred in the Northwest Atlantic. Many fishermen and fishery managers in Canada, however, attributed the decline in cod to increases in the harp seal population. Notwithstanding the greater likelihood that the cod decline was due to overfishing, Canada began subsidizing the harp seal hunt in 1994. In 1995 Canada increased the allowable catch to 250,000. The subsidies have been continued. In 1997 Canada authorized a catch of 275,000, which many scientists believe cannot be sustained and will cause the affected population to be reduced substantially below its maximum net productivity level. In the meantime, cod stocks have shown no sign of recovery.

Unintentional Bycatch of Marine Mammals in Commercial Fisheries

Marine mammals are caught unintentionally in nearly all commercial fisheries. Recognizing this, Congress included in the Marine Mammal Protection Act a provision for permitting the take of marine mammals incidental to commercial fisheries when the taking would not disadvantage the affected species or stocks. As enacted originally, the Act prohibited taking from stocks that were endangered, threatened, or depleted, or from which the status was uncertain. A court ruling in 1987 (*Kokechik Fishermen's Association* v. *Secretary of Commerce*) raised questions as to whether incidental take permits could be issued to many of the fisheries known to catch marine mammals unintentionally. Such a prohibition would have severely curtailed many fisheries, leading Congress, in 1988, to enact a five-year exemption to the permitting requirement. This enabled the National Marine Fisheries Service, in consultation with the Commission to develop a new regime to govern incidental taking. The Commission recommended guidelines for the new regime in July 1990. Among other things, the Commission recommended that the new regime allow the incidental taking of endangered, threatened, and depleted marine mammals when the taking will not significantly delay recovery of the affected species or stock. The Commission's recommended guidelines provided the basis for the potential biological removal concept that constitutes the foundation of the new incidental take regime adopted in the 1994 amendments to the Marine Mammal Protection Act. The regulatory regime implementing these amendments attempts to minimize the impacts on both affected fishermen and marine mammal stocks.

Recent Environmental Threats to Marine Mammals

Many threats to marine mammals and their ecosystems were not recognized or anticipated when the Marine Mammal Protection Act was enacted in 1972: entanglement in lost and discarded fishing gear and other types of persistent marine debris; collisions with ships; disturbance and possible mortality associated with loud sounds from human sources; and introduction of increasing amounts of fertilizers, pesticides, pharmaceuticals, and other chemical contaminants into the world's oceans.

Marine Debris—The marine debris problem arose from the use of nonbiologically degradable plastics and other synthetic materials for fishing nets and lines, and packaging materials such as soda and beer six-pack holders. Scientists first recognized the problem in the late 1970s and early 1980s when increasing numbers of fur seals on the Pribilof Islands breeding grounds were entangled in bits of discarded fishing gear, six-pack holders, etc. Because of the associated decline in the fur seal population, the Commission recommended in 1982 that the National Marine Fisheries Service convene an international workshop to assess the magnitude and sources of the problem and what could be done to address it. The workshop was held in Honolulu in November 1984 and led to a worldwide effort to document and eliminate the causes of the problem. The Presidential Task Force on Persistent

Marine Debris, on which the Commission participated, called on the United States to support and implement international and domestic regulations to prohibit intentional dumping of plastic products in marine waters.

Ocean Noise—The first indication that human sources of ocean noise might be a problem surfaced in the late 1970s when ringed seal distributions off the north coast of Alaska changed in response to high-energy seismic surveys exploring for offshore oil and gas deposits. The effects were biologically insignificant, leading Congress to amend the Marine Mammal Protection Act in 1981 and again in 1986 to exempt such activities from the Act's general moratorium on taking. This enabled the National Marine Fisheries Service and the Fish and Wildlife Service to authorize taking of small numbers of marine mammals incidental to such activities when the effects would be negligible.

Conservationists raised new concerns in the early 1990s when the Defense Department funded studies to determine whether high-intensity (very loud), low-frequency sounds could be transmitted across ocean basins to detect changes in ocean temperature related to global warming. Cetaceans produce similar sounds, presumably to communicate over distances of hundreds if not thousands of miles. Scientists and environmental groups raised concerns that the sound transmissions would mask these low-frequency communications or otherwise interfere with the normal behavior of a variety of marine species, including fishes and sea turtles as well as marine mammals. Marine mammal studies done as part of the Acoustic Thermometry of Ocean Climate Program found some subtle changes in the distribution, movement, and other behavior patterns of the animals studied. The effects were judged to be biologically insignificant.

Further concerns were raised in 1996 when the Navy announced plans to deploy a low-frequency active (LFA) sonar to detect new classes of quiet submarines at distances up to 200 miles. Concerns over sound in the marine environment were heightened in March 2000 when at least 17 cetaceans, including 14 beaked whales, beached themselves in the northern Bahama Islands following a Navy exercise involving use of midfrequency-range sonars. Similar stranding incidents have occurred along other coasts where military operations were using mid-range sonars.

Although the sources and characteristics of sounds used for these purposes differ, the potential effect that some types of noises may have on cetaceans is unknown but possibly significant. Environmental groups have challenged permits issued by the National Marine Fisheries Service and other government programs regarding various sources of sounds in the marine environment. Gaining a better understanding of how different types of sound affect different species of marine mammals is a high priority.

Conclusion

The Marine Mammal Protection Act has fostered a better understanding of marine mammals and their habitats. The Marine Mammal Commission and its Committee of Scientific Advisors has been instrumental in overseeing implementation of the Act, focusing attention on new management issues, and advising federal agencies and others on innovative solutions to resolve highly contentious scientific and management issues. At the time it passed, the Marine Mammal Protection Act took an unprecedented approach to conservation and management of overexploited species. It has been successful in stemming the tide of overexploitation and ushering the recovery of marine mammal populations. Future threats to marine mammals will continue to arise, bringing new challenges to researchers and managers. Advances in marine mammal and other realms of science and evolution of the Act and policies regarding its implementation hold the best opportunity to ensure that healthy populations of marine mammals will exist for future generations.

Chapter II

REAUTHORIZATION OF THE MARINE MAMMAL PROTECTION ACT

The Marine Mammal Protection Act was enacted in 1972. Since then, it has been amended and reauthorized several times. The most recent authorization, enacted in 1994, extended appropriation authority for carrying out the provisions of the Act through fiscal year 1999. Although the Act has not been reauthorized since then, its provisions remain in effect and Congress continues to appropriate funds to carry out its mandates.

As a matter of course, Congress examines the implementation of the Act during the reauthorization process. It is not uncommon for amendments to be made at such intervals. For example, major amendments were enacted in 1984, 1988, and 1994, the last three times the Act was reauthorized. The Act may also be amended at other times, as it was in 1997 when significant changes were made to the Act's tuna-dolphin provisions (see Chapter IV). Most recently, the Act was amended by the Marine Mammal Rescue Assistance Act of 2000, enacted as Title II of Public Law 106-555. This Act created the John H. Prescott Marine Mammal Rescue Assistance Grant Program and directed the Secretary of Commerce to initiate a study of the environmental and biological factors that may be contributing to the increase in mortality events involving the eastern North Pacific stock of gray whales. The grant program is discussed in Chapter VI of this report.

Background

Congress began the most recent process to reauthorize the Marine Mammal Protection Act in 1999. As discussed in previous annual reports, the Subcommittee on Fisheries Conservation, Wildlife, and Oceans of the House Resources Committee held an initial hearing in June 1999. The Marine Mammal Commission and the other federal agencies with primary responsibilities under the Act testified on implementation of the 1994 amendments and identified problems that may warrant additional legislation. The statement submitted by the Commission provided a comprehensive review of the 1994 amendments, described the steps taken to implement those amendments, and identified those provisions that had yet to be fully implemented. The statement also identified particular areas where further amendments may be useful and on which Congress may want to focus attention as it considers reauthorizing the Act. A summary of the Commission's recommendations and the full text of the Commission's statement were included in the 1999 annual report.

Further hearings were held in April 2000 before the House Subcommittee on Fisheries Conservation, Wildlife, and Oceans. The Chairman of the Commission testified at the first of two hearings. That hearing examined implementation of section 118 of the Marine Mammal Protection Act, the regime to govern the taking of marine mammals incidental to commercial fisheries enacted in 1994. The Commission's testimony summarized the requirements of the applicable statutory provisions and actions taken to establish take reduction teams to address the most significant sources of marine mammal mortalities and serious injuries. The Commission noted that the existing statutory framework was fundamentally sound but offered suggestions as to how the process might be im-

proved. Further discussion of the Commission's recommendations and the full text of its statement can be found in the 2000 annual report.

At a second hearing, also held in April 2000, representatives of the National Marine Fisheries Service, the Fish and Wildlife Service, and Alaska Native organizations provided testimony that examined efforts to develop and implement cooperative agreements between the Services and those organizations under section 119 of the Marine Mammal Protection Act. All participants in that hearing recognized the benefits to the conservation of marine mammals that had been and could be derived from such agreements. However, they also identified shortcomings regarding the existing provisions and recommended that the Act be amended to authorize the parties to enter into enforceable agreements that would allow for the management of subsistence harvests before an affected marine mammal stock is designated as depleted. As discussed in the Commission's 2000 annual report, the two Services, along with the Commission, met with representatives of Alaska Native organizations following that hearing to fashion a proposal for Congressional consideration that would expand the existing authority for cooperative agreements to enable the parties to set harvest limits for both depleted and nondepleted species.

The joint proposal on co-management of subsistence taking by Alaska Natives was a central element of a proposed bill transmitted to Congress by the Secretaries of Commerce and the Interior during the 2000 legislative session. That bill also would have authorized appropriations for the Marine Mammal Commission, the Department of Commerce, and the Department of the Interior to carry out their responsibilities under the Act through fiscal year 2005. Further, the bill recommended extensive revisions to the Act to address various problems that had arisen since the last reauthorization and to clarify certain provisions of the 1994 and 1997 amendments. Among other things, the bill proposed by the Administration would have amended the Act to clarify the purposes for which marine mammals may be exported from the United States, streamline the process for permitting the import of polar bear trophies from Canada, prohibit the display of cetaceans in traveling exhibits, expand the coverage of section 118 to include incidental taking by certain recreational fishermen, eliminate the requirement to prepare a take reduction plan for those strategic stocks for which fishery-related mortality and serious injury are negligible, increase the available penalties under the Act, authorize funding for research grants under section 110 of the Act, and revise the statutory definition of the term harassment. The Administration reviewed and reworked the draft bill during 2001 and 2002 and submitted a new proposal to Congress in 2002.

The Subcommittee on Fisheries Conservation, Wildlife, and Oceans of the House Resources Committee again turned its attention to Marine Mammal Protection Act reauthorization during the 2001 session of Congress. On 11 October 2001 the Subcommittee held a day-long oversight hearing on the Act to consider a broad range of topics bearing on reauthorization and possible amendments. The Commission's Chairman participated on a panel of government agencies and, along with the heads of the National Marine Fisheries Service and the Fish and Wildlife Service, provided an assessment of the implementation of the 1994 amendments to the Act and identified areas where amendments would be useful. A representative of the Department of State also participated on that panel, presenting testimony concerning the bilateral polar bear agreement concluded between the United States and Russia in October 2000. Other panels focused on issues related to ocean noise and the deployment of Navy sonar systems, marine mammal–fishery interactions, cooperative efforts between Alaska Natives and federal agencies to manage subsistence hunting of marine mammals, public display permits, and the conservation of California sea otters. The text of the Commission's testimony, which focused on updating the Subcommittee on recent actions taken to implement the 1994 amendments, identifying those actions that had yet to be completed, and calling attention to those areas where amendments might be warranted, can be found in Appendix D of the Commission's 2001 annual report.

On 9 November 2001 the Commission was sent a series of follow-up questions from members of the Subcommittee. Those questions focused on four issues—ocean noise, the Act's definition of harassment, polar bear sport hunting, and problems associated with the maintenance of polar bears at a traveling exhibit in Puerto Rico. The Commission drafted its responses to these ques-

tions and submitted them for interagency review and coordination in mid-December. Clearance through that process took longer than expected and, as a result, the Commission's responses were not transmitted to Congress until 29 March 2002. Copies of those responses can be obtained by contacting the Commission.

Activities in 2002

Introduced Bill

Representative Wayne T. Gilchrest, Chairman of the Subcommittee on Fisheries Conservation, Wildlife, and Oceans, introduced H.R. 4781 on 21 May 2002 to reauthorize appropriations under the Act through fiscal year 2007. The bill sought to address some, but not all, of the issues identified by the Commission and others at previous reauthorization hearings. The bill deferred consideration of some major issues, such as the desirability of adding a mechanism to restrict subsistence hunting by Alaska Natives before a stock becomes depleted, until a new recommended bill had been provided by the Administration.

Among the amendments that had been advocated by the Commission and other agencies at reauthorization hearings, H.R. 4781 would have—

• authorized appropriations under the Act for a five-year period;

• amended the Act's cultural exchange provision [section 101(a)(6)] to clarify that exports of marine mammal products as part of such exchanges by Alaska Natives and Native inhabitants of Russia, Canada, and Greenland, as well as imports, are authorized;

• eliminated the notice and comment requirements for each permit authorizing the importation of a polar bear trophy from Canada, replacing it with a semiannual reporting requirement;

• added an explicit prohibition on the unauthorized release of captive marine mammals;

• required take reduction plans prepared under section 118(f) to consider the impacts of recreational as well as commercial fisheries;

• increased the presence of National Marine Fisheries Service employees at the meetings of take reduction teams;

• required the Service to reconvene take reduction teams before publishing any take reduction plan that differs from that recommended by the team; and

• eliminated the provision restricting the amount the Commission can spend on experts or consultants to $100 per day.

The bill also included several provisions that had not been specifically recommended by the Commission or other federal agencies, either in the proposed bill submitted by the previous Administration or in Congressional testimony. For example, H.R. 4781 would have directed the Secretary of Commerce to conduct additional research on the nonlethal removal and deterrence of nuisance pinnipeds, aimed primarily at pinniped-fishery interactions. The bill also would have amended the Whaling Convention Act of 1949 (16 U.S.C. § 916c) to allow Alaska Native subsistence hunters to seek and receive assistance in towing struck whales to shore in emergency situations. Another provision of the bill would have changed the Marine Mammal Protection Act's grandfather provision applicable to the importation of polar bear trophies from Canada to allow the importation of all bears taken legally in Canada before 18 February 1997, the date on which the Fish and Wildlife Service published its regulations allowing imports from some, but not all, of the Canadian populations. This would replace the existing provision, which allows importation of those bears taken before 30 April 1994, the date on which the 1994 amendment authorizing imports was enacted. Imports of polar bear trophies taken after the cut-off date would continue to be allowed only if the bear was taken from one of the populations approved by the Service. Other amendments included in the Gilchrest bill would have extended existing certificates of exemption issued under the Endangered Species Act that allow for the manufacture and sale of scrimshaw products for an additional eight years and would have eliminated the requirement that the Marine Mammal Commission be staffed by no fewer than 11 employees.

Congressional Hearing

The House Subcommittee on Fisheries Conservation, Wildlife, and Oceans convened a hearing on 13 June 2002 to solicit comments on H.R. 4781. The Commission's Chairman provided testimony on behalf of the Commission. Other agencies represented on a panel of government witnesses included the Department of Defense, the Navy, the National Marine Fisheries Service, and the Fish and Wildlife Service. A second, nongov-

ernment panel consisted of representatives of environmental organizations, commercial and sport fishermen, and, representing the scientific community, a research oceanographer. (See Appendix D of this report for the Commission's testimony.) The statements of the other witnesses who testified at the hearing can be found at the House Resources Committee's web site (http://www.house.gov/resources/107cong/fisheries/2002jun13/agenda.htm).

For the most part, the Commission believed that the proposals included in H.R. 4781 were appropriate, but believed that several of the provisions needed to be expanded to address a broader range of issues. For example, the Commission supported the proposed amendment concerning exports of marine mammal handicrafts for purposes of cultural exchanges, but advocated further amendments to update other provisions of the Act to account for the export prohibition added by the 1994 amendments. The Commission also recommended an amendment to the prohibition section of the Act to reinstate a provision originally enacted in 1981 but dropped under the 1994 amendments. Reinstatement of that provision would clarify that, in an enforcement action involving the unlawful transport, purchase, or sale (and now export) of a marine mammal, it is irrelevant whether the underlying taking also constituted a violation of the Act.

The Commission supported the proposed amendment to expand coverage of take reduction plans to include certain recreational fisheries, but questioned whether the National Marine Fisheries Service would be able to collect the necessary information to do so unless conforming amendments were made to related provisions to establish registration, monitoring, and reporting requirements. The Commission also supported the proposal to direct additional efforts at developing effective, non-lethal methods for deterring pinnipeds from engaging in harmful interactions with fishing operations. The Commission noted, however, that the language used in the bill suggested that it was seeking to address a broader range of issues involving "nuisance pinnipeds." It therefore suggested that the Committee provide additional guidance as to what types of problems it expected the research to address.

The Commission also supported the proposed amendment to streamline the process for issuing permits authorizing the importation of polar bear trophies from Canada. In doing so, the Commission noted that providing additional opportunity for public comment at the permitting stage was unnecessary because the only issue to be resolved is whether the bear was legally taken from an approved population. The Commission's testimony provided some technical drafting suggestions to clarify the intent of the provision and to conform other provisions of the Act to the proposed amendment.

The Commission expressed its appreciation for the intent behind the proposed amendment to eliminate the minimum staffing requirement for the agency, thereby providing the Commission with greater flexibility in allocating its resources to meet its responsibilities. The Commission's Chairman explained, however, that there also needs to be a recognition that there is some minimum staff size below which the Commission is no longer able to function effectively or to meet the demands of its increasing workload. He pointed out that Congress previously had determined that 11 was the minimum size below which operation of the Commission would be compromised and sought assurance that, by proposing this amendment, the Committee was not backing away from its tradition of support for and recognition of the value of having a fully staffed and effectively operating Marine Mammal Commission.

The Commission was most concerned with what had been omitted from the bill. Foremost among these were amendments to clarify the Act's definition of the term "harassment" and to expand the existing authority for establishing cooperative agreements under section 119 of the Act to authorize the National Marine Fisheries Service and the Fish and Wildlife Service to enter into enforceable harvest management agreements with Alaska Native organizations. Such agreements would allow the parties to manage subsistence taking of marine mammals before a stock becomes depleted. The Commission noted that such a provision had been included in a working draft bill circulated by Committee staff during 2001 and sought clarification as to whether its omission from the introduced bill reflected a determination by the Committee that a harvest management amendment does not merit further consideration.

The Commission called on the Subcommittee to consider several other possible amendments

to address issues that had been raised by the Commission and others at previous reauthorization hearings. With respect to the regime governing the taking of marine mammals incidental to commercial fishing operations, the Commission recommended that the Subcommittee consider amendments to (1) specify that a take reduction plan need not be prepared for those strategic stocks for which mortality or serious injury related to fisheries is inconsequential, (2) clarify that it constitutes a violation of the Act to participate in any category I or II fishery without having registered under section 118, regardless of whether incidental takes occur, (3) specify that all participants in category I or II fisheries, whether registered or not, are subject to the observer requirements of section 118, and (4) add a provision to enable reliable information to be collected on the numbers and types of fishery-related mortalities and injuries involving California sea otters. The Commission's testimony also noted that funding for the observer program established under section 118 has not always been sufficient and recommended that the Subcommittee consider possible solutions, including securing contributions from the involved fisheries.

Permit-related issues also merited inclusion in the Commission's testimony. Although some of the issues highlighted by the Commission at previous hearings had been addressed in the introduced bill, the Commission remained concerned about the appropriateness of maintaining cetaceans in traveling exhibits, which present special problems for successful husbandry. The Commission's testimony also described problems with the current provisions for authorizing marine mammal exports. This prompted the Commission to recommend that the interested parties meet to consider better ways to achieve the goal of providing reasonable assurance that marine mammals exported from the United States will be well cared for throughout their maintenance in captivity, and that realistically reflects the ability of U.S. agencies to identify and correct deficiencies at foreign facilities, while not establishing unnecessary barriers to the exchange of marine mammals among qualified facilities.

The Commission's testimony raised several other issues as deserving the attention of Congress during the reauthorization process. Those included possible amendments to provide greater flexibility in funding options for the Marine Mammal Unusual Mortality Event Fund, to update the Act's penalty provisions to reflect changed economic circumstances since they were enacted 30 years ago, to allow forfeiture of a vessel's catch for fishing in violation of section 118 of the Act, and to give the National Marine Fisheries Service similar authority to that in place for the Fish and Wildlife Service that allows fines collected under the Act to be used for the protection and recovery of marine mammals. The Commission also recommended that the Subcommittee consider updating section 110 of the Act to direct the responsible agencies to pursue pressing, broad-scale research, such as an investigation of ecosystem-wide shifts in the Bering and Chukchi Seas and an examination of possible changes in the coastal California marine ecosystem that may be contributing to the recent declines in the California sea otter population. The Commission also thought that Congress should consider establishing a take reduction process for activities other than commercial fisheries, such as ship strikes of whales.

The Subcommittee Chairman had also asked that the Commission's testimony address implementation of the bilateral polar bear agreement concluded between the United States and Russia in October 2000. In response, the Commission briefly discussed the expected benefits of the agreement, which, among other things, will give the parties the ability to regulate the number of bears removed from the Bering-Chukchi Seas population, will help ensure that the United States is fully meeting its obligations under the multilateral 1973 Agreement on the Conservation of Polar Bears, and will lead to enhanced research efforts, which are expected to improve our ability to estimate the size of the population and to determine whether authorized removals are sustainable. The Commission noted that, before the bilateral agreement takes effect, the Senate must provide its advice and consent. The Commission's testimony indicated that draft implementing legislation had been prepared and was being reviewed within the Administration.

The Commission expressed its support for implementation of the agreement and noted that the agreement also is strongly supported by the Alaska Native community and by several conservation organizations. The Commission encouraged the Subcommittee to take all necessary action to see that implementation of the agreement occurs.

Mark-up of H.R. 4781

The Subcommittee on Fisheries Conservation, Wildlife, and Oceans met to mark up H.R. 4781 on 25 July 2002. At that time, Congressman Gilchrest offered an amendment in the nature of a substitute bill, which included three substantive amendments. First, the proposed authorization for exports of marine mammals under section 101(a)(6) of the Act was expanded to include exports of marine mammal products legally possessed by a citizen of the United States in conjunction with travel outside the United States. Second, an extension of the specific authorization of appropriations to carry out cooperative agreements entered into between federal agencies and Alaska Native organizations under section 119 was added to the bill. Third, the proposed expansion of the incidental take regime for commercial fisheries to include some recreational fisheries at the take reduction stage was further expanded to bring recreational fisheries with high rates of incidental taking more fully within the program for monitoring and reducing such taking. At the hearing, the Subcommittee chairman indicated that just because other proposed provisions had not been included in the substitute bill, it did not necessarily mean that they would not be considered later in the legislative process.

Administration Bill

The Clinton Administration transmitted a comprehensive reauthorization recommendation to Congress in 2000. When the Bush Administration came to office in 2001, it reassessed that proposal so it could submit its recommendation to Congress regarding reauthorization of the Marine Mammal Protection Act. The agencies with primary responsibility for implementing the Act, as well as other agencies with an interest in the Act, spent much of 2001 and 2002 updating and seeking consensus on a new Bush Administration bill.

The General Counsel of the Department of Commerce on 18 September 2002 transmitted to Congress a new recommended Administration reauthorization bill, entitled "the Marine Mammal Protection Act Amendments of 2002." The bill would have authorized appropriations for the Marine Mammal Commission, the Department of Commerce, and the Department of the Interior to carry out their responsibilities under the Act through fiscal year 2007. In addition, the bill recommended extensive revisions to the Act to address various problems that had arisen since the last reauthorization and to clarify certain provisions of the 1994 and 1997 amendments. Although patterned on the bill proposed in 2000, the bill transmitted to Congress in 2002 differed in several respects. The similarities and differences between the two proposals are discussed below. The full text of the proposed amendments, as well as the accompanying statement of purpose and need, can be found at the National Marine Fisheries Service's web page (http://www. nmfs.noaa.gov/prot_res/ PR2/ MMPA_ Reauthorization).

Management of Taking by Alaska Natives—As with the bill proposed in 2000, a central provision of the 2002 Bush Administration bill was the harvest management provision worked out between the National Marine Fisheries Service, the Fish and Wildlife Service, the Marine Mammal Commission, and representatives of the Alaska Native hunting community. Unlike existing section 119, which currently enables the National Marine Fisheries Service and the Fish and Wildlife Service to enter into cooperative agreements with Alaska Native organizations, the harvest management agreements entered into under the new provision would be enforceable by both parties. Thus, any limitation on when, where, how, or how many marine mammals may be taken that was agreed to by the parties to the agreement would be binding on all members of the Alaska Native tribes or organizations that are signatories to the agreement. Currently, such limitations can be established only after the affected marine mammal stock has been determined to be depleted and, even then, only through formal rulemaking. Harvest management agreements would be limited to Alaska Native tribes or tribally recognized organizations as a means of ensuring that the Native party had sufficient authority to enforce the agreement with respect to its membership. The proposed amendment would require the Service to provide draft regulations to harvest management partners before imposing restrictions on Native taking and to seek their advice before making a depletion finding concerning any species or stock covered by such an agreement. In addition, the proposed amendment would: (1) provide for cooperative enforcement by the Services and Native organizations, (2) provide an opportunity for public review and comment prior to approval of a co-management agreement, and (3)

authorize specific funding to carry out the new provisions.

The 2002 proposal differs in certain respects from that proposed in 2000. Among other things, the agreements would be referred to as "harvest management agreements" rather than "co-management agreements." Under the revised proposal, agreements would need to describe the underlying tribal authority and the procedures that will be used to promulgate and enforce regulations or ordinances under that authority. Language was also added to the proposal to clarify that agreements with tribal authorities would not apply to taking, transporting, selling, or possessing a marine mammal for purposes other than subsistence or the creation and sale of authentic Native handicrafts and clothing. In addition, a conforming amendment included in the 2000 proposal to address how return of management authority for marine mammals to the State of Alaska would be affected by harvest management agreements was dropped from the 2002 proposal as being unnecessary. The 2002 proposal also added a disclaimer indicating that the proposed amendments are not intended to affect in any way the existing authorities of Alaska Native villages, Alaska Native tribes, tribally authorized organizations, or any other Alaska Native organizations. The last difference was the addition in the 2002 proposal of a definition of the term "tribally authorized organization."

Cultural Exchanges and Exports—As part of a package of permit-related amendments enacted in 1994, Congress added a provision to prohibit the export of marine mammals for purposes other than public display, scientific research, or enhancing the survival of a species or stock. Although this prohibition is subject to exceptions set forth elsewhere in the Act, it was added late in the 1994 reauthorization process, and its drafters neglected to include any such exceptions. Thus, certain types of exports that had been permissible before 1994 arguably could no longer be authorized.

The 1994 amendments also added section 101(a)(6) to the Act to allow marine mammal products to be imported into the United States if they are (1) legally possessed and exported by a U.S. citizen in conjunction with foreign travel, (2) obtained by an Alaska Native outside the United States as part of a cultural exchange, or (3) owned by a Native inhabitant of Russia, Canada, or Greenland and are being imported for noncommercial purposes in conjunction with personal travel or as part of a cultural exchange with an Alaska Native. However, the drafters of this provision did not anticipate enactment of the export prohibition. Thus, many U.S. citizens may not be able to avail themselves of the import provision because they could not have legally exported the item in the first place. Similarly, Natives from other countries who bring marine mammal items into the United States under this provision may face difficulties when they try to take those items with them when they depart.

To address these and related problems, both the bill proposed in 2000 and that proposed in 2002 would have amended several sections of the Act to indicate when exports of marine mammals or marine mammal products are allowed. Among other things, the amendments proposed by the Clinton Administration would have clarified that exports are permissible or may be authorized in the following instances: exports related to foreign travel or as part of a cultural exchange, exports of authentic Native handicrafts, and exports related to a waiver of the Act's moratorium on taking or importing marine mammals. The 2000 proposal would also have clarified that permits may be issued to authorize the export of marine mammals for purposes of public display, scientific research, and species enhancement. Although such exports are currently allowed, the existing provisions are geared toward transfers of marine mammals from U.S. facilities, which does not require a permit, rather than the take of marine mammals from U.S. waters for direct export to foreign facilities. The proposed amendments to section 104 would have supplemented the existing mechanisms for authorizing exports by allowing permits to be issued to authorize certain exports not currently covered by the existing provisions, but would not have required that a permit be obtained in those instances where a permit currently is not required. With two exceptions, the Bush Administration's proposal tracked the provisions of the 2000 bill. The 2002 bill no longer proposed amendments to section 101(a)(6), dealing with foreign travel and cultural exchanges, or to section 101(b), dealing with exports of Native handicrafts, because of concerns expressed by some agencies about whether these provisions were consistent with the equal protection clause of the U.S. Constitution.

Both versions of the proposed bill would also have amended the Act's prohibition section to revert to language enacted in 1981, but changed by the 1994 amendments. The proposed change would close a potential loophole by clarifying that unauthorized transports, purchases, sales, or exports of marine mammals or marine mammal parts constitute violations of the Act regardless of whether the underlying taking was legal.

Permit-Related Amendments—Three sections of both the 2000 bill and that recommended by the Bush Administration would have addressed specific problems that have arisen with respect to permits under the Act. As discussed in previous Commission reports, the 1994 amendments added a provision authorizing the issuance of permits for the importation of polar bear trophies from Canada. Currently, the Fish and Wildlife Service is required to publish in the *Federal Register* a notice of the receipt of the application for each such permit and a notice of issuance for each permit. Inasmuch as the only determination to be made is whether the trophy to be imported was legally taken in Canada before the enactment of the 1994 amendments or from an approved population, and because no public comments on individual imports have been submitted, the proposed bill would have streamlined the permitting process by eliminating these publication requirements. In their place, to ensure that the public continues to have access to information on these types of permits, the Service would have been required to make available on a semiannual basis a summary of all such permits issued or denied. The Service would still have been required to publish a notice of any application received seeking authority to import a polar bear trophy taken from an unapproved population. Although some technical corrections were made in the 2002 proposed bill, it remained substantively identical to the earlier proposal.

Another question that has arisen in the past several years is whether releasing captive marine mammals to the wild constitutes a taking that requires authorization under the Act. The Commission, the National Marine Fisheries Service, and others subscribe to the view that releasing marine mammals has the potential to injure the animals or wild populations exposed to the animals and, therefore, is a taking. This position was adopted by the presiding administrative law judge in a 1999 ruling in an enforcement proceeding brought by the National Marine Fisheries Service against individuals who had released two long-term captive dolphins without obtaining authorization. The bill proposed in 2000 would have codified this interpretation by adding an explicit prohibition on releasing captive marine mammals unless authorized by a permit or under section 109(h) of the Act, which authorizes the rehabilitation and release of stranded marine mammals. Because of the Navy's concerns that marine mammals that it maintains for military and research purposes might fit under this provision, the Bush Administration bill added an exception to exclude the temporary release of such animals.

The 1994 amendments to the Marine Mammal Protection Act eliminated most of the authority of the National Marine Fisheries Service and the Fish and Wildlife Service over captive marine mammals. One result of this shift in agency responsibilities was the invalidation of a long-standing National Marine Fisheries Service policy against issuing permits for traveling displays of dolphins or other cetaceans. This policy had been instituted because of the high stress levels and other risks posed by such exhibits on this group of animals. Both the 2000 proposal and the Bush Administration proposal would have reinstated the ban on traveling cetacean exhibits through an amendment to the Act's prohibition section.

Fisheries Provisions—As discussed in Chapter IV, the 1994 amendments to the Marine Mammal Protection Act established a new regime to govern the taking of marine mammals incidental to commercial fishing operations. This regime replaced an interim exemption for commercial fisheries that had been in place since 1988. The bill proposed in 2000 and that proposed by the Bush Administration in 2002 would have struck the interim exemption provisions (section 114 of the Act), which are no longer operative, and would have made certain modifications to the current provisions. Most notably, the proposed amendments would have expanded the coverage of the incidental take regime to include not only commercial fisheries, but certain recreational fisheries as well. This proposed change was considered desirable because, in some areas, recreational fishermen use the same gear and fishing techniques as do commercial fishermen, yet are not subject to the requirements of section 118 pertaining to monitoring, reporting, and take reduction. The specific amendments proposed in the 2002 bill to address taking incidental to rec-

reational fisheries took a more targeted approach than did the 2000 proposal by directing efforts at those recreational fisheries with the highest incidence of marine mammal mortalities and serious injuries.

Other possible amendments included in both Administration's proposals would have (1) clarified that it is a violation of the Act to engage in a fishery that frequently or occasionally takes marine mammals (category I and II fisheries) without having registered; (2) clarified that owners of vessels engaged in category I and II fisheries are required to carry an observer when requested, whether or not they are registered; (3) consolidated all section 118 prohibitions into a single subparagraph to eliminate possible confusion; (4) eliminated the requirement to prepare a take reduction plan for a strategic stock if it is determined that fishery-related mortality and serious injury are having a negligible impact on that stock; and (5) required that California sea otters be factored into monitoring and observer placement decisions, even though takings of this species would still not be authorized. Both the 2000 bill and the 2002 bill also proposed deleting subsection 120(j) of the Act, which contains provisions applicable to the Gulf of Maine stock of harbor porpoises that are no longer needed.

The Bush Administration bill contained additional provisions that had not been included in the 2000 Administration proposal. It would have revised the provisions concerning take reduction teams to require the Secretary to assign a technical liaison to each team and to reconvene each team to review proposed regulations implementing the take reduction plan and any proposed changes to the draft plan prepared by the team. In addition, the 2002 bill included a new section that would have directed the Secretary of Commerce to undertake and fund research to develop improved fishing methods and gear aimed at reducing the take of marine mammals incidental to fishing operations.

The 2000 and 2002 proposed bills also recommended several technical changes to the Act's tuna-dolphin provisions to correct or clarify certain provisions of the 1997 International Dolphin Conservation Program Act.

Enforcement and Penalties—The fines and other penalties that may be assessed under the Marine Mammal Protection Act have not been increased since the Act was originally enacted in 1972. To account for inflation since that time and to enhance effective enforcement of the Act, both the 2000 bill and that recommended by the Bush Administration would have increased the maximum civil penalty from $10,000 to $50,000 for each violation. Maximum criminal fines would have been increased from $20,000 to $100,000 per violation. Similarly, the maximum fine that could be assessed against a vessel for violating the Act would have been increased from $25,000 to $50,000. Another proposed amendment included in both bills would have allowed for the seizure and forfeiture of a vessel's cargo (including fish) for fishing in violation of the provisions of section 118 of the Act.

The proposed amendments also would have added a new provision explicitly prohibiting various actions that frustrate implementation and enforcement of the Act. The recommended provision would make it illegal to refuse a lawful vessel boarding, interfere with an authorized search or inspection, or submit false information in an investigation. Under the Bush Administration proposal, an enhanced penalty of up to $200,000 would have been made available for offences involving the use of a dangerous weapon, that causes bodily injury to enforcement officials, or that places enforcement officials in fear of imminent bodily injury.

One other proposed amendment included in the 2002 bill, but not the 2000 proposal, would have directed the Secretary to seek to enter into agreements with state law enforcement agencies to establish, implement, and fund cooperative enforcement efforts under the Act.

Marine Mammal Commission—The Marine Mammal Protection Act currently limits the amount that the Commission may compensate experts or consultants to $100 per day. This limitation, in today's economy, prevents the Commission from securing the services of virtually all experts and consultants. Both proposed bills would have eliminated this restriction and placed the Commission on an equal footing with other government agencies.

Marine Mammal Health and Stranding Response—Under both the 2000 and the 2002 proposed bills, appropriations would have been authorized to carry out Title IV of the Marine Mammal Protection Act for a five-year period. In addition, proposed amendments to section 402 (data collection), section 403 (stranding response agree-

ments), and section 406 (indemnification) would have specified that these provisions apply to disentanglement activities as well as to stranding responses. Under a proposed amendment added to the 2002 bill, general funding provided to implement the Act, whether or not earmarked for unusual mortality response, could have been placed in the unusual mortality event fund.

Research Grants—Section 110 of the Marine Mammal Protection Act authorizes the National Marine Fisheries Service and the Fish and Wildlife Service to make grants or otherwise fund research pertaining to the protection and conservation of marine mammals and identifies specific research projects to be undertaken. All of the projects specified under this provision, however, should now have been completed. Therefore, the Bush Administration proposal submitted to Congress in 2002 recommended that the provisions applicable to those projects be deleted. In addition, it was proposed that section 110 be expanded to clarify that research be directed not only at specific marine mammal issues but at ecosystem-level problems as well. In this regard the proposed language identified studies of two such problems that should be given high priority — a Bering Sea–Chukchi Sea ecosystem study and a study of the California coastal marine ecosystem. This proposal was substantially the same as that recommended by the previous administration except that it did not include a separate funding authorization for research projects under section 110.

Definition of Harassment—Although harassment has been one element of the term "take" since the Marine Mammal Protection Act was enacted in 1972, a definition of harassment was not added to the Act until 1994. Under that definition, Level A harassment is any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild. Level B harassment is defined as any act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. The definition has been subject to differing interpretations. For example, as discussed in Chapter IX, the National Marine Fisheries Service, in the context of small-take authorizations, has recently adopted the position that, to constitute Level B harassment, any disturbance must *significantly* disrupt behavior patterns. The Commission, in contrast, has noted that the statutory definition of harassment contains no such threshold, requiring only that an action have the potential to disrupt behavioral patterns. Further in this regard, the Commission has noted that using a significance criterion would likely complicate enforcement of the Act, requiring that the Service, to sustain a case, show not only that a marine mammal has been disturbed but that any such disturbance has had biological significance (e.g., by adversely affecting the animal's survival or reproductive potential).

To eliminate the ambiguities in the current definition and to provide greater predictability, the bills proposed in 2000 and 2002 would have redefined the term "harassment." Level A harassment would have been redefined to mean any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild. The definition of Level B harassment would have been split into two parts. First, Level B harassment would be any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering to a point where such behavioral patterns are abandoned or significantly altered. Second, Level B harassment would be any act directed toward a specific individual, group, or stock of marine mammals in the wild that is likely to disturb the mammal or mammals by disrupting behavior, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering.

Additional Amendments in the 2002 Bill—Two other provisions in the recommended bill submitted by the Administration in 2002 had no counterparts in the 2000 bill. A new provision was added that would have amended section 112 of the Act to require the Secretary of Commerce to use existing authorities under the Act to reduce the incidence of ship strikes of whales and to encourage further investigation of methods for avoiding such ship strikes. The other new proposal would have amended an existing provision of the Act that authorizes the Fish and Wildlife Service to use fines collected thereunder for the protection and recovery of marine mammals under its jurisdiction to confer similar authority on the National Marine Fisheries Service.

Related Legislation—During the 2002 session of Congress, two other bills proposing amendments to the Marine Mammal Protection Act were introduced. On 10 October 2002, Senator Murkowski, on behalf of himself and Senator Stevens, introduced S. 3104 to repeal the long-term goal for reducing the incidental mortality and serious injury of marine mammals incidental to commercial fishing operations to insignificant levels approaching a zero rate. Under the 1994 amendments that goal was to have been achieved by 2001. Focus on this issue was prompted by the filing of a lawsuit by environmental groups in August 2002 alleging failure of the National Marine Fisheries Service to comply with the requirements of section 118 of the Act as they pertain to the zero mortality rate goal. (See Chapter IV for a discussion of this case.) Congressman Young of Alaska and Congressman Jones of North Carolina introduced H.R. 5597, an identical bill, in the House of Representatives, also on 10 October.

Congressman Young introduced another bill, H.R. 4883, on 6 June 2002 to reauthorize the Hydrographic Services Improvement Act of 1998 and for other purposes. Although not in the original bill, the provision that had been included in H.R. 4781 (the Marine Mammal Protection Act reauthorization bill discussed above) concerning emergency assistance for subsistence whalers was added to the bill prior to its passage. The bill was signed into law as Public Law 107-372 on 19 December 2002. Although, technically, this is a free-standing provision, it is related to the Marine Mammal Protection Act, as well as the Endangered Species Act and the Whaling Convention Act. It is the only part of the Marine Mammal Protection Act bill that became law during the 2002 session and allows Alaska Native subsistence hunters to seek and receive assistance in towing struck whales to shore in emergency situations.

As discussed in Chapter XI, the conditions under which several polar bears were being maintained by a circus exhibiting the animals in Puerto Rico received considerable Congressional attention during 2001 and 2002. In response, Congressman Blumenauer and more than 30 co-sponsors introduced H.R. 3932, the "Polar Bear Protection Act of 2001," on 12 March 2002. That bill would not have amended the Marine Mammal Protection Act, but would have added a provision to Title 18 of the U.S. Code to make it unlawful to make available any polar bear for use in a traveling show or circus. The bill, however, was not enacted.

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, to make recommendations to the Department of Commerce, the Department of the Interior, and other federal agencies on research and management actions needed to conserve species of marine mammals.

To meet this charge, the Commission devotes special attention to particular species and populations that are vulnerable to various types of human-related activities, impacts, and contaminants. Such species may include marine mammals listed as endangered or threatened under the Endangered Species Act or as depleted under the Marine Mammal Protection Act (Table 2). In addition, the Commission often directs special attention to other species or populations of marine mammals not so listed whenver special conservation challenges arise that may affect them.

During 2002 special attention was directed to a number of endangered, threatened, or depleted species or populations. As discussed below, these include North Atlantic and North Pacific right whales, humpback whales in Alaska, the western North Pacific stock of gray whales, mid-Atlantic coastal bottlenose dolphins, Cook Inlet beluga whales, vaquita in the Gulf of California, Hawaiian monk seals, Steller sea lions, southern sea otters, and Florida manatees.

Other species not so listed, but which received special attention during 2002, include eastern North Pacific gray whales, killer whales in the eastern North Pacific, Gulf of Maine harbor porpoises, bottlenose dolphins (other than the mid-Atlantic coastal bottlenose dolphins), Pacific walruses, harbor seals in Alaska, polar bears, and sea otters in Alaska and Washington.

North Atlantic Right Whale *(Eubalaena glacialis)*

The North Atlantic right whale was once abundant in coastal waters on both sides of the North Atlantic Ocean, but is now one of the world's most endangered species of mammal, terrestrial or marine. Only a single population numbering about 300 whales survives in the North Atlantic. At least two separate populations existed historically. The eastern population along the coast of Europe was eliminated by commercial hunting that began in the 11th century and continued through the early 1900s. The western population, whose remnants are now found primarily along the coast of North America between Florida and southeastern Canada, was first exploited by Basque whalers in the Gulf of St. Lawrence in the mid-1500s. By the early 1600s thousands of western North Atlantic right whales had been killed, and by the early 1900s, its survivors numbered only a few hundred whales at most, and perhaps just a few tens of animals. With the exception of the eastern North Pacific right whale population found off Alaska in summer, the western North Atlantic right whale population is easily the most endangered marine mammal population in U.S. waters.

There are two other right whale species (the southern right whale, *E. australis*, found only in the Southern Hemisphere, and the North Pacific right whale, *E. japonica*), which also were hunted nearly to extinction by the early 1900s. (Although North Pacific and North Atlantic right whales are now considered separate species, both are still grouped together as northern right whales on the U.S. list of endangered and threatened species as shown in Table 2). Because of their perilous status, all right

Table 2. Marine mammals listed as endangered (E) or threatened (T) under the Endangered Species Act or depleted (D) under the Marine Mammal Protection Act, as of 31 December 2002

Common Name	Scientific Name	Status	Range
Manatees and Dugongs			
West Indian manatee	*Trichechus manatus*	E/D	Caribbean Sea and North Atlantic from southeastern United States to Brazil; and Greater Antilles Islands
Amazonian manatee	*Trichechus inunguis*	E/D	Amazon River basin of South America
West African manatee	*Trichechus senegalensis*	T/D	West African coast and rivers; Senegal to Angola
Dugong	*Dugong dugong*	E/D	Northern Indian Ocean from Madagascar to Indonesia; Philippines; Australia; southern China
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			
Caribbean monk seal	*Monachus tropicalis*	E/D	Caribbean Sea and Bahamas (probably extinct)
Hawaiian monk seal	*Monachus schauinslandi*	E/D	Hawaiian Archipelago
Mediterranean monk seal	*Monachus monachus*	E/D	Mediterranean Sea; northwestern African coast
Guadalupe fur seal	*Arctocephalus townsendi*	T/D	Baja California, Mexico, to southern California
Northern fur seal	*Callorhinus ursinus*	D	North Pacific Rim from California to Japan
Western North Pacific Steller sea lion	*Eumetopias jubatus*	E/D	North Pacific Rim from Japan to Prince William Sound, Alaska (west of 144° W longitude)
Eastern North Pacific Steller sea lion	*Eumetopias jubatus*	T/D	North Pacific Rim from Prince William Sound, Alaska, to California (east of 144° W longitude)
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 attenuata*	D	Eastern tropical Pacific Ocean
Coastal spotted dolphin	*Stenella attenuata graffmani*	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
Cook Inlet beluga whale	*Delphinapterus leucas*	D	Cook Inlet, Alaska
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
Western Pacific gray whale	*Eschrichtius robustus*	E/D	Western North Pacific Ocean
Sperm whale	*Physeter macrocephalus*	E/D	Oceanic, all oceans

Source: Fish and Wildlife Service regulations at 50 C.F.R. § 17.11 and National Marine Fisheries Service regulations at 50 C.F.R. § 216.15.

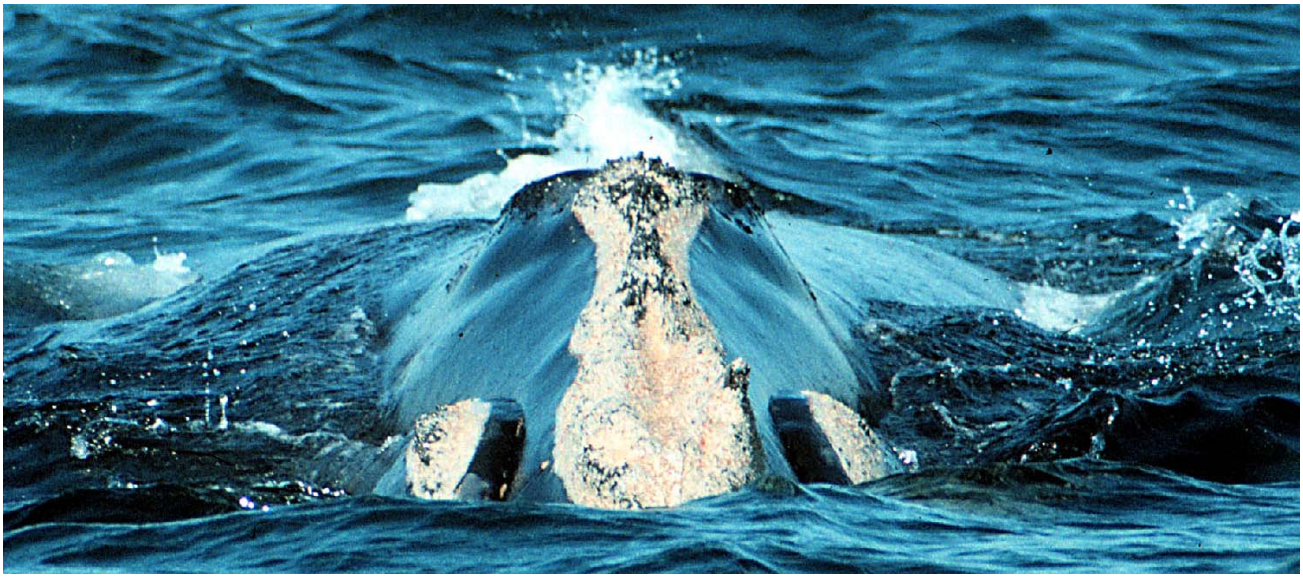

Figure 1. Unique patterns of collosities, such as those on the head of this right whale, change little after a right whale's first year of life and can be used to identify individual animals. (Photo by Moira Brown, courtesy of the Center for Coastal Studies.)

whales were protected under an international ban on hunting that also included gray whales. The ban was adopted by the League of Nations in 1935 and has been carried forward by the International Whaling Commission since the late 1940s. Although the ban made these the first whale species to receive international protection, some nations were slow to adopt the measure, and some whalers continued to kill right whales illegally. With time, however, acceptance of the ban increased, and since the 1970s, it appears that right whales have received full protection from deliberate hunting.

Information on North Atlantic right whales before the 1970s is limited largely to commercial catch records that are incomplete at best. Estimates of their abundance and understanding of their distribution before the 1970s are therefore poor. Over the past 25 years, however, scientists with research organizations and government agencies have photographed, identified, and catalogued almost every right whale in this population. Identification is based on scars and unique callosity patterns (i.e., raised patches of roughened skin found on the head, lips, chins, above the eye, and behind the blowholes [see Fig. 1]). Resighting histories recorded in this catalogue enable researchers to assess movements, calving rates, survivorship, scarring rates, and other life history parameters vital for monitoring the population's status and trends. The combination of sighting data and genetic data collected on known individuals since 1988 has made the North Atlantic right whale population one of the best-studied large whale populations in the world.

From early spring through fall, most North Atlantic right whales are found off New England and southeastern Canada where four major feeding habitats have been identified. These include (1) Cape Cod Bay, used principally between January and April, (2) the Great South Channel and northern edge of Georges Bank east of Cape Cod, used mainly from April through early July, (3) the lower Bay of Fundy, just north of the U.S.-Canadian border, used most intensively from August to October, and (4) the Roseway Basin off the southern tip of Nova Scotia, used in summer and fall. Females with nursing calves seem to prefer more protected inshore areas (e.g., Cape Cod Bay and the Bay of Fundy). Although some whales remain in New England waters year-round, it is not known where most right whales spend the winter.

Since the 1970s the western North Atlantic right whale population has shown little evidence of recovery and may now be declining. A recent modeling study suggests that its numbers grew at perhaps as much as 2.5 percent per year in the 1980s, but have been decreasing at about that rate since the early 1990s. This trend stands in sharp contrast to most other large whales, including the southern right whale, which has increased steadily

at 4 percent or more per year in recent decades. Deaths due to ship strikes and entanglement in commercial fishing gear (principally lines from lobster traps and gillnets, as determined by material removed from entangled whales and identified to date) appear to be a major reason for the population's failure to recover. From 1991 through 2002 nearly half of all right whale carcasses (16 of 34 carcasses) found along the eastern United States and Canada have been attributed to these two causes (12 ship strikes and 4 entanglements).

Other unrecorded deaths from these and other causes are likely. In 2001, for example, a badly entangled right whale, whose condition declined markedly as numerous rescue efforts failed to remove the attached gear, disappeared as it was being tracked with a satellite-monitored telemetry tag. It is thought to have died, but because its carcass was not found, it is not listed as a known death. At least eight other whales have disappeared after being last seen seriously entangled, and other whales killed by ships or entanglement undoubtedly go completely unobserved. As noted below, seven new seriously entangled whales (one of which was subsequently found dead) were seen in 2002.

When combined with natural mortality and the species' low rate of reproduction (on the average, adult females bear a single calf every three to six years), this level of human-related mortality could be the difference between a population that is declining and one that otherwise would increase. The modeling study noted above found that eliminating the deaths of just two female right whales per year could reverse the current decline. Since the early 1980s when directed right whale studies began, an average of about 12 calves per year has been born. A record high of 31 calves was seen in 2001, and 22 were counted in 2002. These high calf counts are encouraging, but they follow record low calving years between 1998 and 2000 when only six, four, and one were counted, respectively. Some researchers believe that the large fluctuations in annual calf counts reflect year-to-year changes in right whale food supplies, which could affect the fitness of adult females to carry calves to term. The encouraging reports of high calf counts in the past two years have been tempered by the death of at least 9 of the 53 calves born during that period.

Under the Endangered Species Act and the Marine Mammal Protection Act, the National Marine Fisheries Service is the lead federal agency responsible for right whale recovery work, but many other agencies and groups also perform vital tasks. In addition to the Marine Mammal Commission, cooperating federal and state agencies include the Army Corps of Engineers, the Coast Guard, the Environmental Protection Agency, the Navy, the Florida Fish and Wildlife Conservation Commission, the Georgia Department of Natural Resources, the Maine Department of Natural Resources, the Massachusetts Division of Fisheries, and the Rhode Island Division of Fish and Wildlife. Key nongovernmental partners include the Center for Coastal Studies, the Humane Society of the United States, the International Fund for Animal Welfare, the Massachusetts Environmental Trust, the National Fish and Wildlife Foundation, the New England Aquarium, the University of Rhode Island, the University of Georgia, and the Woods Hole Oceanographic Institution. Recovery work also is closely coordinated with the Canada Department of Fisheries and Oceans, which leads Canada's recovery efforts.

To guide and coordinate recovery work, the National Marine Fisheries Service prepared a right whale recovery plan in 1991 and subsequently established various advisory teams. Among these are two regional implementation teams charged with overseeing research and management activities. One team focuses on right whale feeding grounds off New England, and the other focuses on the calving grounds off Florida and Georgia. Pursuant to the Marine Mammal Protection Act, the Service also established the Atlantic Large Whale Take Reduction Team to help mitigate the incidental take of right whales in commercial fishing gear. A representative of the Marine Mammal Commission has participated in meetings of all three teams.

As discussed in previous annual reports, the Commission helped initiate right whale research off the U.S. East Coast in the late 1970s and made the initial recommendations for preparing a right whale recovery plan in the 1980s. In 1996, 1998, and 2000 the Commission conducted reviews of right whale recovery work by key program participants to identify research and management priorities. Results of those reviews are described in past annual reports. The following describes developments and activities in 2002.

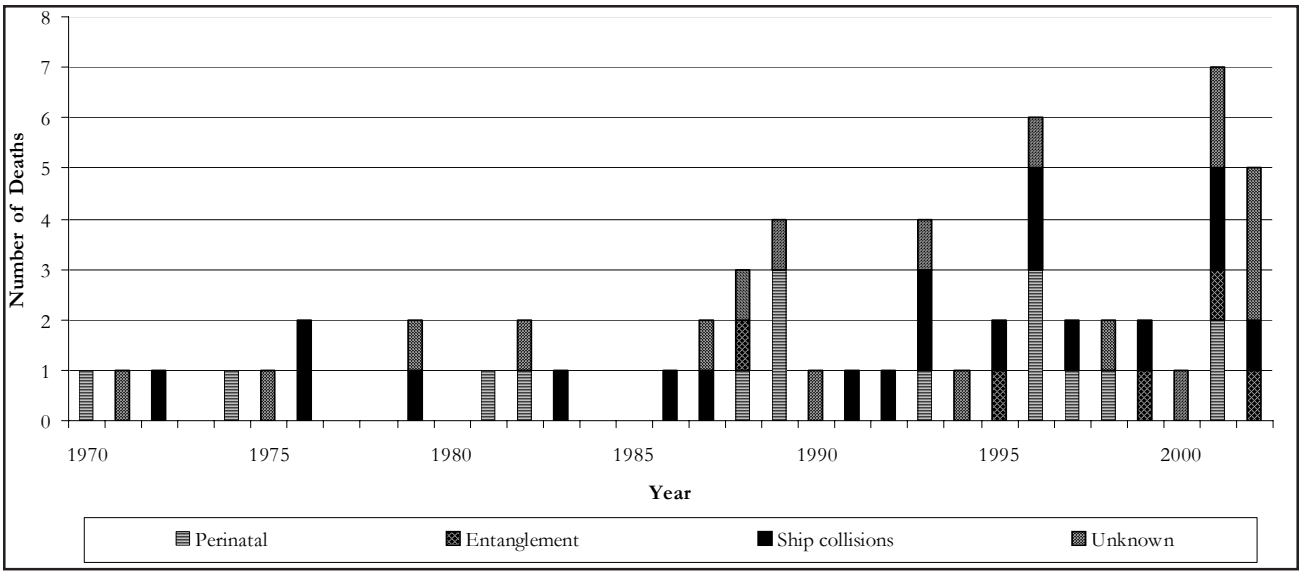

Figure 2. Known mortality of North Atlantic right whales, 1970–2002. (Assignments for cause of death in 2002 are preliminary.)

Right Whale Mortalities and Injuries in 2002

Since 1970, when the collection of data on right whale mortalities along the eastern United States first began, 58 dead right whales have been found along the eastern U.S. and Canadian coasts, including five in 2002 (see Fig. 2). Perhaps two or three times the number of known deaths go unrecorded because carcasses drift far offshore where they are eaten by scavengers and sink undetected. As a result, the total number of deaths, including those due to ship strikes and entanglements, undoubtedly exceeds the numbers shown in Figure 2. Of the five carcasses found in 2002, three died of unknown causes, at least one was hit by a ship, and at least one died of injuries from entanglement in fishing gear. All were either calves or yearlings and four were females.

Right Whale Deaths—The first carcass found in 2002 was a male calf spotted by a right whale aerial survey team about 95 nmi east of Cape Ann, Massachusetts, on 10 June. Due to weather and the animal's decomposed state, it could not be towed ashore for necropsy. Some tissue samples were collected at sea, but cause of death could not be determined. The second carcass, also a calf, was found by a recreational boater on 22 August, 23 nmi east of Ocean City, Maryland. Although badly decomposed, it was towed to shore and found to have a deep propeller wound on its back, indicating that it had been struck by a ship while alive and died as a result.

The third carcass was a yearling found on 3 September by a recreational fisherman about 20 nmi east of Chincoteague, Virginia. The fourth carcass was a calf first seen by a passing U.S. Navy vessel on 6 September about 90 miles southeast of Ocean City, Maryland. Due to their advanced decomposition, neither of the two whales was retrieved. However, two badly decomposed carcasses assumed to have been the same animals subsequently washed ashore—one on 16 September south of Oregon Inlet on North Carolina's Outer Banks and the other on 25 September at False Cape State Park, Virginia. Genetic samples were taken to verify that they were the same dead animals seen and sampled offshore, but results of those analyses were not available as of the end of 2002. In neither case could a cause of death be determined.

The last carcass found in 2002 was a yearling (whale #3107) that washed ashore on Nantucket Island, Massachusetts, on 12 October. It was emaciated and had a deep wound on its tail stock. Preliminary analyses suggest that wounds on the tail stock contributed to the whale's death. The whale was previously seen entangled in commercial fishing gear on 6 July in the Bay of Fundy off Nova Scotia's southwestern coast. At that time it had several wraps of line around its tail stock and an orange buoy attached to the trailing line. After

several unsuccessful disentanglement attempts, the attached gear was removed on 1 September by which time the attached rope had cut a deep gash into the animal's tail stock. It was last seen alive but in poor condition in the Great South Channel on 30 September.

Right Whale Injuries—In addition to the yearling that died apparently of entanglement wounds, six other serious and potentially fatal entanglements were documented in 2002. On 12 February an adult male added to the right whale catalogue in 1981 (whale #1424) was found seriously entangled by an aerial survey team five miles off Amelia Island, Florida. It had line caught in its mouth, looping over the back, and trailing 150 to 300 feet behind the flukes. It was resighted off Cape Cod, Massachusetts, on 29 March, noticeably thinner. A whale disentanglement team attached a satellite telemetry tag to the trailing line on 17 April to help follow the animal for rescue efforts, but the tag fell off the following day. It was briefly resighted east of Nantucket on 6 May and 12 May and was last seen, still entangled, 15 miles east of Cape Cod on 18 June.

On 7 April 2002 an entangled yearling (whale #3120) was seen by a party boat captain 15 miles south-southeast of Cape Fear, North Carolina. It had rope caught in the mouth with wraps around the rostrum, body, and possibly a flipper, and a buoy was attached to the trailing line. The whale could not be relocated for disentanglement, but was briefly resighted on 23 May in the Great South Channel off Cape Cod, Massachusetts. On 25 July it was resighted in the Bay of Fundy in poor condition and still entangled. A telemetry tag was attached during an unsuccessful disentanglement effort on 24 August, but it came off the next day with some, but not most, of the line. The whale had not been resighted as of the end of 2002.

On 12 June an entangled adult male (whale #1427) was reported by a recreational boater 15 miles east of Atlantic City, New Jersey. The whale had line caught in its mouth and possibly around its flipper; about 150 feet of line and an attached buoy were trailing from its flukes. Cuts from the rope were evident on its head and flipper. About 300 feet of line was removed the same day, and a satellite tag was attached to the remaining line to help relocate the animal for further disentanglement work. Unfortunately a well-meaning charter boat captain cut the buoy off two days later, and the whale was last seen on 21 June off Georgia, still entangled in the remaining gear.

The other seriously entangled whales included an adult female (whale #2330) seen with two wraps of line through the mouth and around the rostrum on 4 August in the Bay of Fundy and last seen 10 August; another adult female (whale #1815) was seen only once off the southern tip of Nova Scotia with line across the back behind the blowhole; and an unidentified right whale was seen once on 30 August in the central Bay of Fundy with one, and possibly two, tight wraps of line around the rostrum. One other minor entanglement that was seen involved an adult female (whale #2040) accompanied by a calf in Baie de Chaleur, New Brunswick, in the western Gulf of St. Lawrence with line on the tail and in the mouth. That whale was resighted in good condition without attached gear and still accompanied by its calf in the Bay of Fundy on 17 September.

Thus, including the whale that died of apparent entanglement injuries and the minor entanglement, a total of eight right whales was seen entangled in 2002, six of which were still seriously entangled on last sighting.

Entanglement of Right Whales in Fishing Gear

Entanglement in commercial fishing gear poses a serious threat to right whales. In 2002 there were at least one death likely due to entanglement and six potentially fatal entanglements. This was the largest number of such entanglements on record. Because disentanglement efforts either were not possible or were unsuccessful, all six of the whales with potentially fatal entanglements remained entangled when last seen in 2002. A recent analysis also documents 48 whales observed with serious entanglements between 1970 and 2002, at least eight of which have not been resighted in the past six years and have likely died.

Atlantic Large Whale Take Reduction Plan—The Marine Mammal Protection Act requires that the National Marine Fisheries Service convene take reduction teams to help develop take reduction plans for "strategic" marine mammal stocks whose members are incidentally killed or seriously injured by commercial fisheries in U.S. waters. Stocks of marine mammals that are listed as endangered or threatened under the Endangered Species Act are automatically considered strategic

stocks. The Marine Mammal Protection Act further directs that the goal of take reduction plans shall be to reduce the number of deaths and serious injuries among strategic stocks to levels below their calculated potential biological removal level (PBR) within six months of a plan's implementation date. PBR is calculated using a formula designed to estimate the number of animals that can be removed from a stock each year (other than by natural causes) while still maintaining a high degree of assurance that it will continue to increase toward or remain at its optimum sustainable population level. Because of its critically endangered status, the PBR for North Atlantic right whales has been determined to be zero.

Although it often is impossible to identify the source of ropes and lines removed from entangled right whales and other large whales, most of the material removed from whales along the U.S. East Coast that has been identified has been from gillnets or lobster traps. The Atlantic Large Whale Take Reduction Plan has therefore focused exclusively on reducing entanglement risks from these fisheries. Three basic approaches have been used: (1) disentangling whales, (2) seasonal or temporary fishing closures in times and areas where right whales occur most often, and (3) requirements that fishing gear incorporate features that might make it less likely to entangle whales.

Although all three approaches seem appropriate and important, the Commission has written to the Service on numerous occasions expressing its belief that the plan as developed has done little to reduce entanglement risks. Among other things, the Commission believes that the plan has placed too much reliance on abilities to disentangle whales; made too many exceptions to fishery closures, which have resulted in little reduction in fishing activity and little protection against increased fishing effort in high-use right whale habitats; and relied too heavily on gear restrictions that, in most cases, offered questionable benefits for reducing entanglement risks. It therefore has recommended repeatedly that the Service adopt more restrictive seasonal fishing closures within designated right whale critical habitats (see Fig. 4) and stronger restrictions regarding required gear characteristics.

As right whale deaths and entanglements continued in 2001, the Service reconvened the Atlantic Large Whale Take Reduction Team on 27–28 June 2001 to obtain advice on strengthening the take reduction plan. The team includes representatives of regional gillnet and lobster fisheries, environmental groups, the scientific community, and involved federal and state agencies, including the Marine Mammal Commission. After considering the team's advice, the Service proposed three sets of regulatory changes to the plan in the fall of 2001. As discussed below, the Commission commented on all three rules, which were subsequently adopted by the Service early in 2002.

Gear Design Requirement—On 1 October 2001 the Service proposed changing a list of gear technology options previously established for lobster traps and gillnets. Under previous regulations, the Service required that lobster fishermen select one of several options, including use of line 7/16-in. or less in diameter for buoy lines. That option was based on an assumption by the Service that whales could break line up to that thickness and thereby free themselves if they became entangled. Because use of such line was common practice, this option allowed most fishermen to comply with the requirements without changing their gear. The Service's October proposal called for deleting this option in 2003 because it had determined that line thickness was not necessarily proportionate to breaking strength.

Other options on the Service's list included weak links on buoy lines and gillnet float lines. By making it easier for buoys to separate from lines and gillnet float lines to break, it was thought that whales might be less likely to become entangled or injured. Depending on gear type, the Service's October proposal called for requiring weak links with lower breaking strengths than previously required.

Figure 3. A breaching North Atlantic right whale. (Photo by Amy Knowlton, courtesy of the New England Aquarium.)

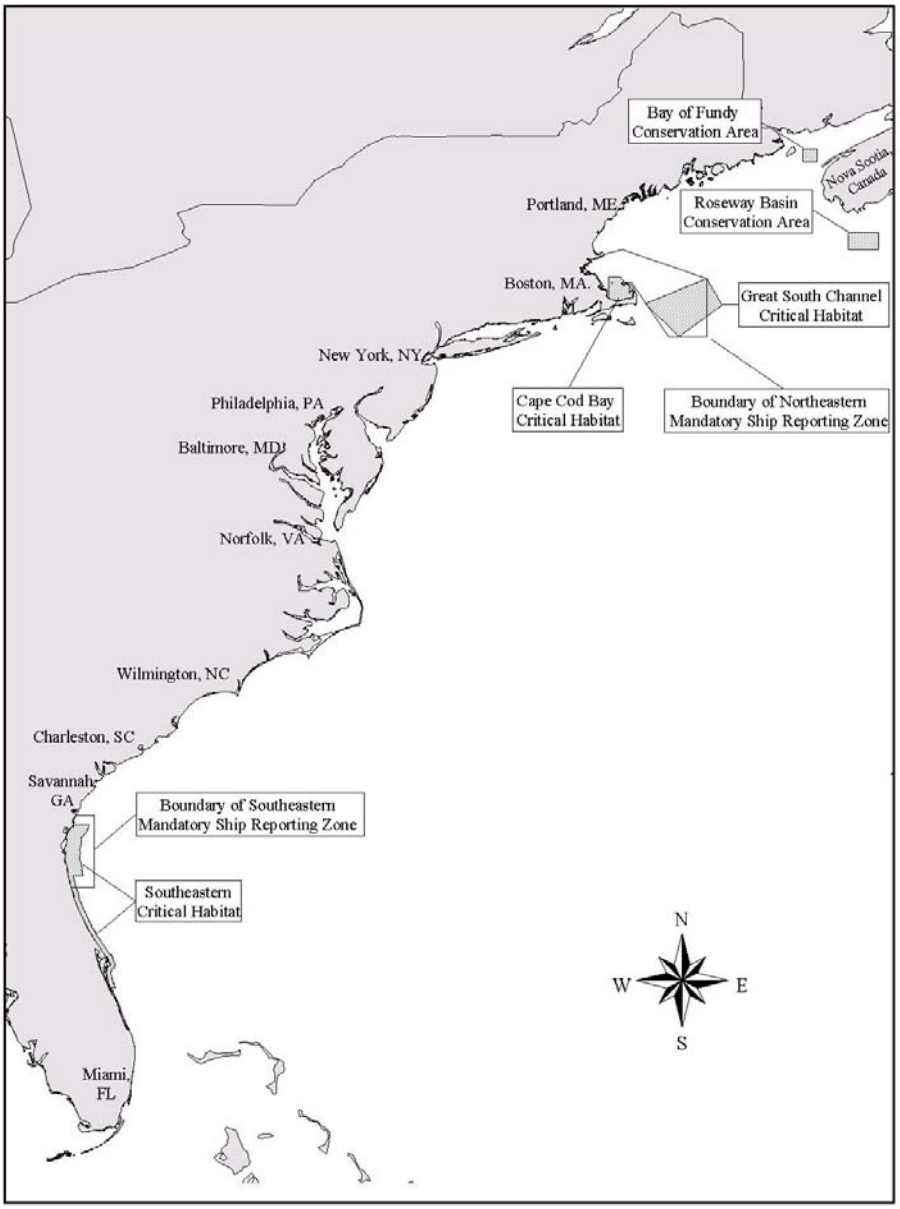

Figure 4. Designated critical habitats and mandatory ship reporting zones for North Atlantic right whales. (Figure by Leslie Ward and Alex Smith, courtesy of the Florida Marine Research Institute.)

With regard to this proposal, the Commission on 31 October recommended that, given the ineffectiveness of the 7/16-in. line as a way to reduce entanglement risks, the Service should immediately eliminate this as a gear option rather than waiting until 2003 and that it should add a requirement that neutrally buoyant or sinking line be used immediately in certain high-use right whale habitats and for all ground lines between lobster traps by 1 January 2003. Most lobster fishermen currently use floating line to link strings of lobster traps because heavier line chafes on submerged rocks. However, floating line forms loops that rise up into the water column and pose entanglement risks for whales. Neutrally buoyant line remains on or near the bottom, thus eliminating loops in the water column that could entangle whales.

On 10 January 2002 the Service published its final regulations for new lobster and gillnet gear requirements. The Commission's recommendations were not adopted. With regard to the recommendation of the Commission and others that neutrally buoyant line be required for lobster traps, the Service noted that it was still investigating its use, but that it had added its use as an option in some areas and as a requirement in a new seasonal management area (see below).

Dynamic Area Management Closures—On 2 October 2001 the Service published a proposed rule under authority of the Marine Mammal Protection Act and the Endangered Species Act to establish procedures for temporarily restricting fishing on short notice in areas where concentrations of whales were observed. Based on a study of past right whale sightings by Service scientists, it was determined that when three or more whales were seen feeding within an area such that their density was 0.04 whale per sq. nmi., it was likely that a group of whales would remain in the area for two or more weeks as they exploited a local food source. Therefore, the Service proposed that, upon receiving a single report of three or more right whales at a density of 0.04 whales per sq. nmi from a reliable source (e.g., right whale researchers, the Coast Guard, or whale-watching boats), it would promptly determine whether and what regulatory

measues might be needed based on certain indentified factors such as the weather, how much gear was set in the area, and whether other fishery closures were in effect in the area. No confirmation of the sighting was necessary.

If the whale sighting criteria were met, the Service would publish a notice of the temporary regulations in the *Federal Register*. Once a notice is filed, it takes three to five days for publication. The Service indicated it would take steps to advise affected fishermen of the rules as soon as it filed its regulatory notice and the regulations would then go into effect two days after publication. Thus, fishermen could begin removing or modifying their gear depending on the requirements. The rules would remain in effect for up to 15 days unless the Service rescinded them sooner or extended them based on the continued presence of whales in the area. The area covered would include all waters within 15 nmi of the group's initial sighting. The possible restrictions could include a requirement that all gillnets and lobster traps be removed from the area or that fishing be limited to gear with certain modifications that the Service determined safe for whales. However, because the Service did not identify gear modifications that could be allowed in dynamic management areas, its regulatory options were restricted to a requirement for removing gear. If the Service decided not to implement regulations, it would issue an alert requesting voluntary efforts to remove fishing gear and avoid setting new gear in the area.

By letter of 31 October 2001 the Commission expressed support for the proposed rule, but recommended that the Service describe how it intended to apply the factors identified for determining whether to impose restrictions. On 9 January 2002 the Service published final rules for designating dynamic area management zones, but included no further discussion of how it planned to apply its identified decision factors.

Seasonal Area Management—On 28 November 2001 the Service published proposed rules to establish a seasonal management area in waters immediately north of the designated right whale critical habitat in the Great South Channel. The area, frequently used by groups of feeding whales in the spring, includes a band stretching from the shoreline of Cape Cod and the southern Massachusetts Bay to the seaward boundary of the U.S. Exclusive Economic Zone. During the spring, lobster gear set in the area would have to be equipped with sinking or neutrally buoyant ground lines, a single buoy line per string of traps, and a weak link attached at the buoy on buoy lines with a maximum breaking strength of 1,500 lbs. for offshore areas and 600 lbs. for inshore and nearshore areas. Set gillnets would have to (1) be equipped with five weak links (maximum breaking strength of 1,100 lbs.) on each net panel, (2) be held in place by an anchor with the holding power of a 22-lb. Danforth-style anchor to provide the drag necessary for whales to break the weak link, and (3) have a weak link (1,100-lb. maximum breaking strength) attached at the buoy to the buoy line.

In announcing the proposed rule, the Service cited evidence of a right whale that was seriously entangled and injured in a lobster trap equipped with a weak link. In its 13 December 2001 comments to the Service, the Commission therefore supported designation of the new seasonal management area, but recommended that the rules prohibit all gillnet and lobster fishing within the area during the designated season. On 9 January 2002 the Service published final rules for the seasonal management area as initially proposed. The Service did not adopt the Commission's recommendation.

Gillnet Fishing in the Right Whale Calving Grounds—Regulations adopted as part of the Atlantic Large Whale Take Reduction Plan prohibit some, but not all types of gillnet fishing in the right whale calving grounds off Florida and Georgia during the winter calving season. On 27 March 2002 the Service proposed rules to prohibit the nighttime use of "straight-set" gillnets in the calving grounds between mid-November and the end of March. Straight-set gillnets are gillnets set in a straight line. They are used in the area to target schooling fish and are usually retrieved within 30 minutes of being set. They were excluded from the initial gillnet fishing restrictions for the area because the Service believed that, given the brief time they were deployed and the constant presence of the fishermen, they posed no risk to right whales.

In its proposed regulations, the Service noted that it continues to believe that daytime sets of straight-set gillnets do not pose a risk to right whales because the fishermen would be on-site in the event of an entanglement. However, it determined that nighttime fishing is more hazardous because fish-

ermen "are not as actively involved with straight-set gear" and because whales are more difficult to see at night. The new restrictions, which cover waters from Savannah, Georgia, to the center of Florida's east coast, were adopted by the Service and published in the *Federal Register* on 26 September 2002.

Efforts to Implement Dynamic Area Management—The Service's efforts to implement its own regulations for the new dynamic area management approach were weak and inconsistent. On most occasions when groups of whales were sighted and reported to the Service by reliable sources, the Service delayed decisions on designating temporary management zones or chose not to impose restrictions on fishing gear. Contrary to its adopted regulations, the Service decided that a second observation was needed before initiating a closure. Actions taken to implement the program in 2002 are shown in Table 3.

On 14 April 2002 a right whale aerial survey team reported a group of 10 right whales about 30 nmi east of Cape Ann, Massachusetts. After considering its decision-making factors for several days, the Service published a *Federal Register* notice on 26 April requiring that all gillnets and lobster gear be removed from an area covering about 1,100 sq. nmi effective 29–30 April. Thus, it took the Service 14 days after the initial sighting to require fishermen to remove their gear from the dynamic area. The regulated area expanded to about 1,700 sq. nmi for the period 1–13 May. Because about 600 sq. nmi of the temporary management area overlapped the seasonal management area that was due to expire on 1 May, the Service decided to defer the requirement for the overlapping area until that time.

Several other sightings of right whale groups were made by Service scientists and other reliable sources off Massachusetts during this period. However, instead of relying on past analyses that indicate that an initial sighting likely reflects a feeding group that will remain in the area where it was sighted, the Service adopted a policy that, before triggering a management action, it would require sightings on successive surveys to verify that whales were using the area. This decision was made despite the possibility that subsequent surveys could be and, in fact, frequently were delayed several days due to weather or other factors, and that whales could be present in the area but not seen by observers.

As May progressed, most right whale sightings shifted southward into the Great South Channel critical habitat where right whale survey teams observed the largest concentration of right whales (more than 70 individuals) since research efforts began in the 1980s. Many of these animals were located in and around the western part of the designated critical habitat (an area called the "sliver")

Table 3. Actions taken by the National Marine Fisheries Service in 2002 to implement fishing restrictions under the dynamic area management program

Whales Initially Sighted	Date of *Federal Register* Notice	Action Required
14 April: 10 whales 30 nmi E of Cape Ann, MA	26 April 2002	Required removal of all gillnets and lobster traps from area outside designated seasonal area management (SAM), 29–30 April. Required removal of all gillnets and lobster traps from both SAM and non-SAM portions of the area, 1–3 May.
4 May: 9 whales in eastern half of Great South Channel critical habitat	1 July 2002	Required removal of all anchored gillnets and lobster traps, 1–15 July.
20 November: 10 whales near Jeffrey's Ledge	3 December 2002	Required removal of all anchored gillnets and lobster traps, 5–20 December. Rescinded rule 10 December due to weather. Requested voluntary restraint on new sets until 20 December.
13 December: Cashes Ledge, confirmed 19 December	30 December 2002	Requested voluntary removal of gear for 15 days.

that the Service had excluded from its critical habitat rules banning gillnets. The Service continues to allow gillnet fishing in that area because of its use as a fishing area for groundfish.

The Service had closed all waters east of Cape Cod, including the sliver area, to groundfish fishing during May to protect depleted fish stocks. Thus, there was no need to close the area in May. However, the concentration of whales in the Great South Channel persisted through the end of May. In light of the continued presence of whales, the Service issued an advisory on 31 May requesting that fishermen voluntarily refrain from setting fishing gear in the Great South Channel. The advisory noted that the Service was not establishing rules under its dynamic area management authority "because that program was developed to protect right whales outside of existing critical habitat."

Concerned about the risk that gillnets would pose given such a large concentration of right whales and aware that the rules adopted by the Service for dynamic area management zones included no provisions excluding its application in critical habitat, the Commission sent a letter by facsimile on 31 May to the Director of the Service. In its letter the Commission noted that the Service's decision not to establish a closure under its new dynamic area management authority was both illogical and contrary to the best interests of the species. Concluding that it made no sense for the Service to be able to protect whales outside critical habitat but not within it, the Commission recommended that the Service reexamine its rule and immediately institute a temporary closure of the area to gillnetting either under that authority or under the emergency regulation provisions in section 118 of the Marine Mammal Protection Act.

Although record high numbers of right whales continued to be sighted through mid-June in the critical habitat area, including in and around the sliver area, the Service took no action to prevent gillnet fishing in the sliver area until the end of June, when fishing in the area typically subsides. At that time, it filed a notice published on 1 July requiring that gillnets be removed from the western portion of the critical habitat and that no new gillnets or lobster traps be set in the area during the period 1–15 July. In the western section of the regulatory area, the Service asked that fishermen voluntarily remove gear and avoid setting new gear. It is unknown to what extent fishermen complied with the request. By early July, whale sightings had declined significantly. The dynamic area management zone expired on 15 July.

On 18 July the Service responded to the Commission's 31 May letter. In its letter, the Service stated that the dynamic area management authority was intended to be used outside designated right whale critical habitat but could be used in designated critical habitat when necessary. Although the gillnet fishing area within the critical habitat was not closed in June, the Service noted that other parts of the critical habitat were closed to both gillnets and lobster traps between 1 April and 30 June. It apparently considered that those measures afforded adequate protection. In view of those measures, the Service advised that it would use the dynamic area management measures within that critical habitat only from 1 July through 31 March.

The Service invoked its dynamic area management authority twice more in 2002. On 20 November 2002 a group of eight right whales was sighted near Jeffreys Ledge off New Hampshire. On 3 December a *Federal Register* notice was published announcing that, effective 5 December, the Service would require all anchored gillnets and lobster traps to be removed from a 1,600-sq.-nmi area around the whale sighting location and that no new gear could be set in the area until 20 December. On 10 December the Service published another *Federal Register* notice rescinding the rule due to rough weather conditions that made it unreasonable to expect fishermen to remove their gear. Instead, the Service advised that it was asking fishermen to voluntarily remove their gear and avoid setting new gear through 20 December. It is not known to what extent fishermen did so.

The final use of the provision in 2002 was in an area called Cashes Ledge, a bank east of New Hampshire. On 13 December and again on 19 December, aerial survey teams reported sightings of five and eight right whales, respectively, in that area. On 24 December the Service asked lobster and gillnet fishermen to voluntarily remove their fishing gear from the area for the period of 24 December 2002 to 7 January 2003. A *Federal Register* notice announcing the voluntary dynamic manage-

ment area was published on 30 December. It is not known to what extent fishermen removed gear.

For the dynamic area management system to be effective, the Service must find a way to implement a regulation within 48 hours of the time a congregation of whales is first sighted by a reliable observer. Experience in 2002 demonstrated the Service's inability or unwillingness to implement its own regulations expeditiously.

As noted above, the Service's rules for dynamic management areas contemplated, but did not identify, provisions to allow certain types of fishing gear considered safe for whales to be used within established dynamic management areas. As of the end of 2002 the Service was developing a proposed rule for publication in early 2003 to identify such gear.

Future Management Efforts—As noted above, 2002 was a record year for observed right whale entanglements. During the Marine Mammal Commission's 8–10 October 2002 annual meeting, a representative of the Service briefly summarized information on the status of the entangled whales and the rulemaking actions undertaken earlier in the year. Because it was clear that take reduction plan goals were not being met, it was noted that the Service planned to reconvene the Atlantic Large Whale Take Reduction Team early in 2003 to seek its advice on needed measures. It also was noted that the Service's Northeast Regional Office was planning to prepare an environmental impact statement to analyze the range of options available under the large whale take reduction plan to further reduce entanglement risks.

Based on information provided at the meeting, the Commission wrote to the Service on 27 November 2002 expressing concern about the adequacy of the Service's take reduction measures. It noted that the recent high numbers of lethal and potentially lethal entanglements clearly demonstrate that the current approach falls well short of what is needed to solve the problem. The Commission therefore reiterated its previous recommendations that the Service prohibit all gillnets and lobster traps in designated right whale critical habitats during periods of peak whale occurrence in those areas.

In addition, the Commission recommended that the Service immediately establish a deadline of 1 January 2004 by which date ground lines on strings of two or more lobster traps set along the eastern U.S. coast must be either sinking line or neutrally buoyant line to eliminate line floating in the water column where it could entangle whales. Noting that buoy lines and ground lines associated with crab and fish traps pose no less of a hazard for whales than lobster traps, the Commission also recommended that the Service require that all gear modifications currently applicable to the lobster fishery also be made applicable to any crab or fish traps set in the ocean north of Ft. Pierce, Florida.

As of the end of 2002 the Service had not announced a date for the next meeting of the Atlantic Large Whale Take Reduction Team, and it was unclear when the Service would take additional steps to improve its take reduction plan, when the environmental impact statement on the plan would be available, or whether section 7 consultations under the Endangered Species Act would be reinitiated on fisheries known to entangle right whales.

Section 7 Consultations

Given the Service's statutory responsibility to manage fisheries in the Exclusive Economic Zone in compliance with section 7 of the Endangered Species Act, it has consulted with itself on potential effects of the lobster trap, monkfish gillnet, groundfish gillnet, and spiny dogfish gillnet fisheries on right whales and other endangered and threatened species. On 14 June 2001 the Service completed four biological opinions on the fishery management plans that regulate those fisheries. Recent rates of right whale entanglement in fishing gear used in these fisheries caused the Service to conclude that each of these fisheries, as initially proposed, was likely to jeopardize the continued existence of right whales. As reasonable and prudent alternatives to the initial proposal, the Service developed measures for (1) additional gear research and gear modification requirements, (2) development of a dynamic area management process to temporarily close or manage fisheries in areas where right whale feeding aggregations are seen, (3) development of seasonal management areas in right whale feeding grounds outside critical habitat where either (a) fishing would be prohibited in seasons when whales are likely to occur or (b) fishermen would be required to use fishing gear that "has been proven to prevent serious injury or mortality to right whales."

As noted above, in 2002 at least eight right whales were entangled in fishing gear, seven of which were considered to be in life-threatening situations, including one in which the animal was subsequently found dead. The Service's biological opinions on the four fisheries required reconsultation when one or more whales was "seriously injured." Despite the large number of potentially life-threatening entanglements, the Service did not determine that "serious injury" had occurred until a right whale that had previously been observed entangled in fishing gear washed ashore on Nantucket Island on 12 October. The whale had serious lacerations in its tail stock thought to be caused by ropes. As of the end of 2002 the Service had not reinitiated consultations with itself regarding entanglements despite stipulations to do so as set forth in its previous consultation decision. The Service, however, offered grants to fishermen to help support development of innovative fishing gear designs that would reduce whale entanglement risks.

Collisions between Ships and Right Whales

Most human-related right whale deaths are caused by collisions with ships. Between 1991 and the end of 2002 ship strikes have caused at least 35 percent (12 of 34) of all documented deaths, including an animal found off Maryland in 2002. Based on the large size of propeller slashes and massive injuries, such as crushed skulls and broken vertebrae, evident on carcasses, it appears that large vessels are the cause of most, if not all, lethal collisions.

To prevent ship strikes, the National Marine Fisheries Service has relied on voluntary efforts by vessel operators to look out for and avoid hitting whales. To promote this strategy, the Service, in cooperation with other agencies, has encouraged and partially supported aerial right whale surveys in key right whale habitats to locate whales and alert mariners of their locations. These early warning systems, first developed in the southeastern calving grounds in 1994 and in feeding grounds off New England in 1996, have relied heavily on cooperation and support from the Coast Guard; the Navy; the Army Corps of Engineers; state agencies in Florida, Georgia, and Massachusetts; and nongovernmental research organizations. When whales are sighted in the southeastern calving grounds, their locations are relayed as quickly as possible to the Coast Guard (in as little as 10 minutes in some cases), which forwards that information and a request for caution to vessel operators via broadcast notice to mariners, voice radio, and NAVTEX (a telex communications system aboard most large vessels). The early warning system in the Southeast has provided information on a near real-time basis to mariners, but the program for the northeastern feeding grounds reports sightings to the shipping industry by facsimile at the end of each day.

In addition, the Service and others have developed videos, placards, brochures, and additions to nautical publications such as East Coast volumes of the *U.S. Coast Pilot* and navigation charts to educate mariners about the threat ships pose to right whales and steps they can take to reduce collision risks, such as maintaining a sharp lookout and using reduced speed in areas where right whales are likely to occur. The Commission assisted in developing a number of these outreach materials.

The Navy, which operates two major port facilities adjacent to right whale calving grounds (i.e., the Kings Bay submarine base in southern Georgia and the Mayport Naval Base in northern Florida), has implemented more restrictive measures for the operation of its vessels during the calving season. Among other things, the Navy minimizes its operations within the calving area and directs that most of its vessels entering or leaving port use a course perpendicular to shore during the calving season to minimize travel through the calving grounds and use reduced speed (generally less than 15 knots) when near reported right whale sighting locations less than 12 hours old.

To supplement these efforts, the Commission recommended that the Coast Guard and the Service advise the International Maritime Organization (IMO) of the threats that large ships pose to right whales and seek its assistance in mitigation efforts. The IMO is a specialized agency of the United Nations that coordinates international management of shipping. Among other things, the IMO has authority to approve mandatory ship reporting systems, as well as speed and routing measures, in international waters. In 1997 the Commission helped draft an initial background paper to the IMO on collisions with right whales and the possible need for IMO action to help protect them.

The Service and the Coast Guard, with assistance from the Marine Mammal Commission, subsequently submitted a proposal to the IMO to establish two mandatory ship reporting systems: one in the southeastern U.S. calving grounds and the other in the northeastern feeding grounds off Massachusetts (see Fig. 4). These systems were approved by the IMO and became operational in 1999. They require that operators of large vessels (more than 300 gross tons) entering the two areas contact a shore station for information on right whales, including recent sighting locations, and advice on how to avoid hitting them. To help assess vessel traffic risks for whales, the vessel operators also must provide certain information, including their destination, route, and speed.

Overall, only about 50 percent of the ships entering ports in the two areas were in compliance with the reporting requirements in 2000 and 2001. The Coast Guard and the National Marine Fisheries Service therefore took steps beginning late in 2001 to clarify reporting procedures and to issue warnings to vessels not reporting. In 2002 the Coast Guard began citing vessels for not reporting.

In 2002 compliance levels increased to 72.7 percent in the northeastern area and to 58.2 percent in the southeastern area in November and December. In early 2002 staff with the Service, the Florida Fish and Wildlife Conservation Commission, and the Coast Guard also completed an analysis of vessel traffic patterns in both areas based on data gathered from the reporting vessels. In part, the analysis revealed that the tracks of commercial vessels entering the southeastern U.S. calving grounds form fans that spread out from points a few miles off entrances to the ports of Jacksonville and Fernandina Beach, Florida, and Brunswick, Georgia, with most coming from the southeast. About three-fourths of these vessels reported speeds of 18 knots or less. Off southern New England, many vessels follow the designated shipping lanes within the western boundary of the Great South Channel right whale critical habitat, but many others cross the southern and central parts of the critical habitat. About three-fourths of the ships entering the northeastern area were traveling at 16 knots or less.

New Regulatory Measures—On several occasions in the past, the Commission has recommended to the Service that vessel speed and routing measures be developed to minimize collision risks to right whales. To help in this regard, the Commission recommended to the Service and, in 1999, provided partial support for a study, in consultation with the commercial shipping industry, to identify additional measures. The study and subsequent report, conducted under auspices of the two regional right whale implementation teams, was completed in August 2001 (see Russell et al. 2001, Appendix C) and transmitted to the Service.

The report recommended various routing and speed measures for vessels 65 ft. (20 m) or longer. Because right whales are believed to migrate close to shore, seasonal 10-knot speed limits were recommended within 20 nmi (37 km) of major port entrances between southern New England and northern Georgia during migratory periods. For the calving grounds, it recommended a seasonal 10-knot speed limit within about 25 nmi (46.2 km) of the northeastern Florida and southern Georgia coasts, and that a study be done to determine if new mandatory traffic lanes for the three ports would significantly reduce travel in the areas where right whales occur most often. The report also recommended that the Coast Guard conduct a port access route study, which includes analyses of economic and environmental impacts, to ensure navigation safety. For feeding grounds off Massachusetts, it recommended a combination of measures: requiring vessel traffic to follow existing shipping lanes through the Great South Channel; a seasonal 10-knot speed limit for a segment of those lanes; and a dynamic management system to impose short-term 10-knot speed limits in other segments of those lanes, as well as elsewhere within the species' range in U.S. waters, when groups of whales are observed feeding.

On 18 October 2001 the southeastern implementation team wrote to the Service noting that the study represented a commendable job of consolidating information on the various issues and formulating management options. It recommended that the report be further considered and that, as recommended in the report, additional studies be undertaken to assess economic impacts of the identified speed and routing measures, consider the possibility that ships may move to ports outside the calving grounds due to the new restrictions, complete a risk assessment to evaluate the effectiveness of various recommended measures, and carry out a port access study, which is a prerequisite for any new regulatory measures affecting a port.

The northeastern implementation team submitted comments on the report to the Service on 29 January 2002. It noted that the process used to develop the report had provided ample opportunity for all concerned parties to express their views. Although there was not unanimous support among team members for all of the recommendations in the report, most of the recommended measures were supported by a majority of the team. In general, most of the team supported the basic concepts of establishing mandatory routing and speed restrictions through high-use right whale areas. The team also noted that an economic analysis was needed to assess potential economic impacts of the various measures. In this regard, the Marine Policy Center at Woods Hole Oceanographic Institution conducted a preliminary analysis of the economic impacts based on the report. The team also identified an additional regulatory recommendation not included in the report. It recommended requiring that vessel operators or others involved in the accidental injury or death of right whales report such incidents to the Service.

Recognizing that information on the causes of vessel-related right whale deaths was limited, the Commission also organized a study to compile and evaluate information on collisions between large whales of all species and motorized vessels worldwide. The results, published in early 2001 (see Laist et al. 2001 in Appendix C) and provided to the Service and other involved agencies and groups, revealed that all sizes and types of vessels may hit whales, but that lethal and serious injuries are almost always caused by large vessels – particularly those longer than 80 m (262 ft.). The analysis suggested that vessel speed likely is a factor in the probability of serious and lethal collisions and that a vast majority of reported collisions involving serious or lethal injuries to whales have been caused by vessels traveling 13 knots or greater. Such injuries appear to occur rarely at speeds of 10 knots or less. It also found that whales were almost never seen before they were hit or they were seen only at the last moment when it was too late to avoid a strike. Thus, it concluded that, where measures are needed to reduce collision risks for whales, advance planning to alter vessel operating procedures (e.g., ship speed or routing) will likely be needed.

During 2002 staff of the National Marine Fisheries Service reviewed the report by Russell et al. and other information, including results of the study organized by the Commission. At its annual meeting on 8–10 October 2002, the Commission was advised that a proposal to reduce ship collision risks for right whales was nearing completion and that measures under consideration included vessel speed and routing. Based on information provided at the meeting, the Commission, in consultation with its Committee of Scientific Advisors, wrote to the Service on 27 November.

In its letter, the Commission noted that, although constructive steps had been taken to establish mandatory ship reporting systems for two key right whale habitats, right whales continued to be killed by ships and fishing gear at high levels and that unless more determined commitments are made now, the population would face a real possibility of declining to levels from which recovery may be impossible. With regard to further actions to prevent ship strikes, the Commission noted that restrictions on both vessel speed and routing seemed appropriate, but that the process of developing a proposed plan of action was taking too long, particularly given that regulatory actions once proposed still face a long and uncertain path to implementation. The Commission therefore recommended that the Service complete a proposed plan of action and accompanying timetable to reduce ship strike risks as quickly as possible and that it circulate the plan and timetable to the Commission and other concerned parties for comment.

The Commission also noted that speed and routing for at least some areas would require action by the IMO, which could take several years to develop and implement. For other areas, however, it noted that such measures might be implemented more quickly under domestic authority. The Commission therefore requested that the Service complete and disseminate an analysis identifying what speed and routing measures could be taken under domestic authority, what actions would require IMO approval, and what new legal authority, if any, would be needed to implement regulatory actions such as those identified in the Russell report on recommended management measures.

At the end of 2002 the Service had yet to announce the specific regulatory actions it planned to propose to reduce collision risks in U.S. waters, nor had it responded to the Commission's letter.

Shipping Lanes in Canada—In late summer and fall, up to two-thirds of the North Atlan-

tic right whale population, including most mother-calf pairs, spend at least part of their time feeding in Canadian waters in the Bay of Fundy between Nova Scotia and northern Maine. Each year about 800 ships call at the ports of Saint Johns and Bayside in New Brunswick; Digby and Hantsport in Nova Scotia, and Eastport, Maine. These ships transit designated shipping lanes that cut across the eastern half of the region's right whale feeding grounds. At least three right whales are known to have been struck and killed along these lanes since 1992. Like efforts to alert mariners to the presence of whales in key U.S. right whale habitats, the Canadian Coast Guard advises vessels using these lanes of the location of recent right whale sightings and urges vessel operators to exercise caution to avoid hitting the whales. To help inform mariners of the importance of the area for right whales, a 15- by 12-nmi area around the core feeding area was designated in 1993 as a right whale conservation area by the Canada Department of Fisheries and Oceans, and information on right whales has been placed on the back of regional nautical charts.

To further protect right whales from vessel traffic in these lanes, Transport Canada, the agency that regulates shipping in Canada, in cooperation with the Department of Fisheries and Oceans and the Canadian Coast Guard, submitted a proposal to the IMO in April 2002 to shift a portion of the designated lanes about 4 nmi east to move vessel traffic farther from the core feeding area. Based on past whale sightings, it is estimated that the shift could reduce the probability of ships encountering whales by as much as 80 percent. Canada's proposal was approved by the IMO's Subcommittee on Safety of Navigation at its 8–12 July 2002 meeting and was forwarded to the Marine Safety Committee for final adoption. The IMO's Marine Safety Committee subsequently met in early December 2002 at which time the Canadian proposal was adopted, thereby clearing the way for Transport Canada to implement the new lane configuration on 1 July 2003 in time for the next whale season in the Bay of Fundy.

Petition To Amend Critical Habitat

Section 4 of the Endangered Species Act authorizes the Secretary of Commerce to designate as critical habitat areas that are determined to contain physical or biological features essential for the survival of species under their jurisdiction that are listed as endangered or threatened under the Act. Such designations serve to formally recognize the importance of these areas as habitat for a listed species. It also requires that federal agencies consult with the Service to assess the effects of any activities they may fund or authorize in that area that could adversely affect the survival of that species or modify the ability of the area to support that species.

In 1990 the Northern Right Whale Recovery Team petitioned the National Marine Fisheries Service to designate three areas off the U.S. East Coast as critical habitat for northern right whales. Those areas included waters along the coast of Florida and Georgia, where most females calve and begin nursing their young, and two feeding areas off Massachusetts—one in Cape Cod Bay and the other in the Great South Channel east of Cape Cod. To assist in considering that petition, the Marine Mammal Commission funded a study to review available right whale sighting data for each of those areas and to evaluate information on the occurrence of whales relative to criteria for designating critical habitat (see Kraus and Kenney 1991 in Appendix B). Based on that report and other information available at that time, the Service designated critical habitat in all three areas in June 1994 (see Fig. 4).

Since then, research has provided new information on the extent to which right whales use those three areas and adjacent waters. Based on that information, the Ocean Conservancy, a national environmental organization, submitted a petition to the Service on 9 July 2002 to expand the existing critical habitat boundaries. For the southeastern U.S. calving grounds, the petition sought to extend the offshore boundary from roughly 15 to 30 nmi between Brunswick, Georgia, and St. Augustine, Florida, and from 5 to 10 nmi offshore between St. Augustine and a point about 30 miles south of Cape Canaveral, Florida. For the two feeding areas off Massachusetts, the petition sought to establish a single expanded area that encompassed both the Cape Cod Bay and the Great South Channel critical habitats and the waters in between.

Under provisions of the Endangered Species Act, the Service must determine within 90 days of receiving such a petition whether it includes substantial scientific information indicating that the action may be warranted. On 19 November 2002

the Service announced in the *Federal Register* that it had determined that the petition contained information satisfying this requirement and that it was therefore requesting comments on the petitioned action. The Act requires that, within 12 months of the date on which the petition is received, the Service must publish a determination on whether it intends to deny the petitioned action, adopt it, or implement a modified approach. At the end of 2002 the Commission expected to provide comments to the Service in early 2003.

North Atlantic Right Whale Recovery Plan

In the late 1980s, at the recommendation of the Marine Mammal Commission, the National Marine Fisheries Service appointed a Northern Right Whale Recovery Team to draft a recovery plan for northern right whales. At that time, right whales in the North Atlantic and North Pacific were considered to belong to a single species and thus, in 1991, the National Marine Fisheries Service adopted a final recovery plan identifying research and management priorities necessary to promote recovery of right whales in both areas. Since that time, new information and experience has rendered the plan out of date and the Service has taken steps to develop two new plans—one for the North Atlantic right whale and one for the North Pacific right whale.

As described in its previous annual report, the Commission provided comments to the Service on a draft of a new North Atlantic Right Whale Recovery Plan on 6 September 2001. Due to limited staff and other urgent matters, including the need for new regulations to reduce ship strike and entanglement risks for right whales, the Service was unable to complete and adopt a new North Atlantic Right Whale Recovery Plan in 2002. As of the end of 2002 the Service hoped to do so early in 2003.

National Whale Conservation Fund

As described in previous annual reports, the National Fish and Wildlife Foundation established a National Whale Conservation Fund to help obtain public and private funding for projects that would benefit the conservation of whale populations in U.S. waters, but that have not been undertaken because of limited government funds. The idea for the Fund was developed by the Commission based on a review of the right whale recovery program at its annual meeting in 1996. That review found that constraints on federal funding were severely hampering right whale recovery work. The fund was subsequently created in response to a 1999 law sponsored by Senators Judd Gregg and Ted Stevens that directed the Foundation to administer the fund in consultation with the Marine Mammal Commission and the National Marine Fisheries Service. The purpose of the fund is to help support research, management, conservation, and education/outreach activities related to the conservation and recovery of whales, particularly those that are most endangered.

Initial efforts to establish the fund were hampered by a lack of seed money; however, in 2001 Congress provided $250,000 earmarked for this purpose. With those funds, the Foundation organized an administrative structure, including a fund council to oversee fund development, and made its initial grant to the Center for Coastal Studies to support work on disentangling right whales and other large whales along the U.S. East Coast.

In 2002 the fund dispersed more than $125,000 to support projects related to humpback whales and North Atlantic right whales. Work related to right whales included projects by (1) the Woods Hole Oceanographic Institution to assess their hearing and communication capabilities, (2) the New England Aquarium to convene annual meetings of the North Atlantic Right Whale Consortium to review and share new information on right whale biology, ecology, and conservation, and (3) the Center for Coastal Studies to study North Atlantic right whale genetic diversity and population structure.

In 2002 the fund also was asked by the National Marine Fisheries Service to help disperse grants to state agencies in support of their right whale conservation activities and to fund research to develop "whale-friendly" fishing gear. The Foundation and council agreed and subsequently received $1.1 million for related work by agencies in Atlantic coastal states and $175,000 for work on designing whale-friendly fishing gear. At the end of 2002 the fund had requested proposals for this work and was in the process of awarding grants. Also in 2002 the Foundation took steps to develop a large whale conservation plan to help identify funding priorities and to expand its fund-raising efforts. Results of the latter effort included a pre-

liminary commitment by the Pacific Life Foundation to serve as a corporate partner and sponsor for the fund.

North Pacific Right Whale (*Eubalaena japonica*)

North Pacific right whales, like right whales in the North Atlantic Ocean, were severely depleted by commercial whaling and are now among the world's most endangered mammals (Fig. 5). Two populations are thought to survive, one in the western North Pacific off Russia and the other in the eastern North Pacific off Alaska. The status of both populations is poorly known. The western population is thought to number in the low hundreds although reliable information to support that estimate has not been published. The eastern population appears to number a few tens of animals, making it the most endangered marine mammal population in U.S. waters.

Early in the 1960s the eastern population apparently numbered in the low hundreds and presumably was recovering slowly. However, between 1962 and 1967 Soviet whalers killed more than 350 animals in the southeastern Bering Sea and Gulf of Alaska, despite an international ban on the hunting of all right whales. It appears that this illegal whaling virtually eliminated the population. Between the late 1960s and the mid-1990s sightings of right whales in the eastern North Pacific were rare, widely scattered, and almost always involved solitary animals. Then, in the summer of 1996, a group of four animals was reported in the southeastern Bering Sea. Each year since then, the National Marine Fisheries Service has undertaken aerial, shipboard, and/or acoustic surveys of the area during the summer.

Results of those surveys have yielded sightings of between 3 and 13 whales per year in a 60-by-100-nmi area about 200 nmi north of Unimak Pass in the eastern Aleutian Islands. Although more than 40 whales have been involved in the various sightings since 1996, many of those have probably included resightings of the same individuals.

Figure 5. The deviated nostrils of right whales, including this North Pacific right whale, create a V-shaped blow that is unique among cetaceans and is useful in identifying species in the field. (Photo by Richard LeDuc, courtesy of the National Marine Fisheries Service.)

Photo-identification techniques have identified only 13 individuals in the Bering Sea as of the end of 2002. Along with three other eastern North Pacific right whales photo-identified in other areas (one off San Clemente Island, California, in 1992; one off the southern Baja Peninsula, Mexico, in 1996; and the third off Kodiak Island, Alaska, in 1998), the total number of known individuals is 16. Biopsy samples have been collected from 10 individuals, nine of which have been males. During 2002 six sightings of between one and three animals were recorded, including one sighting of a cow-calf pair. The latter sighting is particularly noteworthy because it is the first confirmed report of a right whale calf anywhere in the North Pacific Ocean since the early 1900s and included the only known female identified in the population to date.

Critical Habitat Petition

The annual sightings of right whales in the same area of the southeastern Bering Sea in recent years suggest that the area is a summer feeding grounds for what remains of this population. Based on this information, the Center for Biological Diversity wrote to the National Marine Fisheries Service on 4 October 2000 to petition that a large portion of the southeastern Bering Sea be designated as critical habitat for right whales under provisions of the Endangered Species Act. The Service found that the petition provided sufficient scientific information to warrant consideration and published a *Federal Register* notice on 1 July 2001 requesting comments.

As noted in its previous annual report, the Commission responded to the request on 11 July 2001. In its letter the Commission noted that the repeated right whale sightings in recent years along with historical whaling records from that area provide a reasonable basis for concluding that the petitioned area contains features essential for the population's survival. Given experience with North Atlantic right whales, it also noted that entanglement in commercial fishing gear and collisions with ships could be potential threats to eastern North Pacific right whales. The Commission therefore recommended that the Service proceed with designating the area as critical habitat with a view toward modifying its boundaries at a future date as better data on the population's distribution become available. To improve information in this regard, the Commission also recommended that the Service initiate a study to tag right whales in the southeastern Bering Sea with satellite telemetry tags to track their movements and habitat-use patterns. It also recommended that the Service (1) examine photos of North Pacific right whales for scars that might indicate interactions with fishing gear or collisions with ships, and (2) assess the extent to which gillnets and crab traps that might entangle right whales occur within the petitioned area during the summer months when the whales are present.

On 18 September 2002 the Service responded to the Commission's letter noting that, although it had not yet decided how to proceed on the petitioned action, it was considering the use of satellite telemetry but did not plan to carry out such a study until it reviewed concerns raised by some scientists about the effects of tag implants on North Atlantic right whales. It also noted that it had found no evidence of scars from interactions with either fishing gear or vessels in any of the right whale photographs taken in the southeastern Bering Sea.

On 20 February 2002 the Service published a *Federal Register* notice announcing that it had determined that the petitioned action to designate critical habitat for eastern North Pacific right whales was not warranted at this time. The notice advised that, although the Service recognized the designation may be a prudent action, it concluded that the extent of critical habitat could not be determined because essential biological requirements of the population were not sufficiently understood. It therefore advised that it would continue to analyze issues raised by the petition following the completion of planned 2002 right whale surveys and research.

Marine Mammal Commission Review

During the Commission's 8–10 October 2002 annual meeting, representatives of the Service provided information on the status of North Pacific right whales and results of the 2002 field surveys. The surveys, which involved aerial, shipboard, and acoustic survey techniques, were more extensive than those used in past years. They expanded the search area from a core 60-by-100-nmi sighting area to a broader area covering surrounding waters in the southeastern Bering Sea and the northern Gulf of Alaska. As noted above, six sightings were made of 1–3 whales each, including a cow-calf pair, all of which were within the core area. Hydrophones

documented numerous right whale vocalizations in the core area during the course of the surveys; however, efforts to locate many of these vocalizing whales were unsuccessful, and it was not possible to determine the number of whales present. There were no sightings and no whale vocalizations heard in waters outside the core area.

No steps were taken to deploy satellite telemetry tags during the 2002 field season. The Commission was advised that the Service now considered such tagging to be the highest priority research need for eastern North Pacific right whales and apparently is satisfied that such tagging can be done safely. Unfortunately, the Service also advised that it had been unable to schedule shiptime on one of its vessels to study North Pacific right whales in 2003.

Based on this information, the Commission wrote to the Service on 27 November 2002. In its letter, the Commission recommended that, if the Service is unable to dedicate one of its own vessels to tag and survey right whales in the southeastern Bering Sea in the summer of 2003, the Service provide such funding as may be needed to charter a vessel to carry out that research. As of the end of 2002 it was not clear whether and what research might be undertaken during 2003.

Gray Whale (*Eschrichtius robustus*)

Gray whales (Fig. 6) are divided into two discrete populations, one on either side of the North Pacific Ocean. The eastern population migrates along the West Coast of North America between winter calving grounds along Baja California, Mexico, and summer feeding grounds in the Bering and Chukchi Seas between Alaska and Russia. The annual migration of some gray whales back and forth between calving and breeding grounds can exceed 10,000 miles, making it the longest annual migration of any mammal. The western population occurs along the Asian coast, where it migrates between summer feeding grounds off Sakhalin Island, Russia (about 500 miles north of the Japanese island of Hokkaido), and winter calving grounds at an unknown location suspected to be in the South China Sea.

Commercial whaling severely depleted both populations between the mid-1800s and early 1900s. As a result, gray whales were protected under a ban on commercial hunting adopted by the League of Nations in the mid-1930s. This ban, which also covered right whales, was the first international agreement to protect a whale species from commercial whaling. The ban on commercial gray whale catches has been carried forward since the late 1940s by the International Whaling Commission. Gray whales also were listed as endangered under the Endangered Species Conservation Act of 1969, the predecessor to the U.S. Endangered Species Act of 1973.

Under this protection, eastern gray whales made one of the most complete recoveries of any large whale population that had been depleted by commercial whaling. By the early 1990s eastern gray whales had recovered to levels thought to be at or near the preexploitation population size, and in 1994 the Service removed the population from the U.S. list of endangered and threatened species, making it the first marine mammal population (and the only one to date) to be delisted. Recently, however, concern arose about its status after the number of gray whales found dead along the U.S., Canadian, and Mexican coasts increased sixfold and calf production dropped to record lows.

Unlike the eastern population, the western population has shown no signs of recovery. It is

Figure 6. Western gray whale breaching off the coast of Sakhalin Island, Russia. (Photo by David Weller, courtesy of the National Marine Fisheries Service.)

one of the world's most critically endangered populations of whales and remains listed as endangered on the U.S. list of endangered and threatened species.

During the Marine Mammal Commission's 2002 annual meeting on 8–10 October in San Diego, California, information on the status and conservation of both gray whale populations was presented by researchers with the Service and reviewed by the Commission and its Committee of Scientific Advisors on Marine Mammals. Results of that review are discussed below.

The Eastern North Pacific Gray Whale Population

The eastern population of gray whales was reduced to perhaps 1,000 to 2,000 whales by the early 1900s by commercial whaling. It had recovered to an estimated level of more than 20,000 whales by 1994 when it was removed from the U.S. endangered and threatened species list. Upon removal of a species from that list, the Endangered Species Act requires that a five-year monitoring program be undertaken to ensure that the Act's protection is no longer needed. The National Marine Fisheries Service implemented such a program, and in March 1999 it convened a workshop to review the results and consider further actions.

Participants at that workshop concluded that eastern gray whales were at or near carrying capacity (i.e., the maximum number of individuals supportable by the ecosystem) and were neither endangered nor threatened as defined by the Act. They noted, however, that continued monitoring of the population offered important opportunities to gain insight into a number of significant biological and management issues. Among these are how to estimate the carrying capacity of large whale populations; how abundance levels change as populations reach carrying capacity levels; and what factors are likely to regulate the abundance of large whale populations once they reach carrying capacity. Accordingly, workshop participants recommended that monitoring efforts be continued for an additional five years. As discussed below, shortly after that workshop the population began to show signs of a decline, further underscoring the need for continued monitoring.

Recent Strandings and Calf Production— In 1999 and 2000 unprecedented numbers of gray whales were found dead or dying along the coastline between Alaska and Mexico. Before 1999 gray whale strandings had averaged about 40 a year, with a record one-year total of 87 carcasses. In 1999 and 2000 stranding totals leaped to 284 and 377. Most of the whales were adults and subadults in unusually thin condition, suggesting that limited prey availability had been a factor in their deaths. Aerial photogrammetric studies of migrating whales undertaken by the Service beginning in 1997 to assess the condition of live whales also supported this conclusion. By measuring the ratio of whale lengths to widths in photos of animals migrating southward from their feeding grounds, Service researchers developed an index to assess the fatness and general condition of the whales. The results of studies in 1999 and 2000 revealed a marked increase in the number of unusually thin whales.

Also in 1999 and 2000 calf counts of gray whales migrating north from their calving grounds past Point Piedras Blancas, California, declined sharply to the lowest levels on record. Between 1994, when the Service began annual counts, and 1998, an average of nearly 375 calves was counted annually, with a maximum of 501 calves in 1997 and a low of 194 calves in 1995. In 1999 and 2000 the counts dropped to 141 and 96.

As this information became available, the Commission wrote to the Service on 7 August 2001 and again on 15 January 2002, recommending that the Service develop a second five-year research plan, complete a stranding response plan to better coordinate gray whale stranding investigations, assess effects of the 1999–2000 die-off on the population's status, and review planned research to ensure that information is adequate to assess the population's status and conservation needs.

On 5 March 2002 the Service responded to the Commission's letters. Based on information gathered since 1994, the Service continued to believe that the eastern gray whale population was neither endangered nor threatened and did not warrant protection under the Endangered Species Act. A second five-year monitoring program under the Act's post-delisting provisions, therefore, was not required. However, recognizing the importance of further monitoring, the Service noted that it planned to continue annual calf counts on northbound migrations through at least 2004 and that it had conducted additional population counts on southbound migrations in the winters of 2000–2001 and 2001–2002. It also noted that steps had

been taken to improve the stranding response program and that it was analyzing effects of the 1999–2000 die-off on the population's status.

At the Commission's October 2002 annual meeting, Service representatives noted that limited prey could have affected both mortality and calf production in 1999 and 2000. They noted that increased attention had been focused on examining conditions in the population's main feeding grounds in the Bering and Chukchi Seas. Gray whales feed mostly on small benthic organisms, particularly small shrimplike animals called amphipods, by filtering mouthfuls of soft muddy sediment through their baleen. In the 1980s benthic ecologists reported a decline in the abundance and size of amphipods in a key gray whale feeding area south of Bering Strait and north of St. Lawrence Island in the north-central Bering Sea. They suggested that the increase in gray whale abundance may have been the cause. There is evidence that amphipod abundance in the area has remained low since then. Although the cause of the amphipod decline remains uncertain, climate change, as well as increased gray whale foraging, are possible factors. Nevertheless, the gray whale population continued to increase through the 1990s.

To help assess gray whale feeding activity, the National Marine Fisheries Service conducted an aerial survey in 2001 over parts of the eastern population's feeding grounds. Surveys in the 1980s revealed that most feeding activity occurred in a shallow basin located in the northernmost Bering Sea. Survey flights in 2001, however, found few whales in that area. Instead, a dense concentration of feeding whales was found north of the Bering Strait in the southern Chukchi Sea where few whales had been seen in the 1980s. Although only a small proportion of the population was seen during the 2001 flight and although whale distribution may change from year to year, results of the 2001 survey suggested that the species' principal feeding grounds may have shifted in the past 15 years to areas north of Bering Strait.

Service scientists have attempted to correlate trends in calf production with changes in seasonal ice cover at the time whales arrive at their feeding grounds in spring. In some years when ice is slow to retreat through the Bering Strait, gray whale access to the most productive feeding grounds, now possibly located north of the strait, might be delayed or shortened, leaving females in poor condition and less able to either become pregnant or successfully carry a calf to term. Results of the investigation found a strong correlation. Years of heavy spring ice cover in the northern Bering Sea were followed by low calf counts the following spring, but years of light spring ice cover were followed by higher calf counts the following spring.

Although calf counts remained low in 2001, ice cover over the northern Bering Sea in the spring of 2001 was relatively light. Service scientists therefore predicted that calf production would increase in 2002. Although a final spring calf count for 2002 was not provided at the Commission's October meeting, Service scientists reported that it had apparently increased as predicted. Also in 2001 gray whale strandings declined to 21 animals and remained at more normal levels in 2002. Based on ice cover in the spring of 2002, Service scientists predict that calf counts in 2003 will again be high.

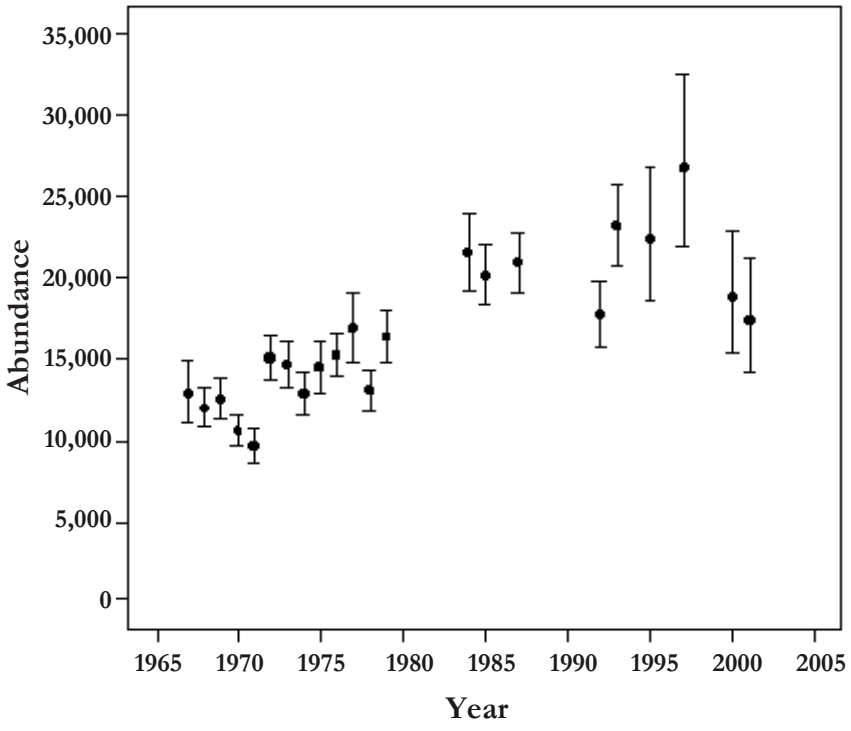

Figure 7. Gray whale population abundance.

Population Status and Trends—Abundance estimates for eastern gray whales are based on winter counts made as gray whales migrate south along the coast of California to their calving grounds. National Marine Fisheries Service researchers have made 22 such counts since 1967. Recent counts leave little doubt that the eastern gray whale population declined as a result of the 1999–2000 die-off. Population estimates for the winters of 1997–1998, 2000–2001, and 2001–2002 declined from 26,635 (95 percent confidence interval 21,877 to 32,428) to 18,761 (95 percent confidence interval 15,429 to 22,812) to 17,414 (95 percent confidence interval 14,322 to 21,174), respectively.

The magnitude of the recent decline, however, may be far less than the 12,313 suggested by these point estimates. During the Commission's annual meeting, Service scientists noted that, given the imprecision of population estimation techniques, counts sometimes produce what appear to be artificially high and low numbers when counts are viewed in a longer-term context (Fig. 7). In this regard, the count during the winter of 1997–1998 produced an estimate that appears suspiciously high. In addition, when the estimates are viewed over 30 years, it appears that the population size increased between the 1970s and early 1980s and remained relatively stable within a range of about 18,000–23,000 between the mid-1980s and 1999. Thus, the decline in 1999 and 2000 may only have been a few thousand animals. Based on this information, Service scientists concluded that the decline in 1999 and 2000 had ended, and that it was caused by changes in environmental conditions that affected gray whale foraging patterns, which in turn affected the condition of adult whales. In the future, year-to-year variations in environmental conditions can be expected to produce periodic fluctuations in the population.

Future Research and Monitoring Plans—During its October 2002 meeting, the Commission was advised by the Service that it planned to continue annual calf counts for the foreseeable future and to continue aerial photogrammetric studies through 2003, at which time it would reevaluate the results. The Service does not plan to conduct a new population count during the winter of 2002 to 2003, but expects to carry out another survey in two or three years if funding is available.

In response to this information, the Commission wrote to the Service on 27 November 2002 concurring with the Service's view that the eastern gray whale population appears to be fluctuating within the range of carrying capacity in response to year-to-year variations in environmental conditions. It commended the Service for its recent efforts to assess and monitor the status of eastern gray whales and recommended that funding and support be continued at the levels provided in recent years to carry those studies forward.

Subsistence Whaling—Native residents in Russia and the United States take gray whales for subsistence and cultural purposes under quotas set by the International Whaling Commission (IWC). The quotas are based on requests by Russian and U.S. delegations to the IWC on behalf of their respective Native communities. At its 1998 meeting, the IWC adopted a five-year quota of 620 whales, with no more than 140 whales to be taken in any one year, for 1998 to 2002. Historically, the vast majority of gray whales have been taken in Russia, with just a few taken by Alaska Eskimo whalers. For example, during the previous five-year quota period (1994 to 1998), annual catches ranged between 42 and 122, with only two gray whales reported taken by Alaska Natives during that entire period.

In the past, a small share of the gray whale quota was requested for Alaska Natives; however, given their preference for bowhead whales and their limited interest in hunting gray whales, no request was made on their behalf to take gray whales when the 1998–2002 quota was considered. To meet the needs of Makah whalers of Washington State, however, the U.S. delegation requested and was granted a share of five whales per year, with the remaining 135 allocated to Russian hunters.

Since 1998 the Makah Tribe and the Department of Commerce have taken steps to reestablish a traditional gray whale hunt that has not been practiced since early in the 1900s. As a result of court action in 2001 on a suit challenging the adequacy of the Department's environmental assessment on the Makah Tribe's whaling program, the Department was directed to complete and circulate a new environmental assessment in 2002. The Service completed a revised assessment, which again was challenged for its adequacy in a new lawsuit filed in January 2002 (*Anderson* v. *Evans*). The

plaintiffs also contended that whaling by the tribe must be authorized under the Marine Mammal Protection Act, not merely under the quota issued by the International Whaling Commission. On 20 December 2002 the U.S. Court of Appeals for the Ninth Circuit reversed the district court ruling and ruled for the plaintiff on both courses of action. In light of the uncertainty and controversy over the impacts of Makah whaling, the court ordered the Service to prepare an environmental impact statement. In particular, the ruling concluded that the environmental assessment had not adequately considered the potential impact of whaling on the small local group of gray whales that use the Strait of Juan de Fuca between Washington and British Columbia, Canada, as a feeding grounds or the precedent the tribe's resumption of whaling could set for other areas.

More important, the court determined that whaling by the Makah Tribe remains subject to the Marine Mammal Protection Act. In so ruling, the court found that the provision of the Act that allows taking authorized by preexisting treaties and agreements with the Makah Tribe was inapplicable in this case. Further, the court ruled that applying the Marine Mammal Protection Act taking prohibition to the Makah whaling rights recognized in the 1855 Treaty of Neah Bay is necessary to achieve the Act's conservation purpose. Because the court found the Marine Mammal Protection Act applicable to whaling by the Makah Tribe, it did not need to consider the merits of the plaintiffs' alternative argument that the whaling rights contained in the treaty had been abrogated by enactment of the statute.

As of the end of 2002 the federal agencies and the tribe were considering their options, which include seeking rehearing by the court of appeals or seeking review of the case by the U.S. Supreme Court.

Against this backdrop of legal challenges, Makah whalers killed and landed one whale in 1999 but have taken no other whales since then. In 2002, as in 2001, they refrained from engaging in any whaling activity. However, one gray whale was struck, but not landed, in June 2002 by Alaska Natives from the village of Little Diomede in the Bering Strait. Apparently because of a very poor bowhead whale hunting season in the spring of 2002, village whalers attempted to take a gray whale instead. During the course of the hunt, one of the whalers was killed. As noted above, the gray whale quota no longer includes provisions for Alaska Natives to take gray whales. As a result, an infractions report may need to be filed with the IWC when it meets next year (see also the IWC section in Chapter V).

With the expiration of the gray whale quota in 2002, the U.S. and Russian delegations to the May 2002 IWC meeting requested an extension of the gray quota at the same level for another five-year period (i.e., 620 whales with no more than 140 whales taken in any one year). The request was granted for the period 2002 to 2007 with five whales per year to be available to Makah whalers.

The Western North Pacific Gray Whale Population

As recently as the 1970s, the western gray whale was thought to be extinct. However, a small remnant population is now known to have survived and is recognized as one of the world's most critically endangered large whale populations. Its only known feeding grounds, off Sakhalin Island, Russia, occurs in an area where several major oil and gas fields are currently undergoing intensive exploration and development. One offshore drilling platform has already been constructed within 20 km of the population's principal feeding area and others are planned. Noise, oil spills, routine discharges, ship traffic, and other perturbations associated with offshore oil and gas exploration and development pose risks both to the remaining whales and their habitat.

In view of the population's critical status, the IWC adopted a resolution concerning western gray whales at its 23–27 July 2001 annual meeting. The resolution called on the population's range states (i.e., those nations with jurisdiction over waters in which the population occurs) and other interested parties to expand research and monitoring efforts on the population, eliminate any sources of human-caused mortality, and reduce all sources of disturbance to the western gray whale population.

Also concerned about the critical status of this population, the Marine Mammal Commission wrote to the National Marine Fisheries Service on 15 January 2002 recommending that Service scientists work cooperatively with their Russian counterparts to design, fund, and implement research and recovery measures necessary to ensure the long-term conservation of this population. The Ser-

vice responded to the Commission's letter on 15 March 2002 noting that, although its scientists were continuing to work closely with their Russian colleagues, the Service was unable to increase its support for work on western gray whales due to critical needs for other marine mammal species in U.S. waters. Recognizing the importance of ongoing research and monitoring to identify impacts and mitigation needs, the Commission provided partial funding to help support the joint U.S.-Russia monitoring studies during the summer of 2002 (see also Chapter VIII). Involved scientists with Texas A&M University and the National Marine Fisheries Service presented results of the 2002 field season and previous research seasons during the Commission's 8–10 October annual meeting.

Oil and Gas Exploration and Development—To evaluate possible effects on gray whales and mitigation needs resulting from planned development of oil reserves off Sakhalin Island (see Fig. 8), Sakhalin Energy Investment Company Limited (the oil consortium led by Royal Dutch/Shell, which is developing one of the major offshore oil and gas fields nearest to the gray whale feeding grounds) circulated and requested comments on a document early in 2002 entitled "Western Gray Whale Protection Plan: A Framework of Monitoring and Mitigation Measures Related to Sakhalin Energy Oil and Gas Operations on the Northeast Coast of Sakhalin Island, Russia." The Commission responded to the request on 30 August 2002.

Figure 8. The location of Sakhalin Island, Russia, and the western gray whale study site.

The company's plan concluded that the activities of the Sakhalin Energy Investment Company have not had any long-term negative effects on the gray whale feeding habitat. The document, however, did not describe the spatial and temporal overlap between gray whale feeding activity and oil and gas operations or the cumulative effects of all ongoing and planned activities in the region. In addition, baseline information was not collected on gray whale foraging distribution before exploration activities began. The Commission therefore questioned whether such a conclusion could be justified. The Commission noted that detection and mitigation of possible adverse effects on gray whales would depend to a considerable extent on the quality and objectivity of scientific research and monitoring programs. It encouraged the company to provide adequate support to continue gray whale monitoring studies. It also recommended that mechanisms be provided for the independent review and oversight of gray whale research and monitoring activities, and that the results of those studies be made freely available to the public and outside reviewers.

As of the end of 2002 the Commission had not received a response from the company or a revised document.

Western Gray Whale Research and Monitoring—Since 1997 Russian and U.S. scientists have surveyed gray whales off Sakhalin Island (Fig. 8) for two to four months each summer between June and October. Other than information from Russian aerial surveys between the 1960s and 1980s and a few days of dedicated photo-identification surveys in 1994 and 1995, virtually nothing is known about the use of this area by gray whales before 1997.

Between 1994 and the end of the 2002 field season, 118 individual whales have been photo-identified, including five new animals (other than calves) seen for the first time in 2002. The studies document a high degree of site fidelity among the individual whales to this feeding area, and a vast

majority of the population is now thought to be included in the photo-identification catalogue. Since 1995 researchers have counted a total of 31 calves (between 2 and 8 per year), including 7 in 2002. Many of these calves have not been resighted after the year of their birth, suggesting that calf survival is low. Biopsy samples from 93 individuals also have been collected. Analyses of these samples reveal a strong bias toward males among both calves and older animals. Fewer than 20 reproductively active females have been identified.

The population's principal feeding area appears to be a narrow band of coastal waters about 5 km wide and 70 km long off the northeastern shore of Sakhalin Island. A second feeding area used by fewer whales also has been identified farther offshore. An existing oil and gas platform has been constructed 20 km offshore, southeast of the coastal feeding area, and, as indicated above, other platforms are to be placed in the area. In 2001 high-intensity seismic surveys were conducted over a six-week period near the feeding grounds. During that period, the whales moved south, away from the area being surveyed. After the surveys ended, the whales returned to the area, suggesting that the sound generated by the seismic activity may have temporarily displaced them from preferred feeding areas.

Like the thin whales seen in the eastern gray whale population in 1999 and 2000, researchers off Sakhalin Island also have reported relatively high numbers of "skinny" whales apparently in poor health (Fig. 9). Between 1999 and 2001 the numbers of whales seen in this condition were 17, 31, and 19, respectively. Although most of these whales were observed to be underweight in only one year, nine whales appeared thin in two of those years, and five were seen in this condition all three years. In 2002, 15 skinny whales were observed. The cause of this condition is uncertain, but seems likely to be related to some nutritional problem (e.g., limited prey availability or limited access to key feeding areas).

Because of the potential for human-related impacts along migratory corridors and calving grounds off the southeastern coast of Asia, as well as on the feeding grounds, project scientists expressed serious concern for the future survival of the population. They noted that the proximity of whales to seismic surveys, drilling, ship traffic, and other activities associated with offshore development could displace gray whales from essential feeding areas, and that oil spills, dredging, and other

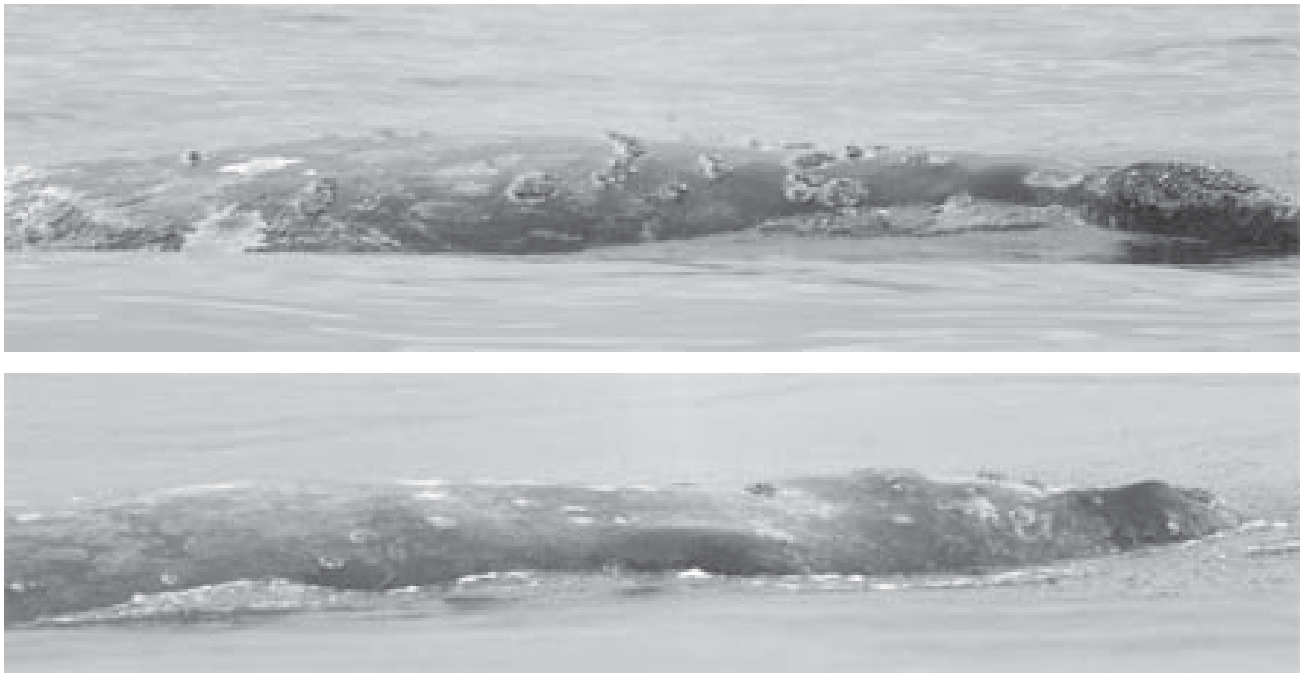

Figure 9. Comparison of a well-nourished *(top)* and a skinny *(bottom)* western gray whale. The dip along the back of the skinny whale behind the blowhole and skull (right side of photos) and the bulge of the scapula (shoulder bone) in the concavity near the water line indicate a thin blubber layer and an undernourished condition. (Photos by David Weller, courtesy of the National Marine Fisheries Service.)

forms of pollution and construction could impact gray whale prey resources.

Project scientists noted that ongoing work was under way to back-calculate population size, conduct survival and mark-recapture abundance estimates, determine patterns of paternity and social relatedness, and synthesize research findings from the past seven years. In addition, they provided details on a special meeting on western gray whales scheduled by the IWC Scientific Committee for 22–25 October 2002 in Korea. The purpose of that meeting was to review information on the status of the population and identify future research and monitoring needs throughout its range. The meeting, which included scientists familiar with data on the population, including those from most of the population's range states (Russia, China, Japan, and the Republic of Korea) was subsequently held as scheduled. A meeting report will be submitted to the IWC at its 2003 annual meeting.

Based on information provided at its October 2002 annual meeting, the Commission wrote to the Service on 27 November 2002. It observed that the photo-identification catalogue and biopsy database offer a valuable opportunity to monitor the health and status of individual whales and determine overall trends in the population. It also noted that further research and monitoring on western gray whales could be very helpful in advancing our understanding of the effects of human activities and environmental variables on whale populations in general. For example, comparisons of trends in the occurrence of skinny whales in both the eastern and western populations could help clarify whether and how broadscale climatic events affect whale populations. The Commission therefore commended the Service for facilitating collaborative research with Russian gray whale scientists and recommended that support be increased as much as possible to carry this work forward for the foreseeable future.

Humpback Whales in the Central North Pacific (*Megaptera novaeangliae*)

Humpback whales occur in all the world's oceans and were severely depleted by commercial whaling during the early 1900s. In the North Pacific alone, more than 28,000 whales were killed during that period. One analysis suggests that 15,000 humpback whales inhabited the North Pacific Ocean before commercial whaling began. By the mid-1960s their numbers may have been reduced to as few as 1,000 whales. Following a similar measure adopted for the North Atlantic humpback whales in 1955, the International Whaling Commission prohibited the taking of humpback whales in the North Pacific Ocean in 1966, and the ban has remained in place since then.

Three populations are currently recognized to occur in the North Pacific Ocean, the largest being the central North Pacific population. Like all humpback whale populations, this population migrates annually between winter calving and mating grounds in the Tropics and summer feeding grounds in temperate and boreal latitudes. Between November and May whales use the coastal waters of the main Hawaiian Islands as calving and mating grounds. Based on aerial surveys conducted

Figure 10. Humpback whales were severely depleted by commercial whaling. Their largest population in the North Pacific Ocean, the central North Pacific stock, migrates between winter calving grounds in coastal waters of Hawaii and summer feeding grounds along the coast of the Gulf of Alaska. (Photo by Ann Zoidis, courtesy of Allied Whale.)

throughout the main Hawaiian Islands in 1993, 1995, 1998, and 2000, the population appears to have been increasing at an average annual rate of about 7 percent per year. The most recent survey produced an abundance estimate of 4,491 whales (95 percent confidence interval 2,044 to 5,836).

The other two stocks of humpback whales in the North Pacific Ocean are the western stock, which calves in the Bonin and Ryukyu Islands south of the main islands of Japan (estimated to number a few hundred whales), and the eastern stock, which calves along the west coast of Mexico and Central America (estimated to number about 1,000 whales).

Humpback whales rarely feed while on their winter calving grounds. Instead they subsist on fat reserves stored in their blubber during the summer feeding season. At the end of the calving season, humpback whales in Hawaii migrate north to feeding grounds along the northern rim of the North Pacific Ocean, principally in coastal waters along the Gulf of Alaska from British Columbia to the Alaska Peninsula. The 2,000–3,000-mile trip requires about two months. Some individuals, however, have been tracked to waters along the Aleutian Islands and into the Bering Sea where their summer feeding range may overlap with the western North Pacific stock. The summer feeding range of the eastern stock occurs in coastal waters between California and British Columbia. They feed principally on krill and small schooling fish (e.g., herring, walleye pollock, anchovies, and capelin).

Many individual whales in the central North Pacific population exhibit strong patterns of site fidelity to specific feeding grounds off Alaska, but this does not appear to be the case on the Hawaiian wintering grounds. For example, there is little evidence that the whales that regularly use particular feeding areas in Alaska (e.g., Prince William Sound or southeastern Alaska) return repeatedly to the same islands in Hawaii year after year. There is, however, evidence that at least some whales travel in loose aggregations between islands in Hawaii. Although it has been suggested that the whales generally move in a northwesterly direction from the island of Hawaii toward Oahu as the winter season progresses, evidence for this is limited, and individual whales have been documented to move in both directions between individual islands within a season. Their distribution in the Hawaiian archipelago is principally in waters less than 100 fathoms (183 m) deep in the main Hawaiian Islands, and they are rarely seen in the remote Northwestern Hawaiian Islands.

With an 11½-month gestation period and a one-year nursing period, adult females generally produce a single calf every two to three years. When competing for access to females in estrous, adult males frequently vocalize, breach, and slap the ocean surface with their tails in apparent attempts to attract females or ward off other males.

Hawaiian Humpback Whale Sanctuary

On 4 November 1992 Congress passed Public Law 102-587 designating certain waters within the 100-fathom (183 m) bathymetric contour around the main Hawaiian Islands as the Hawaiian Islands Humpback Whale National Marine Sanctuary (see Fig. 11). Its purposes are to help protect humpback whales and their habitat in Hawaii, educate the public about the relationship between the whales and Hawaii's marine habitat, manage human uses consistent with the enabling

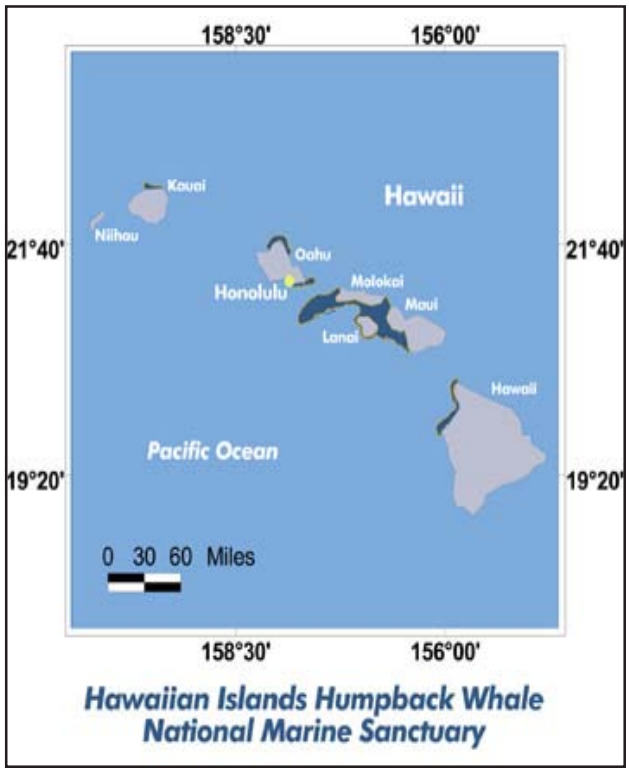

Figure 11. The Hawaiian Humpback Whale National Marine Sanctuary (shown in black) was designated in 1992 in certain Hawaiian waters within the 100-fathom contour to help protect humpback whales. (Figure courtesy of the National Marine Sanctuary Program.)

legislation, and identify marine resources of national significance for possible inclusion in the sanctuary at a later date. Approximately half of the 1,370-sq.-mi. sanctuary is included in a contiguous area between the islands of Molokai, Maui, and Lanai in the central portion of the main Hawaiian Islands. The remainder includes isolated strips of coastal waters on the north shores of Hawaii, Oahu, and Kauai.

The National Marine Sanctuary Program in the National Oceanic and Atmospheric Administration's National Ocean Service and the State of Hawaii manage the sanctuary. Sanctuary regulations prohibit approaching humpback whales closer than 100 yards and operating aircraft below 1,000 feet when over a humpback whale (except during takeoffs and landings).

When NOAA designated the sanctuary, it committed to the State of Hawaii that, within five years of adopting a sanctuary management plan, it would evaluate progress toward implementing the sanctuary. The agency also agreed to submit the results of its five-year evaluation and any proposed revisions that might affect state waters to the Governor of Hawaii for approval. The initial management plan and implementing regulations were adopted in the spring of 1997.

The National Ocean Service completed its review and a draft revised sanctuary management plan early in 2002. The Service proposed to leave sanctuary boundaries and regulations unchanged, but to modify its sanctuary management plan to include a revised set of goals, priorities, and programs for the next five years. On 21 March 2002 the Service wrote to the Commission and other agencies, organizations, and individuals asking for comments on its revised draft management plan.

The revised plan included a description of sanctuary accomplishments since 1997. Among other things, it noted that the sanctuary had trained and funded an enforcement officer to work on whale protection during the annual calving season, helped fund more than 20 studies and research projects, and implemented numerous community outreach efforts to promote public awareness and protection of the humpback whales in Hawaiian waters. During the five years, the number of whales observed had increased and Hawaii's whale-watching industry had grown to an estimated $11 million per year in direct revenues. The National Ocean Service proposed restructuring the sanctuary management program according to lists of seven goals, 24 objectives, and numerous other activities.

On 14 May 2002 the Marine Mammal Commission responded to the National Ocean Service's request for comments on the revised draft management plan. The Commission concluded that the importance of the sanctuary for protecting humpback whales and continuing research and education programs would likely increase in the future. In general, the proposed provisions seemed appropriate and useful, and the Commission recommended that the plan be adopted subject to certain modifications described below.

Whale-Watching Regulations—With respect to whale-watching, the Commission noted that several measures in the draft plan might be modified to improve protection of the whales. First, although the established regulations prohibit approaches closer than 100 yards to a humpback whale, a vessel may find itself closer than 100 yards because whale-watching vessels may drift toward the focal animal or whales may move toward a vessel. The regulations, however, provide no guidance or procedures for vessel operators should they decide to withdraw from a whale that has moved closer than 100 yards. The Commission therefore recommended that the National Ocean Service revise the regulations to describe procedures vessel operators should use when leaving whales that are closer than 100 yards (e.g., upon starting the engines for departure leave them running in idle for a brief period, move directly away from the whale at slow speed, and avoid sudden changes in engine speed or direction).

Second, the Commission noted that a recent review of collisions between whales and ships (see Laist et al. 2001 in Appendix B) had found that all types of vessels may hit and injure whales, including whale-watching vessels. In most cases, whales that are hit are not seen beforehand. The review also found that collisions causing serious injuries to whales had rarely been documented for vessels traveling at less than 14 knots. Noting that unseen whales may occur near observed whales and that collisions between whale-watching boats and humpback whales have been documented, the Commission recommended that the regulations be revised to require use of speeds of 12 knots or less when within one nautical mile of any observed whales.

Third, the Commission noted that compliance with approach rules could be improved substan-

tially if passengers aboard whale-watching vessels were aware of required approach procedures and phone numbers for reporting observed violations. This would provide an incentive for self-policing by commercial vessels and might help in identifying private vessels observed violating approach rules. The Commission therefore recommended that the regulations be revised to require that commercial whale-watching operators post placards aboard their vessels describing the rules for approaching humpback whales off Hawaii and providing the phone numbers to call to report violations.

Identification of Other Significant Resources—When the humpback whale sanctuary was designated in 1992, Congress directed that efforts be undertaken to identify and evaluate significant marine resources other than humpback whales that should be included within the sanctuary boundaries. During the process of developing the initial sanctuary management plan, a Sanctuary Advisory Committee and the public identified a number of additional significant resources, including Hawaiian monk seals, sea turtles, and coral reefs. Actions to address the Congressional directive, however, were deferred by the National Ocean Service. The draft revised plan therefore proposed a new schedule for this process that would begin in 2006 and be implemented in 2007 or thereafter. The Commission recommended that the Service accelerate the draft management plan schedule for considering new marine resources that might be added to the scope of the sanctuary management and that Hawaiian monk seals be among the added resources considered during that process.

Research and Management Information Exchange—The draft plan also called for continuing a number of research and monitoring studies to assess humpback whales and the effects of human activities on them and their habitat. Many researchers are conducting studies on aspects of humpback whale behavior and biology in Hawaii. To enhance communications among researchers, managers, and the public, the draft plan proposed various activities, including the development of a research web site and a research newsletter and holding informational workshops and seminars. Although noting that these measures seemed appropriate and helpful, the Commission recommended that the revised plan also explicitly include provisions to organize an annual meeting of researchers, stakeholders, and managers to exchange information on recent activities, findings, and plans to promote arrangements for data sharing and discuss issues of mutual concern.

Final Revised Sanctuary Management Plan—The National Ocean Service responded to the Commission's recommendations by letter of 24 July 2002, and in August it published a new sanctuary management plan. In response to comments from the Commission and others, the Service amended its proposed plan to accelerate the schedule for considering other marine resources to be addressed under sanctuary management. Under the new schedule, consideration of other marine resources is to begin in 2004 with a decision on which resources to include to be made in 2005. The Service did not adopt the Commission's recommendations to modify the whale-watching regulations or to include explicit plans for convening annual meetings of researchers. The revised plan was subsequently provided to the Governor of Hawaii for approval and became effective on 9 September 2002.

Alaska Whale-Watching Regulations

On 31 May 2001 the National Marine Fisheries Service adopted final rules that established a 100-yard approach limit in Alaska waters and required that vessels operate "at slow, safe speed when near a whale." In adopting the rule, the Service noted that specific speed limits, as had been recommended by the Commission in comments provided to the Service, were not adopted because the Service had concluded that they were not enforceable or practical. In this regard, it indicated that some vessels had "clutch-in speeds" (i.e., the slowest speed a vessel could go without disengaging the engine) of 10 to 14 knots and could not operate safely at slower speeds. The Commission had recommended that the Service require whale-watching vessels to travel at less than 13 knots.

The Commission wrote to the Service on 18 June 2001 questioning the rationale for its speed provision and recommending that the rules be revised to set forth specific speed limits within explicit distances around whales. The Service's 16 October 2001 response advised that it did not plan to revise the regulations and reiterated its conclusions that specific speed limits were not enforceable or practical. In the opinion of the Commission, the Service's rationale was not compelling.

Nevertheless, the Service advised the Commission that it likely would interpret the term slow, safe speed as 15 knots or less.

The Commission disagreed with the Service on its interpretation of available data, and on 27 December 2001 it again wrote to the Service. It noted that whales have been killed or seriously injured by collisions with ships traveling at 14 to 15 knots and that the Service's interpretation of those speeds as "slow, safe speeds" would still pose a risk to whales. It also noted that vessels frequently operate safely at less than their "clutch-in speed" and requested a detailed explanation as to what vessels had clutch-in speeds greater than 10 knots. To the extent that using speeds slower than a cited speed may endanger vessel safety, the Commission noted that speed restrictions could exempt situations where vessel or human safety could be compromised.

Noting that the public had not had an opportunity to comment on the speed restriction adopted by the Service, the Commission therefore recommended that the Service develop and seek public comments on a revised rule limiting approach speeds to 12 knots within a one-half mile of any humpback whale in inland waters and within a mile in offshore waters of Alaska. It also recommended that a provision be added to the rules to require the posting of approach rules aboard whale-watching vessels so that passengers would be aware of the provisions and vessel operators would be less likely to violate them. Finally, the Commission noted that the Service had no requirements for vessel operators to report to the Service when they knowingly hit a whale. The Commission therefore recommended that the Service develop regulations to require such reporting.

On 30 April 2002 the Service responded to the Commission's letter. The Service noted that it would continue to monitor interactions between whales and vessels in Alaska, but that it did not have data to determine that there was a need to modify the approach rules at this time. The Service also noted that enforcement constraints were its primary concern about citing a specific speed limit and that such concerns were expressed by its office of enforcement and the Coast Guard's 17th District. The Service further noted that most whale-watching vessels in Alaska had a top speed of 20 knots. It may therefore be difficult to argue that 15 knots is indeed slow. Nevertheless, the letter stated that the Service believed that "a sufficient case for violations could be made for vessels traveling above the 12–15 knot range."

With regard to identifying vessels that have clutch-in speeds greater than 10 knots, the Service stated that some Coast Guard vessels had such clutch-in speeds. It did not dispute the Commission's understanding that such vessels could operate safely below their clutch-in speeds. It therefore remains unclear why the Service concluded that a speed limit of 12 knots is impractical. With regard to requiring that commercial whale-watching operators post approach rules, the Service noted that brochures and placards are currently distributed to vessel operators to provide to their customers and to post and that it conducts regular training sessions with tour companies to explain approach guidelines and regulations. Concerning the recommendation on requiring reports of collisions that kill or seriously injure whales, the Service noted that it would consider the recommendation further.

Stock Structure

During its November 2001 annual meeting, the Commission considered information from recent photo-identification analyses that suggests that humpback whales in the central North Pacific population are partitioned into relatively discrete groups of whales that use individual feeding grounds (e.g., southeastern Alaska, Prince William Sound, the Kodiak Island area, and the eastern Aleutian Islands area). For example, of 287 whales photographed in southeastern Alaska between 1990 and 1993, only four were observed on other Alaska feeding grounds. Thus, although whales using different feeding grounds may interbreed on the winter calving grounds in Hawaii, whales in different feeding grounds seem to form discrete subpopulation units.

With little exchange between feeding groups, the replacement of animals lost from any one group by those of another group is likely to occur very slowly. For this reason, the Alaska Scientific Review Group (a group of marine mammal experts that helps the Service review and update Alaska marine mammal stock assessment reports) recommended in December 2000 that the Service develop separate population estimates and potential biological removal levels for each identified summer feeding area.

The Marine Mammal Commission concluded that this recommendation had merit. Therefore, by letter of 27 December 2001, the Commission expressed the view that, when there is strong evidence that the loss of a regional group of marine mammals is unlikely to be replaced within a few generations by members of the same species from surrounding areas, the Service should treat that group as a separate management unit for purposes of preparing marine mammal stock assessment reports. It also noted, however, that subdivisions into such units be approached cautiously. It noted that such decisions seem warranted only when there is strong evidence to indicate that members of a group exhibit a high degree of site fidelity and discreteness from other population components, that they represent an ecologically significant part of the regional ecosystem, that immigration from other areas is not likely to occur for at least several generations, and that their geographic extent comprises a significant part of the population's overall range. Noting that groups using at least some Alaska feeding grounds appear to meet these criteria, the Commission recommended that the Service develop separate stock assessments for the humpback whales using southeastern Alaska, Prince William Sound, and, if information warrants, other Alaska feeding areas.

In its 30 April 2002 response, the Service noted that, although southeastern Alaska appears to support a discrete group of whales, some information suggests that whales using more westerly feeding areas, including Prince William Sound, may move between feeding areas. Given the Scientific Review Group's recommendation, it advised that the Service's National Marine Mammal Laboratory would likely be receiving funds in 2002 to update abundance estimates for the total central North Pacific population and for that portion that forages annually in southeastern Alaska. The Service also noted that it hoped to provide that information to the review group in the fall of 2002 to help draft the 2003 stock assessment reports.

The Alaska Scientific Review Group met on 4–5 November 2002 and, among other things, reviewed information on the central North Pacific humpback whale population. In preparation for the meeting, the Service provided funds to the University of Alaska to develop an estimate of the portion of the North Pacific stock that feeds in southeastern Alaska. Although final results of the work were not available in time for the meeting, the group recommended an approach for revising the population's stock assessment report such that the feeding group of humpback whales in southeastern Alaska would continue to be recognized as part of the central North Pacific stock, but that a separate potential biological removal (PBR) level would be calculated for the whales feeding in southeastern Alaska. The PBR level is an estimate of the number of whales that can be removed from a stock annually (other than by natural causes) while still maintaining a high degree of assurance that it will increase toward or remain at its optimum sustainable population level. New abundance and growth rate estimates for the southeastern Alaska feeding group, which are needed to calculate the PBR level, are expected to be incorporated into the draft stock assessment reports that will be made available in 2003.

As a related matter, Service scientists and collaborators met in December 2002 to begin planning a North Pacific–wide research project on the structure of populations, levels of abundance and status of humpback whales in the Pacific. If funding can be secured, the project will be initiated in 2003. If successfully completed, the project could provide much information for revising and improving the North Pacific Ocean humpback whale stock assessments.

Killer Whales in the Eastern North Pacific (*Orcinus orca*)

Killer whales occur in all oceans of the world but are more abundant in temperate and colder waters within 800 km (500 mi) of coasts. In the North Pacific, killer whales are divided into three nonassociating forms or ecotypes referred to as "resident," "transient," and "offshore." Resident and transient forms show distinctive differences in genetic composition, morphology, diet, ecology, distribution, movement patterns, and social structure. The offshore form is less well described, but appears to be more closely related to the resident form than to the transient form. One of the more notable differences among these forms is their diet. All killer whales are considered top-level predators, but the diet of resident killer whales appears to be composed of fish, whereas the transient form appears to prey primarily on marine mammals. The diet of the offshore form has not been characterized but is assumed to be fish.

Within each of these three ecotypes, killer whales in the eastern North Pacific (Fig. 12) are divided into various stocks, each of which also exhibits structure in the form of social groups. Resident whales occur in associations of matrilineal groups, which generally include fewer than 40 individuals, although large aggregations involving multiple pods may also occur. The social structure and reproductive behavior of transient killer whales appears to be more variable. They are generally found in small groups (fewer than 10 individuals) but also may occur as solitary animals or in temporary pairs. Offshore killer whales, on the other hand, tend to occur in large groups of 25 to 75 individuals. The reasons for these differences are not well understood but may reflect foraging-related natural selection over evolutionary time periods or adaptations to foraging conditions over shorter ecological time periods. For each ecotype, association in groups presumably facilitates cooperative behavior (e.g., hunting, calf-rearing). Group cohesion may be maintained by a range of behaviors, including the production of a number of different sounds that are presumably used by killer whales for communication, orientation, and foraging.

Stock Structure, Abundance, Trends, and Status

The National Marine Fisheries Service currently recognizes five killer whale stocks in the eastern North Pacific: (1) a northern resident stock (British Columbia through Alaska), (2) a southern resident stock (inland waters of Washington State and southern British Columbia), (3) a transient stock (Alaska to Cape Flattery, Washington), (4) a California/Oregon/Washington Pacific coast stock (Cape Flattery, Washington, through California),

Figure 12. Two resident killer whales near Harrow Strait in the Pacific Northwest. (Photo by Brad Hanson, courtesy of the National Marine Mammal Laboratory.)

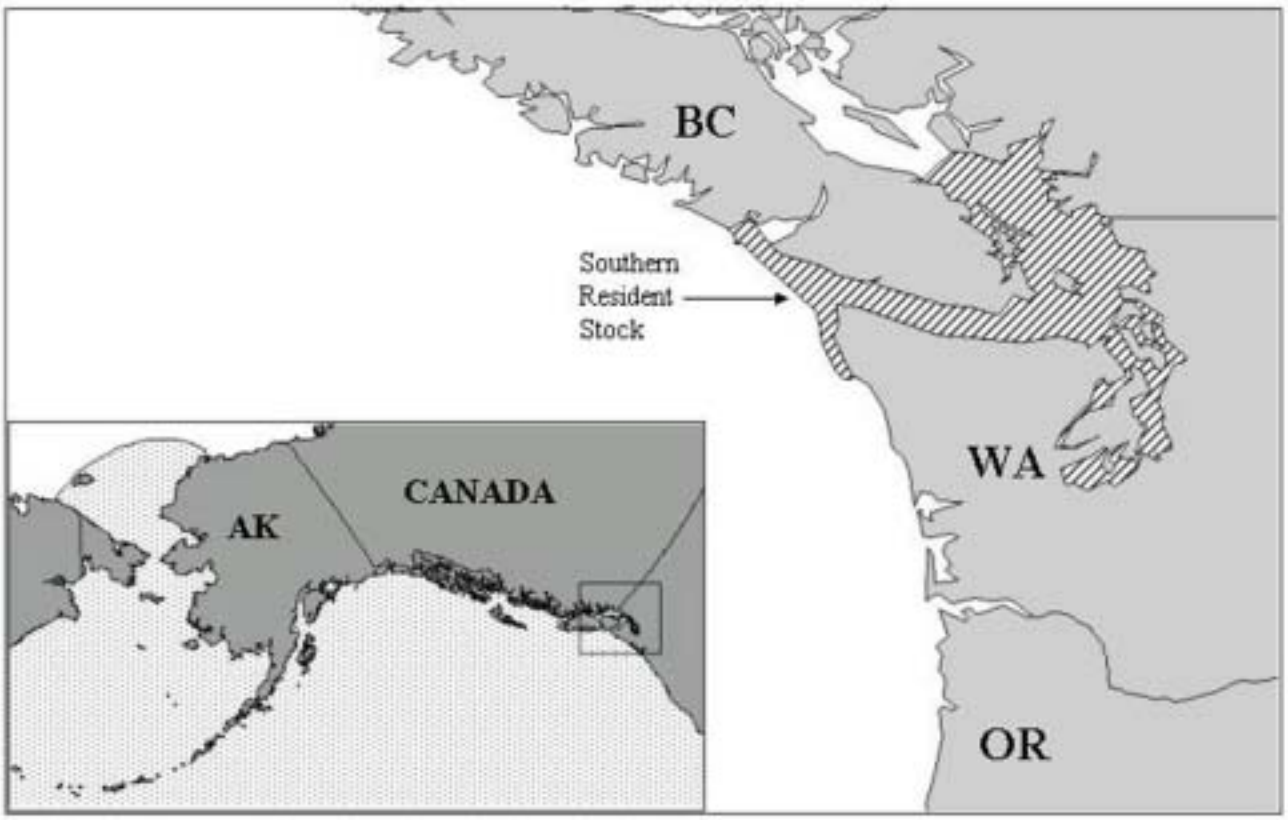

Figure 13. North Pacific killer whale distibution. Figure inset illustrates the wide distribution of killer whale stocks in the eastern North Pacific. The larger background figure shows distribution of the southern resident killer whale stock in Puget Sound, a larger view of the small square in the inset figure.

and (5) an offshore stock (southeastern Alaska through California). The Service's minimum population estimate for the northern resident stock is 723 animals. The minimum estimate for the southern resident stock is 78 animals, which is a decrease of 19 animals since 1995. The minimum estimate for the transient stock is 346 whales. Abundance has not been estimated for the California/Oregon/Washington coastal stock. The minimum abundance estimate for the offshore stock is 209. Trends for the northern resident stock, transient stock, California/Oregon/Washington coastal stock, and offshore stock cannot be described based on the available data. Trends for the southern resident stock are described below, as are trends for the AT1 population of transient killer whales from Prince William Sound area.

None of these recognized stocks is listed as threatened or endangered under the Endangered Species Act or designated as depleted under the Marine Mammal Protection Act. However, the status of killer whale stocks in the eastern North Pacific has become an issue of considerable concern in the past few years due to their potential role as predators and their interactions with, and vulnerability to, human activities. These issues have been confounded by the fact that scientists are now describing subgroups within these stocks based on genetic, geographic, social, morphological, ecological, or other characteristics, and the level of protection they should be afforded under the Marine Mammal Protection Act and the Endangered Species Act is a matter of debate.

Killer Whale Predation

Predation on Other Marine Mammals— Killer whale predation is the leading hypothesis for the decline of the northern sea otter in the central Aleutian Islands region. Such predation also may be a factor in other areas of decline (Alaska Peninsula west through the Aleutian Islands, Kodiak Archipelago, Pribilof Islands, and Bristol Bay area) although direct evidence is lacking. The hypothesis is that transient killer whales have increased

their predation of sea otters to compensate for declining availability of other prey, including Steller sea lions. Killer whale predation is also considered a possible contributing factor in the decline, or lack of recovery, of the western population of Steller sea lions in recent years. However, data required to confirm these hypotheses are not available in sufficient detail. The circumstantial evidence is stronger with respect to the decline of sea otters in the central Aleutian Islands although additional research is needed in both cases. In particular, data are needed on the rate of killer whale predation on sea lions and sea otters from direct observations or inferred from better information on killer whale abundance, trends, and diet. Research programs to address these questions are being initiated by the National Marine Fisheries Service (with respect to Steller sea lions) and the Fish and Wildlife Service (with respect to northern sea otters). Continued long-term support for these programs will be necessary if they are to provide the needed information.

Predation on Fishes Taken in Commercial Fisheries—In the southeastern Bering Sea and Prince William Sound, killer whales interact with longline fisheries for Pacific halibut, sablefish, and Greenland turbot. The whales sometimes damage or remove fish and damage gear. Studies of such depredation in the 1980s indicated that the killer whales tended to target the larger fish caught, that depredation occurred on at least 20 percent of bottom longline sets in the southeastern Bering Sea, and that an estimated 25 percent of the total catch was lost in Prince William Sound. A review of killer whale/longline interactions in the 1980s suggested that this phenomenon was spreading to the Aleutian Islands. Longline fisheries exist throughout the Aleutian Islands and along the continental shelf break (200-m isobath) in the Bering Sea. Such interactions may spread as killer whales learn to take advantage of the foraging opportunities presented by longlines with hooked fish.

In turn, the whales may be injured by ingestion of hooked fish, entangled in the longline gear, or shot by fishermen. The Service estimates that between 1995 and 1999 the average number of killer whale mortalities resulting annually from such interactions in the Bering Sea/Aleutian Islands region was about 0.8 whales. Estimated killer whale mortality due to groundfish fisheries during the same period was similar, suggesting an average total mortality rate of about 1.4 whales per year in the Bering Sea and Aleutian Island region. However, surveys conducted in 1992 by the Service also indicated that 8 of 182 killer whales observed in the Bering Sea and Gulf of Alaska exhibited evidence of gunshot wounds. The mortality rate from such wounds is unknown. In Prince William Sound, 8 of the 35 whales in the AB pod, which is involved in most fishery interactions, were lost between 1986 and 1988. Some of those losses may have been due to gunshot wounds although shooting was prohibited after 1986. An additional 13 whales were lost from this pod after the *Exxon Valdez* oil spill.

A variety of techniques has been tried to reduce or eliminate such interactions, including acoustic deterrents (e.g., "bang pipes" and seal bombs) and modified fishing procedures, such as operating vessels in teams that alternately retrieve lines so that one crew can keep animals away while the other retrieves hooked fish. To date, none of these techniques has proven to be particularly successful. As described in Chapter VIII, the Marine Mammal Commission provided support for a 2002 workshop to develop measures to mitigate interactions between cetaceans and longline fisheries.

Vulnerability to Human Activities

Southern Resident Killer Whale Stock— Southern resident killer whales occur primarily in the inland waters of Puget Sound and southern British Columbia, and occasionally range as far south as California (Fig. 13). Status of the stock before the 1960s is unknown, but it may well have been reduced at that time due to indiscriminate shooting, which was known to occur, and other human-related mortality. In the 1960s and early 1970s the stock was diminished by the live capture and removal of at least 48 whales for aquariums and display facilities. Abundance in 1974 was 71 whales (Fig. 14). The stock began to recover in the mid- and late 1970s, declined during the early 1980s, and then recovered to 97 whales in 1995. Since 1995 the stock has declined by about 20 percent, and abundance in 2001 was 78 whales. This recent decline appears to have resulted from decreases in both fecundity and survival although the change in survival appears to be the more significant factor. The decrease in survival is particularly worrisome because it has involved not only immature animals, but also mature females. Ma-

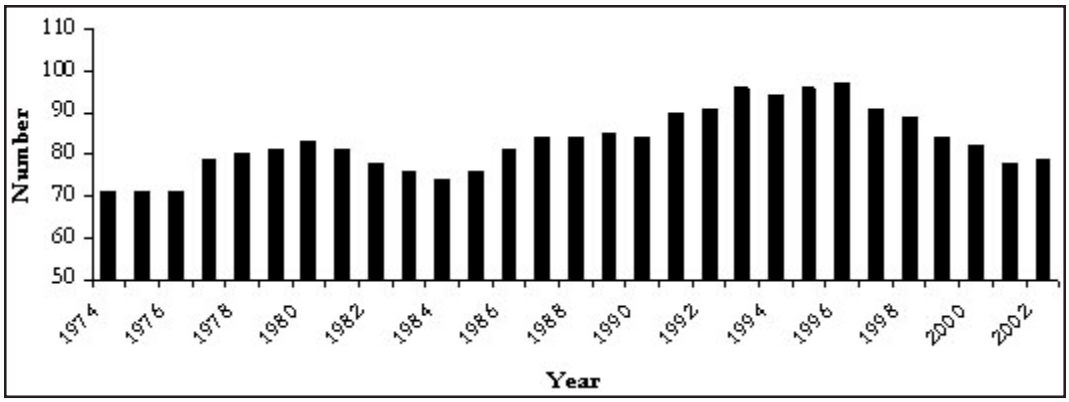

Figure 14. Southern resident killer whale abundance, 1974–2002.

ture females usually have a high probability of survival and are critical to the stock's ability to recover because of their role in reproduction.

Shortage of prey, exposure to contaminants, and disturbance have been identified as three human-related factors that may be contributing to the recent decline of the southern resident stock. Salmon, particularly chinook salmon, appear to be the major prey of these fish-eating resident killer whales. Comparisons of historical and current chinook salmon levels in this region suggest that their numbers have declined markedly, perhaps by 50 to 70 percent or more, throughout the range of the southern resident stock. As top-level predators, these whales also carry high levels of contaminants accumulated through the food chain. The manner and extent to which these contaminants affect the whales is unknown, but they may affect, among other things, immune system function and reproduction. In addition, southern resident killer whales are exposed to a variety of potential human-related disturbances from shipping, fishing, recreational boating, and whale-watching. Here, too, the manner and extent to which such potential forms of disturbance affects these whales are unknown, but such disturbance may affect their distribution and habitat use patterns, behavior, or ability to communicate using sound.

On 1 May 2001 the Center for Biological Diversity and other groups petitioned the National Marine Fisheries Service to list the southern resident stock as endangered or threatened under the Endangered Species Act and to designate critical habitat for the stock. On 13 August 2001 the Service published a notice in the *Federal Register*, finding that listing may be warranted. It convened a biological review team to assess killer whale stock structure and the probability of extinction of the southern resident stock. On 28 February 2002 the Service sent the draft report of the review team to the Marine Mammal Commission with a request for comments. The draft report indicated that the probability of extinction of the southern resident stock was greater than 10 percent over the next 100 years and greater than 85 percent over the next 300 years if the current trend continues. However the conclusion of the report hinged on the question of whether the southern resident stock constitutes a "distinct population segment," which it had previously interpreted (with the Fish and Wildlife Service *[Federal Register* 61:4722]) to be a segment that must be "discrete" from other populations and "significant" to the taxon (species or subspecies) to which it belongs. Ample evidence indicates that the stock is a discrete unit. Thus, the issue was whether it is significant to its taxon. The review team "could not identify with any certainty the true taxa for killer whales." Nonetheless, the team concluded that the southern resident stock was not significant and therefore did not constitute a distinct population segment.

In reaching its conclusion, the review team relied on four criteria established by the joint policy statement for determining significance:

(1) persistence of the discrete population segment in an ecological setting unusual or unique for the taxon;

(2) evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon;

(3) evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; and

(4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

The team also noted that other criteria may be used, as appropriate. The evaluation of these criteria depends heavily on the taxonomic status of killer whales.

In a 22 March 2002 letter to the Service, the Marine Mammal Commission commented that the outdated state of killer whale taxonomy appears to undermine the rationale for the preliminary conclusion that the southern resident stock is not significant. The Commission suggested that the Service consider additional information as to whether the stock is significant. In particular, the Commission recommended that the Service review the finding and purpose of the Endangered Species Act, wherein Congress recognizes the esthetic, ecological, educational, historical, recreational, and scientific value of various species to the nation and its people, and establishes as a purpose of the Act the conservation of the ecosystems upon which threatened and endangered species depend. In view of the uncertainty regarding the taxonomic status of killer whales and the importance of such information in the Service's rationale, the Commission also recommended that the Service act in a precautionary manner to ensure recovery and conservation of the southern resident killer whale stock.

On 1 July 2002 the Service published its final determination that listing of the southern resident killer whale stock was not warranted at this time and under its current taxonomic status because it does not constitute a species, subspecies, or distinct population segment under the Endangered Species Act. At the same time, the Service concurred that "the issue of classifying Southern Resident killer whales into a particular DPS cannot be resolved until the taxonomic structure of *O. orca* is clarified." Therefore, the Service committed to reconsider the taxonomy of killer whales within four years. On the same day the Service published a notice that it was anticipating that it would propose to designate the southern resident stock as depleted under the Marine Mammal Protection Act and was seeking comments on the proposed listing and potential conservation measures. On 6 August 2002 a group of environmental organizations and individuals informed the Service of their intent to sue the Service over its determination that listing under the Endangered Species Act was not warranted.

Representatives of the Service reviewed the status of eastern North Pacific killer whale stocks, including the decisionmaking process regarding the southern resident stock, at the Marine Mammal Commission's annual meeting on 8–10 October 2002. On 18 November 2002 the Commission wrote to the Service to provide additional comments and recommendations pertaining to the southern resident stock. The Commission again questioned the use of current taxonomy of killer whales as a basis for denying protection to the stock under the Endangered Species Act. With regard to the four criteria used to determine "significance," the Commission pointed out that it could be reasonably argued that the southern resident stock occupies an ecological setting unique for the species because it is the only resident stock along the entire Pacific coast of Washington, Oregon, and California.

The Commission also pointed out that the loss of this stock could result in a significant gap in the range of the taxon because transient, offshore, or other resident killer whales with overlapping or adjacent distributions may not expand into the range of the southern resident stock if it were absent. It is not clear, for example, that other ecotypes could replace southern residents because they differ significantly in behavior and ecological requirements. There is no evidence of such expansion to date, nor is there evidence that southern resident whales have excluded them from doing so. Because the Service committed to conduct a review of killer whale taxonomy within four years, the Commission also recommended that the Service develop a plan for carrying out this review and for ensuring that the information needed to make a more informed decision is available for the review.

With regard to the Service's notice of proposed rulemaking to designate the southern resident stock of killer whales as depleted under the Marine Mammal Protection Act, the Commission concurred that the available evidence is sufficient to demonstrate that the stock is below its optimum sustainable population range and warrants such designation. Because the same information used to determine that the stock is depleted may be used to determine when that designation is removed (i.e., the stock has recovered), the Commission rec-

ommended that the Service proceed with the designation but postpone a determination of the recovery level until it has had time to conduct an adequate review of the literature to provide the best science-based estimate of the recovery level.

Finally, the Commission commented on the similarities and distinctions between listing the stock under the Endangered Species Act and designating it as depleted under the Marine Mammal Protection Act. The foremost distinction is the consultation requirement under section 7 of the Endangered Species Act, which provides an explicit mechanism for identifying, evaluating, and modifying (if required) federal actions that may jeopardize a listed species or destroy or adversely modify its critical habitat. Section 7 consultation does not have a counterpart under the Marine Mammal Protection Act, and by declining to list the southern resident stock under the Endangered Species Act, the Service had failed to avail itself of this important tool for identifying and addressing threats to the stock and its habitat. The Commission also noted that designation of critical habitat and consultations on federal actions under the Endangered Species Act provide clear and direct mechanisms for protecting habitat of threatened and endangered species. The Marine Mammal Protection Act addresses habitat concerns more broadly and provides a mechanism under which the Service *may* develop and implement conservation and management measures for areas of ecological significance. The Commission therefore recommended that the Service use its authority to protect important habitat as it develops a conservation plan for the southern resident killer whale stock.

On 18 December 2002 the Center for Biological Diversity, Friends of the San Juans, People for Puget Sound, the Orca Conservancy, Ocean Advocates, Earth Island Institute, Ralph Munro, and Karen Munro filed suit against the National Marine Fisheries Service and the Department of Commerce. The plaintiffs challenged the Service's determination that listing under the Endangered Species Act was not warranted.

AT1 Group of Transient Whales—The AT1 group of transient killer whales occurs in Prince William Sound and the Kenai fjords. They feed on marine mammals, and Dall's porpoises and harbor seals are thought to be major prey. When first assessed in 1984, the group consisted of 22 animals. Currently, the group has declined to nine animals (five females and four males). The cause(s) of the decline have not been confirmed, but suspected causes include the *Exxon Valdez* oil spill, exposure to other contaminants, reduction in prey availability (see Chapter III, section on harbor seals in Alaska), and human-related disturbance.

On 14 November 2002 the Alaska Center for the Environment, Alaska Community Action on Toxics, Center for Biological Diversity, Coastal Coalition, Defenders of Wildlife, Eyak Preservation Council, and the National Wildlife Federation petitioned the National Marine Fisheries Service to designate the AT1 group of transient killer whales as depleted under the Marine Mammal Protection Act. On 22 November 2002 the Service published a notice of the availability of the petition and solicited comments on it.

In a 23 December 2002 letter to the Service the Marine Mammal Commission commented that the question of whether the AT1 group should be designated as depleted appears to hinge on two questions: Does the AT1 group constitute a stock and is the AT1 group below its optimum sustainable population level. The Marine Mammal Protection Act defines a "population stock" or "stock" as "a group of marine mammals of the same species or smaller taxa in a common spatial arrangement, that interbreed when mature." The Alaska Scientific Review Group had previously reviewed evidence that AT1 is a separate stock and, in a 13 December 2001 letter, recommended that the Service recognize it as such. The Commission concurred with the scientific review group.

The limited information available to address the second question suggests that the AT1 group is below its optimum sustainable population level. The group consisted of 22 animals in 1984. Assuming that (1) 22 is a minimum indicator of the environmental carrying capacity for this group, and (2) the lower limit of the optimum sustainable population occurs at 60 percent of the carrying capacity (an assumption previously used by the Service for other marine mammals), then the current abundance of nine animals is less than the optimum sustainable population level.

The Commission's letter regarding the AT1 group recognized that the designation of such a small group of animals as a stock would require a new management approach with new challenges. The designation of the group as depleted and sub-

sequent management actions would also be confounded by a number of sources of uncertainty, including the relationships of the AT1 group to other killer whale groups, and the multiple factors that may have led to its decline. In view of these and other sources of uncertainty, the Marine Mammal Commission recommended to the Service that it take a precautionary approach to management of the AT1 group and designate it as depleted.

Future Research and Management

In its 18 November 2002 letter to the National Marine Fisheries Service, the Marine Mammal Commission emphasized the need for a sustained long-term research program on killer whales in the eastern North Pacific. The role of these animals as top predators and their vulnerability to human interactions had led to a number of significant concerns that are difficult to address in the absence of baseline life history and demographic information on these animals. In its letter, the Commission noted that future support is needed for studies of their biology, taxonomy, population dynamics, and ecology. Although these animals may have substantial influence on North Pacific ecosystems, they also may be vulnerable to changes occurring in these ecosystems as a result of natural factors or human activities. If, for example, the prey of transient killer whales in the Gulf of Alaska and Aleutian Islands region has declined significantly due to the removal of large numbers of large whales and the nearly 90 percent decline of Steller sea lions, then killer whales may have been forced to switch to secondary prey (e.g., sea otters) with significant effects on their foraging success (e.g., energy balance), reproduction, survival, and, ultimately, population trends. The evidence collected in recent surveys suggests far fewer transient killer whales than expected. The low number of sightings may indicate that transient killer whale numbers in this region are, in fact, depleted. For these and other reasons, the Marine Mammal Commission recommended to the Service that it develop a long-term research plan for North Pacific killer whales to provide the level of information needed to understand their population trends and their role in North Pacific ecosystems and to develop conservation programs needed to provide a suitable level of protection to ensure that they remain functioning elements of those ecosystems.

Rescue and Release of A73

A73 is a two-year-old female killer whale from the A pod of the northern resident stock in Canadian waters. In the summer of 2002 she was observed alone, and presumably orphaned, for several months in Puget Sound, where she had begun to interact with vessels and ferries. Out of concern for her health and poor prospects for her survival as a lone animal, the National Marine Fisheries Service decided in late May 2002 to capture her for rehabilitation and release back in her home waters. On 14 June 2002 she was captured and transported to a National Oceanic and Atmospheric Administration facility near Seattle, where she received medical care and was fed a diet of salmon. After treatment for parasites and bacterial infection, she was cleared for release. On 13 July she was transported by ferry to a facility in northern Vancouver. She began interacting almost immediately with killer whales in the area and was released the next day. Before release, the whale was tagged to allow tracking of her movements. Since then, she has been observed with other whales on numerous occasions and appears to be faring well. The rescue and release effort appears to have been a successful collaboration of the Service, Canada's Department of Fisheries and Oceans, the Vancouver Aquarium, and whale advocacy groups.

Cook Inlet Beluga Whale (*Delphinapterus leucas*)

Beluga whales are found in seasonally ice-covered waters throughout arctic and subarctic regions. With the exception of those in Cook Inlet and adjacent waters of the northern Gulf of Alaska, most beluga whales in U.S. waters are thought to winter in the Bering Sea in open leads and polynyas in the pack ice. In spring and summer, they are found in coastal areas or the offshore pack ice. Five stocks are recognized in U.S. waters based on the species' discontinuous summer distribution and on mitochondrial DNA analyses that indicate clear genetic differences among animals using different summering areas. The five stocks are named after their primary summering areas, which are located in Cook Inlet, Bristol Bay, the eastern Bering Sea, the eastern Chukchi Sea, and the Beaufort Sea.

The most isolated population of beluga whales in U.S. waters is found in Cook Inlet and is separated from the other four summer populations by the Alaska Peninsula. Because of their proximity to Anchorage, beluga whales in Cook Inlet are exposed to the largest urban coastal area in Alaska. Analyses by the National Marine Fisheries Service of beluga whale sightings in Cook Inlet over the past 30 years indicate that the stock's summer range has contracted substantially in recent years. Compared with sightings in the 1970s and 1980s, animals are rarely seen now in offshore waters or the southern reaches of the inlet. In early summer when the National Marine Fisheries Service conducts aerial surveys of the population, beluga whales are concentrated in a few groups in the upper reaches of the inlet around the Susitna River delta, Knik Arm, Turnagain Arm, and Chickaloon Bay.

Aerial surveys of beluga whales in Cook Inlet have been conducted by the Service annually in June or July since 1994. Data from those surveys indicate that the Cook Inlet population declined from an estimated 653 (CV = 0.43) individuals in 1994 to 347 (CV = 0.29) in 1998. This constitutes about a 47 percent decline in four years. The 1999 surveys yielded an abundance estimate of 367 (CV = 0.14), somewhat higher but not significantly different than the 1998 estimate. The 2000 surveys produced the lowest index count (184 whales) since systematic surveys began. However, when corrected to account for missed whales and missed groups of whales, the 2000 estimate was 435 whales. The coefficient of variation around this estimate (0.23) again was rather large and it is likely that the apparent increase in the abundance estimate for the stock between 1999 and 2000 was the result of interannual variation in the survey results, rather than growth in the population. This is borne out by the results of the 2001 and 2002 surveys. For 2001 the Service estimated the stock to number 386 whales (CV = 0.087). The range of estimates within the 95 percent confidence interval was 325 to 459 whales. The 2002 surveys produced an index count of 192 beluga whales. When that count is corrected to account for whales missed during the surveys, the best estimate of stock abundance is 313 beluga whales (CV = 0.12). The ranges of estimates within the 95 percent confidence interval is 248 to 396 whales. Although lower than the estimates of stock size obtained in recent years, the difference between the 2002 estimate and those for 1998–2001 is not statistically significant. Abundance estimates dating back to 1994, and the confidence limits around those estimates, are provided in Figure 15.

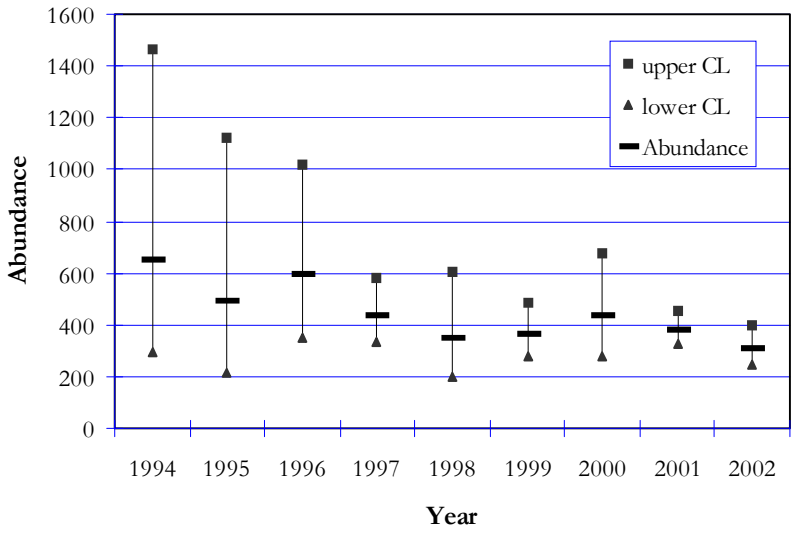

Figure 15. Abundance estimates of the Cook Inlet stock of beluga whales. (Data provided by the National Marine Fisheries Service.)

Stock Assessment

Under the Marine Mammal Protection Act, the National Marine Fisheries Service is required to prepare a stock assessment for each marine mammal stock under its jurisdiction that occurs in U.S. waters. These assessments are to be updated annually for strategic stocks, such as the Cook Inlet beluga whale, which is considered strategic because it has been designated as depleted. The Service published a notice of availability of its 2001 final assessment for Cook Inlet beluga whales on 8 March 2002. The Service made available the draft 2002 assessment for this stock, along with those for the other marine mammal stocks under its jurisdiction, for public review and comment on 19 April 2002.

One issue that has been somewhat controversial for this stock is what recovery factor to use for calculating the stock's potential biological removal level. This calculation is based on the stock's estimated minimum population size, its maximum net productivity rate, and a recovery factor ranging from 0.1 to 1.0, depending on the status of the stock. The potential biological removal level is the maximum number of animals, not including natural mortalities, that can be removed from the stock while providing reasonable assurance that it will recover to or remain within its optimum sustainable population level. The Alaska Scientific Review Group, appointed by the Service to provide advice on the status of Alaska marine mammal stocks, meets at least once a year to evaluate information on the Cook Inlet beluga whale stock. At its meeting in April 1999 the group evaluated information concerning the Cook Inlet beluga whale population and concluded that it should be considered a "high risk" stock because of its low abundance, declining trend, limited range, and susceptibility to catastrophic events. As a result of that review, the scientific review group recommended that the National Marine Fisheries Service use a recovery factor of 0.1 when calculating the potential biological removal level for this stock. Despite this advice, the Service's stock assessment report used a recovery factor of 0.5. Subsequent reports, including the final 2001 report and the 2002 draft report, used a recovery factor of 0.3, which is halfway between the 0.1 recovery factor generally used for endangered species and the factor of 0.5 associated with depleted and threatened stocks. Using this value and the minimum population estimate of 360 whales obtained in 2000, the Service calculated a potential biological removal level of 2.2 whales for this stock in the draft 2002 assessment.

The Commission submitted comments on the draft assessments on 24 July 2002. One of the general observations made by the Commission was that many of the reports, particularly those for stocks in Alaska, concluded that a particular activity was not affecting the marine mammal stock because no data existed to document a potential impact, even when no investigation of the issue had been conducted. The Commission pointed out that such conclusions depended, in part, on the power of the monitoring efforts being made to detect such effects and recommended that the reports discuss such efforts, rather than establishing a "no-effect" determination as the default conclusion.

This was a problem noted by the Commission in its specific comments on the draft assessment report for Cook Inlet beluga whales. In this regard, the Commission pointed out that the report indicated that three large stranding events that had occurred between 1996 and 1999 had not resulted from human causes. However, the report did not discuss the nature and extent of the efforts undertaken to determine the cause or causes of the strandings. Similarly, the Commission noted that the apparent lack of adverse effects on beluga whales by municipal, commercial, and industrial activities may reflect the level of investigation of those factors rather than the fact that such effects were not occurring.

Native Subsistence Harvest

Section 101(b) of the Marine Mammal Protection Act allows Alaska Natives to take marine mammals for subsistence purposes or for making and selling handicrafts provided that the taking is not done in a wasteful manner. Only if a stock has been determined to be depleted or has been listed as endangered or threatened may any other limits be placed on such taking. The National Marine Fisheries Service designated the Cook Inlet stock of beluga whales as depleted in May 2000.

According to figures derived from a variety of sources and provided by the Alaska Beluga Whale Committee (a group made up of Alaska Native beluga whale hunters and biologists), the estimated subsistence harvest of beluga whales from Cook Inlet averaged about 15 animals per year

between 1990 and 1994. It is generally accepted, however, that this figure underestimates the take because it does not include all beluga hunters using the Cook Inlet area or all animals that were struck and lost. The Cook Inlet Marine Mammal Council, a Native group formed in 1992, estimated that more than 30 whales were taken annually by subsistence hunters in Cook Inlet from 1990 through 1994.

The most thorough surveys of beluga whale subsistence harvests in Cook Inlet were undertaken in 1995 and 1996 by the Cook Inlet Marine Mammal Council. The Council reported that 70 whales were taken in 1995, including 26 that were struck and lost. The kill in 1996 was estimated to be 98 to 147 whales, including an estimated 49 to 98 whales struck and lost. In 1997, 70 whales were estimated to have been taken, of which an estimated 35 were struck and lost. The National Marine Fisheries Service estimates that 42 whales were taken in 1998 although other information, including an unverified report of 20 whales taken during one weekend in June by hunters from outside the Cook Inlet region, suggests that the actual number may have been much larger. Taking at these unsustainable levels resulted in about a 50 percent reduction in Cook Inlet beluga whale numbers during the 1990s.

The imprecision of the estimates of subsistence taking during much of the 1990s prompted the Commission and others to recommend that the National Marine Fisheries Service adopt marking and tagging regulations, as provided for by section 109(i) of the Marine Mammal Protection Act. In response, the Service promulgated such regulations in 1999, requiring Alaska Native hunters to report each Cook Inlet beluga whale landed and to present the lower left jawbone of the whale for marking. Since establishment of the reporting and marking requirements, however, there have only been two reported landings of beluga whales.

Part of the impetus for the increased number of beluga whales being taken was the availability of commercial outlets for beluga whale muktuk (a popular Native food composed of the skin and blubber of the whale) in Anchorage. The National Marine Fisheries Service has determined that such sales are authorized under the provision of section 101(b) of the Marine Mammal Protection Act that allows edible portions of marine mammals taken by Alaska Natives for subsistence purposes or for the creation of authentic Native handicrafts to be sold in Native villages and towns. Under the Service's interpretation of the Marine Mammal Protection Act, Anchorage is considered to be a Native village. Because of the demand for muktuk, beluga whales taken near Anchorage had a significant cash value. Before 1999 some hunters reportedly took large numbers of beluga whales for the muktuk, which they sold privately or at Native food stores in Anchorage.

The overharvest and precipitous decline of the Cook Inlet beluga whale has led to a number of actions to prevent further decline and to bring about the eventual recovery of the stock. At first, action was limited to a decision by some hunters to refrain voluntarily from taking whales. Subsequently, a free-standing legislative provision was enacted as part of the 1999 Emergency Supplemental Appropriations Act, Public Law 106-31, that prohibited until 1 October 2000 the taking of a beluga whale from the Cook Inlet stock unless authorized by a cooperative agreement between the National Marine Fisheries Service and an Alaska Native organization. Allowing the Service to limit the taking of Cook Inlet beluga whales for a 16-month period was believed to provide sufficient time for the agency to either (1) conclude a comprehensive co-management agreement with Native hunters or (2) list the stock as endangered or threatened under the Endangered Species Act or as depleted under the Marine Mammal Protection Act and complete a rulemaking to restrict the hunt.

In October 2000 the Service published proposed regulations to govern the hunting of Cook Inlet beluga whales under the Marine Mammal Protection Act. When it became apparent that the Service could not conclude the rulemaking quickly enough to provide the needed protection to the stock, Congress passed a revised provision in December 2000. That provision, enacted as section 627 of Public Law 106-553, extended indefinitely the prohibition on hunting Cook Inlet beluga whales unless authorized by the National Marine Fisheries Service through a cooperative agreement. As discussed below, the rulemaking to establish harvest limits has yet to be completed.

As a result of these actions, no beluga whales were reported to have been taken during the 1999 season. Although the Service entered into a cooperative agreement with the Cook Inlet Marine Mammal Council to allocate one strike to the Na-

tive Village of Tyonek for 2000, no whale was struck during the year. In June 2001 the Service again entered into a cooperative agreement with the Cook Inlet Marine Mammal Council authorizing one strike to Tyonek. This time the hunt proved successful, with the single strike resulting in the landing of a whale. No other taking of a Cook Inlet beluga whale was reported during 2001. The cooperative agreement between the National Marine Fisheries Service and the Cook Inlet Marine Mammal Council entered into in June 2002 again authorized the Village of Tyonek to strike one whale. In addition, Native hunters residing in Anchorage were authorized one strike. The Anchorage hunters struck and landed a large male whale on 22 July 2002. Hunters from Tyonek tried unsuccessfully to find a suitable whale during 2002. On those occasions when whales were spotted, the groups included calves. This prompted the hunters to proceed cautiously to ensure that a female whale accompanied by a calf was not inadvertently taken. As a result, no strike was made by Tyonek village hunters during 2002.

Stock Status and Related Litigation

The National Marine Fisheries Service designated the Cook Inlet beluga whale as depleted under the Marine Mammal Protection Act on 31 May 2000. The Service also determined on 22 June 2000 that listing under the Endangered Species Act was not warranted at that time, primarily because it believed that overharvest by subsistence hunters was the primary threat to the stock and was being adequately addressed by limitations imposed by Public Law 106-31 and by regulations that the Service planned to promulgate pursuant to the depletion designation under the Marine Mammal Protection Act.

Dissatisfied with the Service's reasoning, the groups that had petitioned the Service to list the Cook Inlet stock of beluga whales under the Endangered Species Act filed suit in September 2000 challenging the Service's decision not to proceed with a listing proposal (*Cook Inlet Beluga Whale et al.* v. *Daley*). The court issued its ruling in the matter on 20 August 2001, finding that the Service had acted within its discretion in declining to list the Cook Inlet beluga whale under the Endangered Species Act. The plaintiffs appealed the district court ruling in October 2001. However, in July 2002, before the appellate court had considered the matter, the groups that had filed the case withdrew their appeal.

Regulation of Native Harvest

Section 101(b) of the Marine Mammal Protection Act provides authority for the Service to regulate the taking of depleted species of marine mammals by Alaska Natives when necessary for the conservation of the affected species or stock. Such regulations, however, may only be prescribed through formal rulemaking, which affords affected Natives and other interested parties the opportunity for a hearing on the record, through which an administrative law judge develops the record of the proceeding and subsequently provides a recommended decision to the agency. Section 103(d) of the Act sets forth the rulemaking procedures and the information that must be published by the agency prior to, or concurrent with, the publication of a proposed rule. Among other things, the agency is to make available to the public any Commission recommendations provided to the Service that relate to the regulations.

Following the Service's designation of the Cook Inlet beluga whale as depleted in May 2000, it began to develop regulations to limit subsistence taking. The Commission supported these efforts, and in a July 2000 letter concluded that such an action was essential to conserve the depleted stock of beluga whales.

The Service convened a formal hearing on 5–8 December 2000 at which the proposed regulations were considered. The Commission participated as one of seven parties at the hearing.

Rather than relying on an adversarial process whereby posthearing briefs are submitted by the parties, the presiding administrative law judge encouraged the parties to work cooperatively to arrive at compromise solutions. Heeding that advice, the parties tentatively agreed to an interim quota of six beluga whales over the next four years, with four of the allowable strikes to go to the Village of Tyonek. The parties also agreed that the Service would convene a meeting of agency and other scientists to design a proposal for a longer-term, flexible management regime to be considered by the parties and to develop criteria for determining when the agreed-to harvest limits should be modified in response to unusual mortalities.

The Commission, along with representatives of the National Marine Fisheries Service and the

Village of Tyonek, continued to pursue discussions to resolve these issues. These efforts culminated in the submission on 2 October 2001 of proposed stipulations and a draft final rule by the three parties. Under that proposal, the agreement for six strikes over four years would be formalized and an emergency suspension provision would be added. The parties would request that the judge retain jurisdiction over the issue of strike limits for 2005 and establish a process for developing a long-term, science-based harvest regime that (1) provides reasonable certainty that the population will recover within an acceptable period of time, (2) takes into account the uncertainty with respect to the population dynamics and vital rates of the Cook Inlet beluga whale population, (3) allows for periodic adjustments of allowable strike levels based on the results of abundance surveys and other relevant information, (4) provides assurance that the strike levels will not be reduced below those for 2001–2004 unless substantial information indicates that taking must be reduced to allow recovery of the stock, and (5) can be readily understood by diverse constituencies.

Under the proposed stipulations, the National Marine Fisheries Service is to develop a proposed schedule for accomplishing this no later than March 2004. The Service would provide funding to Alaska Native subsistence users necessary to facilitate their meaningful participation in that process. Related provisions would prohibit hunting before 1 July of any year and prohibit the taking of maternally dependent calves and adults accompanied by such calves. Further, the proposed stipulation would recognize the need to develop objective standards for identifying maternally dependent calves to provide sufficient guidance to hunters and enforcement officials.

Under the proposal, the sale or purchase of any part or product of a Cook Inlet beluga whale would be prohibited except for authentic Native articles of handicrafts and clothing made from nonedible byproducts of legally taken whales. The proposal would, however, allow customary and traditional barter and sharing practices to continue. The parties also recognized the possible enforcement problems that could develop if parts and products of beluga whales from other populations were to enter into commerce in the Cook Inlet area. In response, the proposed stipulations would require that all cooperative agreements authorizing the take of Cook Inlet beluga whales include a mechanism to identify legally taken beluga whales from that population (e.g., through the collection and archiving of genetic samples). Further, the proposed stipulation would ask the judge to retain jurisdiction over this issue and consider remedial action if it appears that parts and products from other beluga populations are being sold in areas and in ways that undermine enforcement of the restrictions on the taking and sale of Cook Inlet beluga whales.

The three parties also developed the framework for the process and criteria that would be used to allocate strikes among Cook Inlet subsistence hunters. Recognizing that the Natives themselves have the greatest knowledge and understanding of subsistence use patterns and needs, the Service would defer to allocation recommendations that reflect the consensus of the hunting community. When consensus is not reached, priority would be given to Cook Inlet tribes and hunters that demonstrate a long-term pattern of use of and reliance on Cook Inlet beluga whales. Factors that would be considered include the duration, history, dependency, and cultural significance of such hunting and the availability of alternative subsistence resources. The parties also recognized that the Village of Tyonek had already established that it has a historical and continuing tradition of reliance on Cook Inlet beluga whales as a mainstay of the tribe's subsistence way of life. They also recognized that other tribes and hunters may be able to establish similar claims. As with other issues not fully resolved, the judge would retain jurisdiction to consider any petitions from the parties challenging the modification of these criteria.

The administrative law judge issued his recommended decision on 29 March 2002. That decision recommended that the regulations originally proposed by the Service be amended to conform to the stipulations discussed above, which, with only a few exceptions, were agreed to by the other parties. The Service published a notice of availability of the recommended decision in the *Federal Register* on 7 May 2002, seeking public comment. Inasmuch as the Commission had already agreed to the modifications to the proposed rule recommended by the judge, the Commission did not submit any comments at that point in the rulemaking. A copy of the judge's recommended decision, the *Federal Register* notice soliciting comments, and the

comments submitted are all available on the Service's web site (http://www.fakr.noaa.gov/protectedresources/whales/beluga/belugapr.htm).

No further action to finalize the regulations or to convene the working group to design the long-term harvest regime apparently had been taken by the Service during 2002. This prompted the Commission to write to the Service on 31 December 2002. The Commission noted that the administrative law judge's decision directs the Service to submit a final recommendation for the long-term regime to him no later than 15 March 2004. In light of that deadline, and the considerable work that needs to be done to develop the regime, the Commission recommended that the Service take prompt action to develop a schedule for convening the agreed-to workshop and provide it to the parties as soon as possible. The Commission also requested that the Service provide it with an update on the status of the rulemaking, noting that the comment period on the judge's recommended decision had closed seven months ago.

Although the rulemaking has yet to be completed, the taking of Cook Inlet beluga whales is limited by the Service under the provisions of Public Law 106-553. Nevertheless, the Service still needs to issue final regulations under the Marine Mammal Protection Act to establish criteria for setting strike limits and for resolving other issues related to harvest management.

Gulf of Maine Harbor Porpoise (*Phocoena phocoena*)

Harbor porpoises occur in relatively discrete regional populations throughout temperate coastal waters of the Northern Hemisphere (Fig. 16). One such population (referred to here as the Gulf of Maine population or stock) is confined to the southern Bay of Fundy and northern Gulf of Maine in summer, but occurs from Maine to New Jersey in the spring and fall and as far south as North Carolina in winter. In the 1980s information suggested that several thousand porpoises per year were being incidentally entangled and drowned in gillnet fisheries in the Bay of Fundy, Canada, and in waters off New England. Although the size of the porpoise population was unknown at that time, it was thought that the catch level was not sustainable.

The situation prompted the Sierra Club Legal Defense Fund in September 1991 to petition the National Marine Fisheries Service to list the Gulf of Maine harbor porpoise stock as threatened under the Endangered Species Act. The Service found merit in the petitioned action and published a proposed rule to list the stock as threatened early in 1993; however, final action was deferred. In 2001 the Service withdrew its proposal (see the

Figure 16. Harbor porpoises, growing to only about 2 m in length, are among the smallest of all cetaceans and are frequently caught incidentally in gillnets. (Photo by Ari Friedlaender.)

previous annual report) in light of new information on stock size and actions being taken to reduce porpoise bycatch under a take reduction plan.

The National Marine Fisheries Service conducted harbor porpoise population surveys in 1991, 1992, 1995, and 1999. Although the first survey yielded a population estimate of 37,500 porpoises (95 percent confidence interval 26,700–86,400), the most recent survey estimate was 89,700 porpoises (95 percent confidence interval 53,400–150,900). The difference between these two estimates likely is due primarily to better spatial coverage in the 1999 survey and improved statistical methods; however, an actual increase in numbers is also possible, if not likely, given evidence of declining bycatch levels over the past decade.

From the 1960s, when regional gillnet fishing began, until the mid-1980s, almost all of the region's porpoise bycatch was in U.S. and Canadian gillnet fisheries for groundfish (i.e., cod, haddock, and flounder). As gillnetters began targeting other species (e.g., dogfish and monkfish), harbor porpoises were caught in those fisheries as well. In the late 1980s the Service began placing observers aboard a sample (about 5–10 percent) of New England groundfish gillnet vessels to estimate bycatch levels. By comparing the number of porpoises taken and amount of fish caught on observed trips with total fish landings for the fishery, bycatch estimates were generated for the entire New England groundfish fishery. In 1993 the Canada Department of Fisheries and Oceans began a similar program in the Bay of Fundy. In the early 1990s observers began covering the New England dogfish and monkfish fisheries, and in the mid-1990s observers also began covering gillnet fisheries south of New England targeting dogfish, monkfish, and coastal finfish (i.e., shad, weakfish, bluefish, and rockfish).

Bycatch estimates from these observer efforts through 2001 (the latest year for which complete annual analyses are available) are shown in Table 4. Because some fisheries known to catch harbor porpoises have gone unmonitored, particularly in the early 1990s, these estimates are incomplete to various degrees. For example, between 1990 and

Table 4. Estimates of harbor porpoise bycatch in sink gillnet fisheries in the Bay of Fundy (Canada), New England (United States), and off the U.S. mid-Atlantic States, 1990–2001[1]

Year	New England[2]	Bay of Fundy[3]	U.S. Mid-Atlantic[4]	Other[5]	Total
1990	2,900 (1,500–5,000)	—	—	—	—
1991	2,000 (1,000–3,800)	—	—	—	—
1992	1,200 (800–1,700)	—	—	—	—
1993	1,400 (1,000–2,000)	424 (200–648)	—	—	—
1994	2,100 (1,400–2,900)	101 (80–122)	—	—	—
1995	1,400 (900–2,500)	87	103 (11–254)	—	1,590
1996	1,200 (800–1,800)	20	311 (162–567)	—	1,530
1997	782 (501–1,208)	43	572 (296–1,071)	—	1,397
1998	332 (170–728)	38	446 (294–894)	—	816
1999	270 (78–364)	32	53 (3–98)	19	374
2000	507 (169–924)	28	21 (1–53)	1	537
2001	51 (2–166)	73	26 (1–83)	3	153

[1] Numbers in parentheses are ranges of the 95 percent confidence interval where available.
[2] Palka, D. 1997. Gulf of Maine Harbor Porpoise By-catch. Prepared for the Gulf of Maine Harbor Porpoise Take Reduction Team Meeting, 16–17 December 1997. National Marine Fisheries Service, Woods Hole, Massachusetts. Estimates since 1997 are from unpublished National Marine Fisheries Service data.
[3] Trippel, E. A. 1998. Harbour Porpoise By-catch in the Lower Bay of Fundy Gillnet Fishery. DFO Maritime Regional Fisheries Status Report 98/7E. Canadian Department of Fisheries and Oceans, Dartmouth, Nova Scotia. Estimates since 1997 are from unpublished data provided by E. A. Trippel.
[4] Palka, D. 1997. Mid-Atlantic Harbor Porpoise By-catch and Gear Characteristics. Prepared for the Gulf of Maine Harbor Porpoise Take Reduction Team Meeting, 16–17 December 1997. National Marine Fisheries Service, Woods Hole, Massachusetts. Estimates since 1997 are from unpublished National Marine Fisheries Service data.
[5] Harbor porpoise strandings with signs of gillnet fishery–related interactions in areas of the U.S. mid-Atlantic region not monitored by fishery observers.

1992 no estimates were available for fisheries in Canada where harbor porpoises are known to have been taken. Even in recent years, some components of coastal gillnet fisheries that appear to be catching harbor porpoises in the mid-Atlantic (based on stranded porpoises with net marks found in unsampled areas) have not been covered by the observer program or factored into bycatch estimates. In addition, a few harbor porpoises are caught and killed annually in herring weirs in the Bay of Fundy, Canada.

Nevertheless, estimates show a substantial decline in porpoise bycatch over the past decade. The estimate of 80 harbor porpoise takes within U.S. waters in 2001 represents a decrease of 85 percent from the 2000 estimate of 529. The 2001 bycatch estimate is being reviewed by the Service and its Atlantic Scientific Review Group for incorporation in the draft 2003 Gulf of Maine harbor porpoise stock assessment report, which is expected to be available for public review in 2003. Final bycatch estimates for U.S. fisheries in 2002 were not available at the end of the year, but preliminary analyses suggest that they remained low during 2002.

Although porpoise bycatch in U.S. waters has continued to decline in recent years, new data from the Canada Department of Fisheries and Oceans revealed an increase in bycatch during 2001 in the Bay of Fundy. Because fishing effort in Canadian waters did not increase in 2001, the increased bycatch appears to be related to unusually large numbers of porpoises in the Bay of Fundy in 2001. In 2002 the Department suspended its Bay of Fundy monitoring program due to financial constraints. Without a monitoring program, it will be difficult to estimate overall 2002 bycatch. However, assuming that the 2002 bycatch for the Bay of Fundy did not exceed the level reported for 2001, it seems likely that the total take for the year remained below the stock's currently estimated potential biological removal level of 747 porpoises per year (see below).

There appear to be two reasons for the overall decrease in porpoise bycatch during the past decade. First, the National Marine Fisheries Service adopted time-area fishing restrictions for the purpose of reducing harbor porpoise bycatch. Those restrictions, which the Service incorporated into a harbor porpoise take reduction plan (see below), include seasonal fishing closures, areas in which gillnets must meet certain specifications (e.g., twine diameter and net lengths) that have a relatively low bycatch risk, and seasonal management areas where gillnets must be equipped with acoustic deterrents, or "pingers." Pingers are soda-can-sized devices that emit periodic sound pulses at specified frequencies to alert porpoises to the presence of nets. Based on a scientific study, pingers can reduce bycatch as much as 90 percent when they are attached to bridles between each net panel in a gillnet string and are properly maintained.

Second, and perhaps more important, bycatch has declined because of increasingly stringent fishery management measures, such as time-area fishing closures and limits on both landings and days at sea, enacted to protect overfished stocks of groundfish and monkfish. Some of these closures occur in areas of historically high porpoise bycatch that are not included in the harbor porpoise take reduction plan. In addition, fishery management measures have compelled many participants to leave these fisheries, thereby reducing the number of gillnets. Although it is unclear precisely how much of the bycatch reduction is due to either one of these two sets of measures, it seems likely that harbor porpoise bycatch is currently at a sustainable level. (Canadian fishery managers have not imposed requirements for the use of pingers or other gear restrictions in the Bay of Fundy, and past declines in bycatch levels for that area have been achieved largely as a result of reductions in fishing effort to protect depleted fish stocks.)

Harbor Porpoise Take Reduction Plan

To manage the incidental take of marine mammals by commercial fisheries in U.S. waters, the Marine Mammal Protection Act was amended in 1994 to require that the National Marine Fisheries Service prepare stock assessment reports for all cetacean and pinniped stocks in U.S. waters. In part, each assessment is to calculate a potential biological removal (PBR) level that estimates the number of animals that can be removed from the stock annually (not including natural mortality), while maintaining a high degree of assurance that the stock will continue to increase toward or remain at its optimum sustainable population level. The formula for calculating PBR relies, in part, on the lower limit of a population's estimated range

of abundance (i.e., minimum population size) and its estimated maximum productivity rate. Based on data available when the first harbor porpoise stock assessment was completed in 1995, the Service estimated bycatch levels to be several times higher than the stock's PBR level, which was then calculated to be 403 porpoises per year.

If incidental taking exceeds a stock's calculated PBR level, the Service is required to convene a take reduction team to develop a take reduction plan. The Marine Mammal Protection Act requires that take reduction plans reduce the bycatch to below the PBR level within six months of implementation and subsequently reduce those takes to levels approaching a zero mortality rate. With regard to harbor porpoises, the latter goal was to be met by April 2001.

In response to these requirements, the Service established two harbor porpoise take reduction teams. In February 1996 it established a Gulf of Maine team to address gillnet fisheries off New England, and in February 1997 it formed a mid-Atlantic team for gillnet fisheries between New York and North Carolina. Each team includes representatives of regional fisheries, environmental groups, the scientific community, and involved federal and state agencies. A representative of the Commission has participated on both teams.

Each team developed a different regulatory approach to reduce porpoise bycatch in its region. The Gulf of Maine team recommended seasonal fishing closures in high bycatch areas and management zones in which gillnets had to be equipped with pingers. The mid-Atlantic team also recommended seasonal fishing closures, but instead of relying on pingers, it chose to recommend requirements for using certain fishing practices (e.g., limited soak times—that is the length of time a net is allowed to remain in the water after being set) and gear characteristics (e.g., twine diameter for mesh, mesh size, tie-downs to limit the vertical height of nets, and the number and length of nets). This choice was based on observer data that suggested that nets meeting those specifications caught far fewer porpoises.

As discussed in previous annual reports, the Service was slow to act on the teams' recommended plans, thus prompting a lawsuit by environmental organizations. In December 1998 the Service adopted a Gulf of Maine Harbor Porpoise Take Reduction Plan that combined recommendations by both teams. Regulatory measures for New England included six seasonal management zones in which fishing was either prohibited or permitted only if gillnets were equipped with pingers (see Fig. 17). Measures for mid-Atlantic gillnet fisheries included seasonal fishery closures and seasonal restrictions on the fishing practices and gear characteristics mentioned above. The regulatory measures were implemented under authority of the Marine Mammal Protection Act, rather than the Magnuson-Stevens Fishery Conservation and Management Act, to prevent changes during the process used by regional fishery management councils to annually adjust fishery management measures. The take reduction plan also included nonregulatory tasks to address research, enforcement, bycatch monitoring, and education needs.

Late in 2000 the Service reconvened the two teams to review progress and to develop further recommendations for reducing bycatch. At those meetings, the teams were advised that, based on the 1999 population survey, the PBR level had been recalculated to be 747 porpoises per year. Although bycatch appeared to have dropped below that level (final estimates for 1999 bycatch levels were not available at the time of those meetings), Service representatives reminded members of the teams that the Marine Mammal Protection Act requires that incidental take levels be reduced to "insignificant levels approaching a zero mortality and serious injury rate." Although the Service has not yet defined this standard, it advised the teams that, for planning purposes, a bycatch of no more than 10 percent of PBR (i.e., 75 porpoises per year) likely would satisfy that goal. Recognizing that such a reduction by the statutory deadline of April 2001 was unlikely, the Service proposed a new date of 2 December 2003 as the target for reaching the zero mortality rate goal.

At its meeting, the Gulf of Maine team was advised that some boats had been fishing illegally without pingers in management zones requiring their use. The team therefore recommended that at-sea boardings be undertaken by enforcement officers to check for illegal fishing and that an annual certification program on using pingers be established for anyone fishing in a management area requiring pingers. The team also recommended that fishery observers be provided with devices to (1) test whether pingers were working properly on nets that catch porpoises and (2) estimate the overall

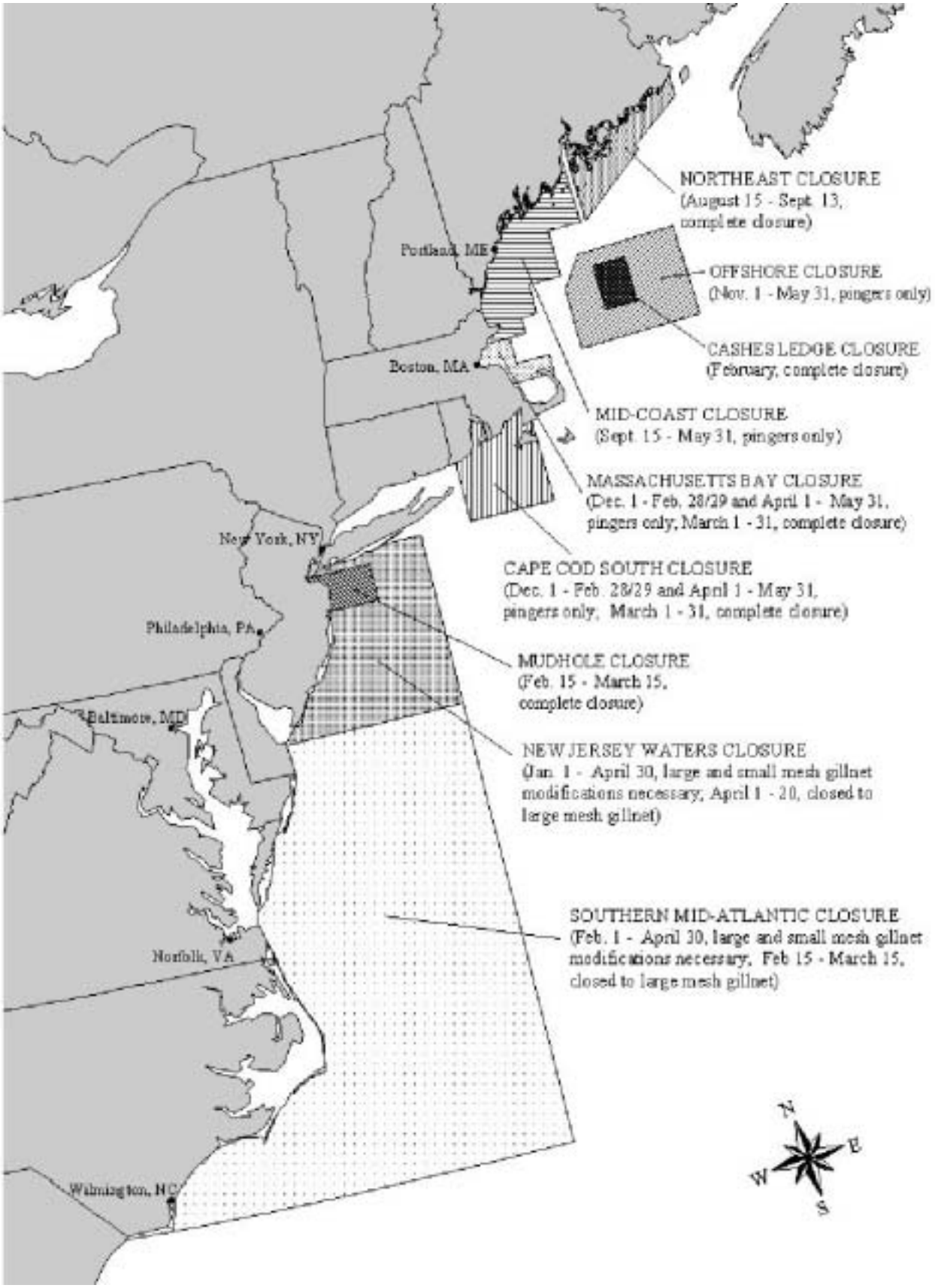

Figure 17. Time-area management zones under the Gulf of Maine Harbor Porpoise Take Reduction Plan. (Figure by Caroline Good, courtesy of the National Marine Fisheries Service.)

proportion of deployed pingers that may not be functioning properly in the operational fishery. For waters south of New England, the mid-Atlantic team expressed concern that observer coverage had declined from 5 to 2 percent in the observed fisheries, that it was not covering all segments of the gillnet fleet, and that the observer coverage was not large enough to accurately determine if or when the zero mortality rate goal was achieved. It therefore recommended that the Service increase observer sampling to at least 6 percent of the overall mid-Atlantic gillnet fishing fleet—the level of observer coverage calculated as being necessary to obtain a statistically reliable estimate of bycatch levels approaching the zero mortality rate goal of 75 porpoises or less.

Both teams also strongly recommended that the Service conduct a scientific experiment to assess the effectiveness of acoustically reflective netting, which is made of hollow-core strands filled with barium sulfate that theoretically reflects sound more readily than conventional nylon nets so that echo-locating porpoises can more easily detect and avoid the nets. The teams recommended that field tests be undertaken to compare bycatch rates in the new nets with those of gillnets equipped with pingers.

Finally, both teams expressed concern about relying on take reduction measures outside the harbor porpoise take reduction plan (i.e., closures under fishery management plans) to reduce harbor porpoise bycatch. They noted that measures under fishery management plans could be relaxed or altered at the recommendation of fishery management councils to meet fish management objectives and thereby incidentally increase porpoise bycatch. The Gulf of Maine team therefore recommended that the Service prepare a proposal to integrate key fishery management plan closures for groundfish into the harbor porpoise take reduction plan so that regional fishery council actions would not incidentally increase porpoise bycatch. As noted in previous annual reports, the Marine Mammal Commission made a similar recommendation to the Service by letter of 17 November 2000. The mid-Atlantic team, however, concluded that it was premature to integrate fishery management closures into the harbor porpoise take reduction plan. Instead, it recommended that the Service develop a process for calculating the effect of proposed changes to fishery management plans on harbor porpoise bycatch, and that it consult with the fishery management councils and the two take reduction teams to identify any measures that may be needed to protect harbor porpoises, given those effects.

On 2 February 2001 the Service responded to the Commission's 17 November letter noting that it would consider effects of proposed changes to fishery management plans on harbor porpoises when it reviewed required environmental assessments or environmental impact statements on fishery management plan amendments. Where proposed changes would increase harbor porpoise bycatch, the Service noted that it would discuss those changes with the council and ask the harbor porpoise take reduction teams to recommend changes to the harbor porpoise take reduction plan to compensate for those increases. It also noted that it would consider the Gulf of Maine team's recommendation to integrate all measures necessary to protect harbor porpoises under that plan.

Due to the significant reductions in porpoise bycatch levels and other high-priority issues, efforts to implement recommendations made by the two teams in 2000 have been limited and neither team was convened in 2001 or 2002. New homeland security responsibilities within the Coast Guard and resource limitations within the Service resulted in a decrease in enforcement efforts in 2002. However, several enforcement actions related to porpoises were undertaken in 2002, and several violations from previous years remained under investigation. In 2002 one case from a previous year was settled with the imposition of an $8,000 fine and a loss of 30 days at sea.

The Service also substantially increased its registry of East Coast gillnetters by incorporating fishermen with state fishing permits that do not fish in federal waters. Many of these fishermen had not registered previously pursuant to the provisions of section 118 of the Marine Mammal Protection Act for authorization to incidentally catch marine mammals during their commercial fishing operations. No steps have yet been taken to require annual certification of gillnetters using pingers or to incorporate key time-area fishing closures adopted under the fishery management plans into the harbor porpoise take reduction plan. However, with regard to area closures, the Service continued to review changes implemented under its fishery management plans and in 2002 it deter-

mined that none of the changes would require amending the harbor porpoise take reduction plan.

With regard to nonregulatory recommendations made by the two teams, the Service contracted for a full-time fishing gear technology specialist to work with fishermen in the mid-Atlantic region on developing fishing techniques to reduce marine mammal bycatch. The position was modeled after a successful program initiated by the Service in New England.

Although the Service has not funded the recommended field experiment to assess the effectiveness of new acoustically reflective netting to reduce porpoise bycatch, it did work with a gear manufacturer to produce a few nets for use by mid-Atlantic gillnetters interested in evaluating their fishing characteristics. As a related matter, the Service also has funded research to determine whether captive bottlenose dolphins can detect the new reflective netting more easily than traditional net material (bottlenose dolphins also are caught incidentally in gillnets – see the section on that species elsewhere in this chapter).

Some encouraging field tests with the new reflective netting have been done in Canada and Denmark. In the Bay of Fundy, Canada, in 1998 and 2000 no harbor porpoises were caught in 231 sets with reflective netting compared with a catch of 12 porpoises in 467 sets of traditional nylon nets. The reflective nets caught far fewer seabirds than all nylon nets, and both types of nets caught fish at comparable rates. Trials in a Danish gillnet fishery in the North Sea in 2000 produced similar results. Researchers in those trials, however, concluded that the reason for reduced porpoise bycatch was the stiffer nature of the reflective netting rather than its increased detectability by porpoises.

To determine if deployed pingers are working properly, the Service developed a device to test whether pingers are emitting signals at required frequencies. Fishery observers monitoring the New England gillnet fishery began using the devices on a limited basis in the fall 2002 fishing season. It also was recommended that testing be done to assess the effectiveness of pingers that emit higher frequencies that would not attract seals. In anticipation of such testing, the Service also contracted for the development and production of a device to detect a broader frequency range. A prototype was tested in 2002 and apparently worked well. With regard to testing new pingers, the Service took steps in 2002 to develop a rule to authorize experimental fishing under the harbor porpoise take reduction plan. The purpose of the proposed rule, expected to be published in 2003, is to facilitate efforts to test new porpoise bycatch reduction technologies.

With regard to its observer program, the Service has not taken steps to expand fishery observer coverage to levels necessary to accurately estimate low levels of bycatch that would approach the zero mortality rate goal. However, the expanded database of registered gillnetters should provide an improved basis for planning observer efforts to monitor harbor porpoise bycatch by providing a more complete and accurate description of the fishery. Additional funding recently made available to the Service for monitoring landings of target species in the New England groundfish fishery also may improve porpoise bycatch data for that area in the short term.

Notwithstanding the limited efforts to implement the recommendations made by the two harbor porpoise take reduction teams since 2000, it appears that bycatch levels remained well below the stock's PBR level through 2001 and remained low in U.S. waters in 2002. The overall bycatch for 2002 likely will remain uncertain because bycatch monitoring efforts in the Bay of Fundy were suspended by the Canada Department of Fisheries and Oceans. At the end of 2002 the Department apparently had no plans to reinitiate a monitoring program in 2003.

Vaquita (*Phocoena sinus*)

The vaquita is one of the world's rarest marine mammals (Fig. 18). It was first described in 1958, but, due to its elusive nature, little is known about it. Vaquita are generally similar to harbor porpoises with respect to life span, patterns of growth, age at sexual maturity, seasonal reproduction, and mating season. In contrast to the harbor porpoise, the calving interval for adult female vaquita may be greater than one year. This has important implications for the potential growth rate of the population and therefore its ability to compensate for human-related sources of mortality and recover from low population levels. The vaquita is found only in the shallow (<50 m), nearshore (<40 km) waters of the northern Gulf of California (Fig. 19).

Figure 18. The vaquita is one of the smallest cetacean species with males reaching a maximum size of about 1.4 m and females about 1.5 m. (Photo by Caterina D'Agrosa.)

Abundance, Trends, and Status

Little information is available on population abundance and trends. A survey conducted in 1993 resulted in an abundance estimate of 224 animals. A more complete survey conducted in 1997 resulted in an abundance estimate of 567 animals, with a 95 percent confidence interval from 177 to 1,073. The difference between the two estimates does not indicate population growth because the 1997 survey involved greater effort and covered a greater area, including extremely shallow areas of the northern Gulf of California.

Historical abundance was almost certainly greater than current abundance, and the decline appears to be due, at least in part, to incidental mortality in fisheries conducted from the early 1900s to the present. Data collected as late as 1993 to 1995 suggested 39 to 84 vaquita mortalities per year in gillnet fisheries for chano, shrimp, and shark and, to an unknown degree, by illegal fishing for totoaba. If the population numbered in the hundreds during this later period, then the level of take is greater than the species' potential rate of increase, and it must have been declining. Current population trends cannot be described.

The International Union for the Conservation of Nature has listed the vaquita as critically endangered. In 1979 the Convention on International

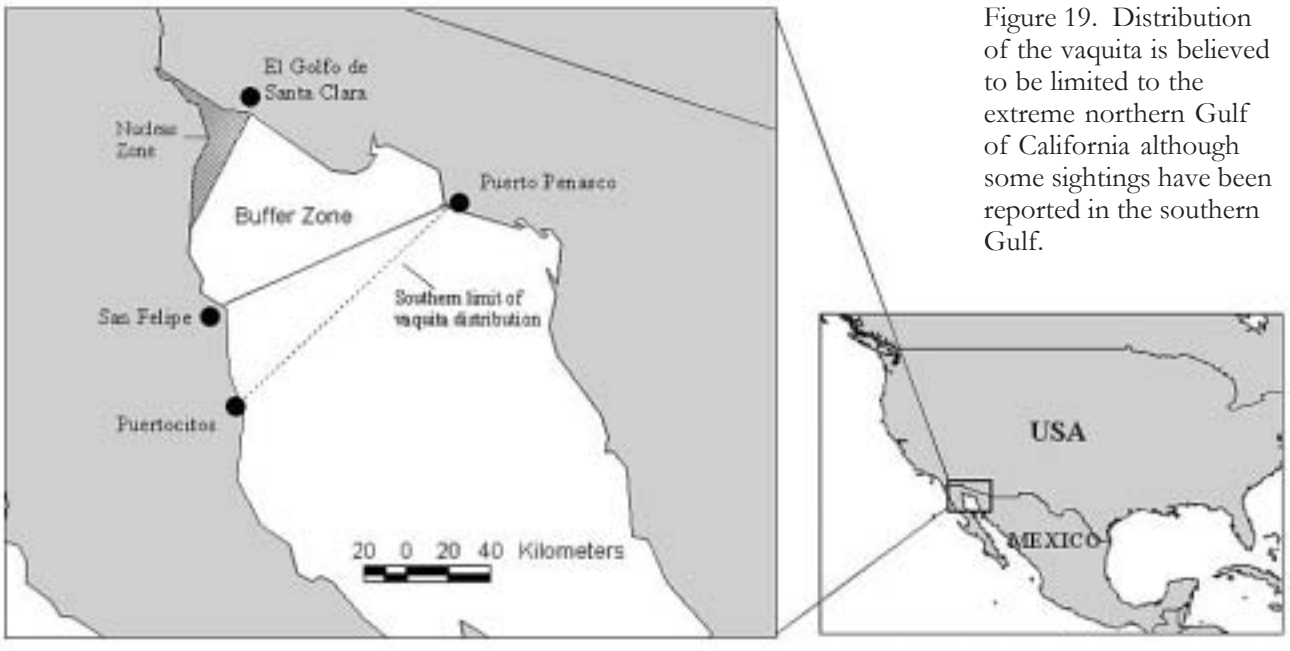

Figure 19. Distribution of the vaquita is believed to be limited to the extreme northern Gulf of California although some sightings have been reported in the southern Gulf.

Trade in Endangered Species of Wild Fauna and Flora listed vaquita on Appendix I. Both Mexico and the United States list the vaquita as endangered, thereby providing some measure of protection under both countries' domestic laws.

Threats

Currently, incidental mortality in fisheries remains the most significant threat to the vaquita. Although gillnets still appear to pose the greatest threat, a smaller but significant number of vaquita are also killed in trawl nets. Fisheries-related mortality appears to be driving the population toward extinction, perhaps in the foreseeable future.

A recent review of risk factors affecting the vaquita identified three other possible threats: habitat alteration, pollution, and inbreeding depression. Since the 1940s water has been diverted from the Colorado River for agricultural, industrial, and domestic uses, thus reducing flow to the upper Gulf of California. The reduced flow may lead to a reduction in productivity and consequently adversely affect habitat for many species in the northern Gulf. Evidence to date, however, suggests that productivity has not yet been dramatically reduced, and the current risk of extinction to vaquita from this factor is currently low. Nevertheless, monitoring of nutrients and productivity in the northern Gulf is essential to determine if and when such changes might occur.

Pollutants also pose a threat to vaquita. Some contaminants have been shown to reduce reproductive fitness and suppress immune system function of marine mammals. Freshwater drainage into the northern Gulf of California contains pollutants from agricultural runoff from both the United States and Mexico. However, contaminant levels in vaquita are low relative to levels detected in other species, and the risk to vaquita appears to be low at the current time.

Inbreeding depression is a decrease in population growth or potential for recovery due to the increased expression of deleterious alleles in small populations. Although genetic data and risk models based on these data indicate that inbreeding depression is not currently a problem for vaquita, it may limit the population's ability to recover, particularly if the population continues to decline.

Recovery Efforts

Mexico—In June 1993 the Mexican government established the Upper Gulf of California and Colorado River Delta Biosphere Reserve to protect endemic species, such as the vaquita and totoaba. In 1996 a management plan for the reserve was completed, and a reserve director and staff were appointed to implement the plan. The plan describes the physical, biological, social, and economic environments of the area and reviews activities under way to study and protect the unique resources in the reserve. Among the goals identified in the plan are reducing immediate threats to vaquita and other protected species and ensuring the managed and sustained use of the area's natural resources. Associated measures limit tourism, research, fishing, and aquaculture in certain areas of the reserve. However, vaquita have not been sighted in areas where fishing is prohibited, and gillnet fishing is still permitted in portions of the reserve where vaquita sightings are more likely to occur. In addition, other important vaquita habitat falls outside the reserve boundaries and is not protected.

In 1997 Mexico's National Fisheries Institute convened a panel of international scientists, the International Committee for the Recovery of the Vaquita (CIRVA), to draft a recovery plan for vaquita. The plan recommended, among other things, (1) moving the borders of the biosphere reserve to better encompass the distribution of vaquita and (2) phasing out gillnets and shrimp trawls from the core area of the biosphere reserve, starting with an immediate ban on large-mesh gillnets.

International—At its 1991 meeting the International Whaling Commission (IWC) Scientific Committee recommended that actions be taken to fully enforce the totoaba fishery closure. The committee also recommended that a management plan be developed that includes evaluation of incidental take of vaquita in fisheries and a program to monitor the status of the species. At its 1994 meeting the IWC Scientific Committee commended the Mexican government for its efforts to protect the vaquita, but concluded that the reported levels of incidental catch could result in extinction of the species. It therefore reiterated its recommenda-

tions that the incidental mortality of vaquita be monitored and that surveys be conducted to improve abundance estimates. In response to the Scientific Committee's findings, the IWC adopted a resolution in 1994 commending the Mexican government for creating a biosphere reserve in the upper Gulf of California and encouraging it 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, including efforts to enforce existing regulations and improve measures to prevent environmental degradation. As noted above, the reserve plan was completed in 1996.

At its June 1996 meeting the IWC Scientific Committee again reiterated its concern about the vulnerability of the species and again recommended that immediate action be taken to eliminate bycatch of vaquita in all fisheries in the upper Gulf of California. The committee also encouraged more research on degradation of the estuarine habitat in the upper Gulf of California and the potential effects on vaquita. The IWC subsequently adopted a resolution on small cetaceans, which congratulated the Mexican government for developing the biosphere management plan and for its strategy for recovery of the vaquita, but also endorsed the conclusion of the recovery plan that, to ensure the survival of vaquita, all bycatch needs to be eliminated as soon as possible.

Current Efforts

Recovery efforts for the vaquita are complicated by socioeconomic considerations. Three communities within the biosphere reserve rely on fishing. The two larger communities, Puerto Peñasco and San Felipe, have diversified economies with strong trade and service sectors and their reliance on fishing appears to be declining. El Golfo de Santa Clara is a much smaller community, with few trade and service activities, and relies almost exclusively on fishing for its economy. Nonetheless, despite a decline of fisheries in the late 1980s and early 1990s and some subsequent economic diversification, the fishing industry is still an important source of income in all three communities. Finding a long-term solution will require the development of alternative economic opportunities for workers currently involved in the northern Gulf fisheries, particularly those using gillnets. CIRVA, the World Wildlife Fund, and Conservation International are currently working with Mexico's Minister of the Environment on a joint strategy that consists of four elements: conservation, education, understanding and incorporating socioeconomic considerations, and establishing a legal framework for conservation.

In October 2002 the Mexican Minister of the Environment implemented a ban on shrimp trawling and large-mesh gillnet fishing in the core area of the biosphere reserve, as recommended in the vaquita recovery plan. Local trawl fishermen and their families protested by interfering with U.S.–Mexican border operations for several days. The Ministry capitulated and allowed local fishermen to continue to trawl in the biosphere reserve although fishermen from outside the area were banned from trawling in the closed areas. On 19 December 2002 the Marine Mammal Commission wrote to the U.S. Department of State to inform officials about the endangered status of the vaquita, alert them to the volatile situation involving recovery measures, and request assistance in identifying appropriate means for international cooperation to facilitate vaquita recovery.

For the past two years, the Commission has provided funding to the Programa Nacional de Investigación y Conservación de Mamíferos Marinos from the National Institute of Ecology to study the potential for acoustic detection techniques to determine abundance, habitat use, and distribution of vaquita (see Chapter VIII). These acoustic detection techniques will also be useful for monitoring the success of the recovery plan. Initial results indicate that the range of the vaquita appears to be much more restricted than scientists previously believed.

Bottlenose Dolphins in the Atlantic and Gulf of Mexico (*Tursiops truncatus*)

Bottlenose dolphins are cosmopolitan in distribution, occurring in most coastal areas in temperate and tropical regions of the world. They are the most common marine mammal along the U.S. southeastern and Gulf of Mexico coasts. In the western North Atlantic, bottlenose dolphins belong to either of two different ecotypes—coastal or offshore. These ecotypes are distinguished on the basis of their distribution, genetic composition, morphology, parasites, and prey. Relatively little is known about the distribution of the offshore ecotype, which typically occurs in deep waters of the continental shelf and inner continental slope. In coastal areas dolphins occur along the outer coastline and in bays, sounds, inlets, estuaries, and other inland waters.

Within these ecotypes, bottlenose dolphins comprise different stocks — groups of animals that are more or less reproductively isolated from other groups within the same ecotype. The degree of reproductive isolation is important not only because it serves as a basis for genetic and evolutionary separation of stocks, but also because it is a determinant of a stock's vulnerability to, and ability to recover from, both natural and human-related adverse influences. Efforts to distinguish reproductive stocks are complicated by the difficulty of studying these animals in their natural environment, by the fact that animals from different stocks cannot be separated on the basis of appearance, and by the fact that different stocks sometimes have geographic ranges that overlap temporally and spatially.

In 1987 and 1988 a large number of bottlenose dolphins stranded along the eastern coast of the United States. The geographical pattern of the die-off was taken as evidence of a single coastal migratory stock. In 1993 the National Marine Fisheries Service designated that stock as depleted under the Marine Mammal Protection Act. In 1997, 10 years after the die-off, the Service established a research program to investigate stock structure, primarily using genetics, but also using photo-identification, telemetry, stable isotope ratios, and information from strandings. Initial efforts have focused along the Atlantic coast because this region includes the depleted, provisional coastal migratory stock and because of documented high levels of incidental take in gillnet fisheries in the coastal waters of the mid-Atlantic.

Preliminary results have provided additional insights into possible stock structure along the Atlantic coast and suggest the possibility of at least seven stocks of the coastal ecotype (Fig. 20). These apparent stocks consist of migratory animals as well as year-round and seasonal residents in bays, sounds, and estuaries of the mid-Atlantic and southeastern states. Little work has been done to delineate stocks south of the North Carolina/South Carolina border; several stocks may occur along the coast and in the estuaries and bays of South Carolina, Georgia, and the east coast of Florida. The bottlenose dolphin take reduction team convened by the National Marine Fisheries Service in 2001 is operating under the assumption that seven coastal bottlenose dolphin stocks exist in coastal waters of the western North Atlantic.

Between 1992 and 1998 the Service conducted six abundance surveys between New York and Florida; a comprehensive survey was carried out in 2002. Estimating the abundance of bottlenose dolphins is complicated by the difficulties associated with distinguishing coastal and offshore ecotypes, seasonal movement patterns that result in overlapping distribution of the coastal stocks, the difficulty of covering the majority of the Atlantic coast in a single survey, and uncertainty about the best analytic methods. The results of the most recent survey were being analyzed at the end of 2002 and are expected to be available in the first half of 2003. Existing information is insufficient for trend analysis for any of the stocks in the coastal waters of the Atlantic coast. Offshore bottlenose dolphins in the western North Atlantic have an estimated population size of 30,633 based on two large-vessel surveys conducted in 1998, but this estimate is confounded by some of the same assessment problems..

Similar issues arise in the Gulf of Mexico, where stock structure is even less clear. In March 2000 the Service hosted a meeting in Sarasota, Florida, to discuss the most efficient ways to resolve questions about the species' stock structure in the Gulf. Service personnel presented a brief report of that meeting to the Commission at its 2000 annual meeting in St. Petersburg Beach,

Florida, and indicated that funds would be sought to begin a comprehensive research program similar to that now under way along the Atlantic coast. In a 12 December 2000 letter to the National Marine Fisheries Service, the Commission agreed that comprehensive studies along the Atlantic coast provided a good framework for future dolphin research in the Gulf of Mexico. The Commission commended the Service for its efforts in this regard and urged it to expedite funding for such research. As of the end of 2002, the Service's Southeast Fisheries Science Center was seeking, but had not yet received, funding to conduct comprehensive bottlenose dolphin studies in the Gulf of Mexico.

Lacking better information, the Service currently recognizes 38 stocks in the Gulf of Mexico region (outer continental shelf, continental shelf edge and continental slope, western coastal, northern coastal, eastern coastal, and 33 resident stocks

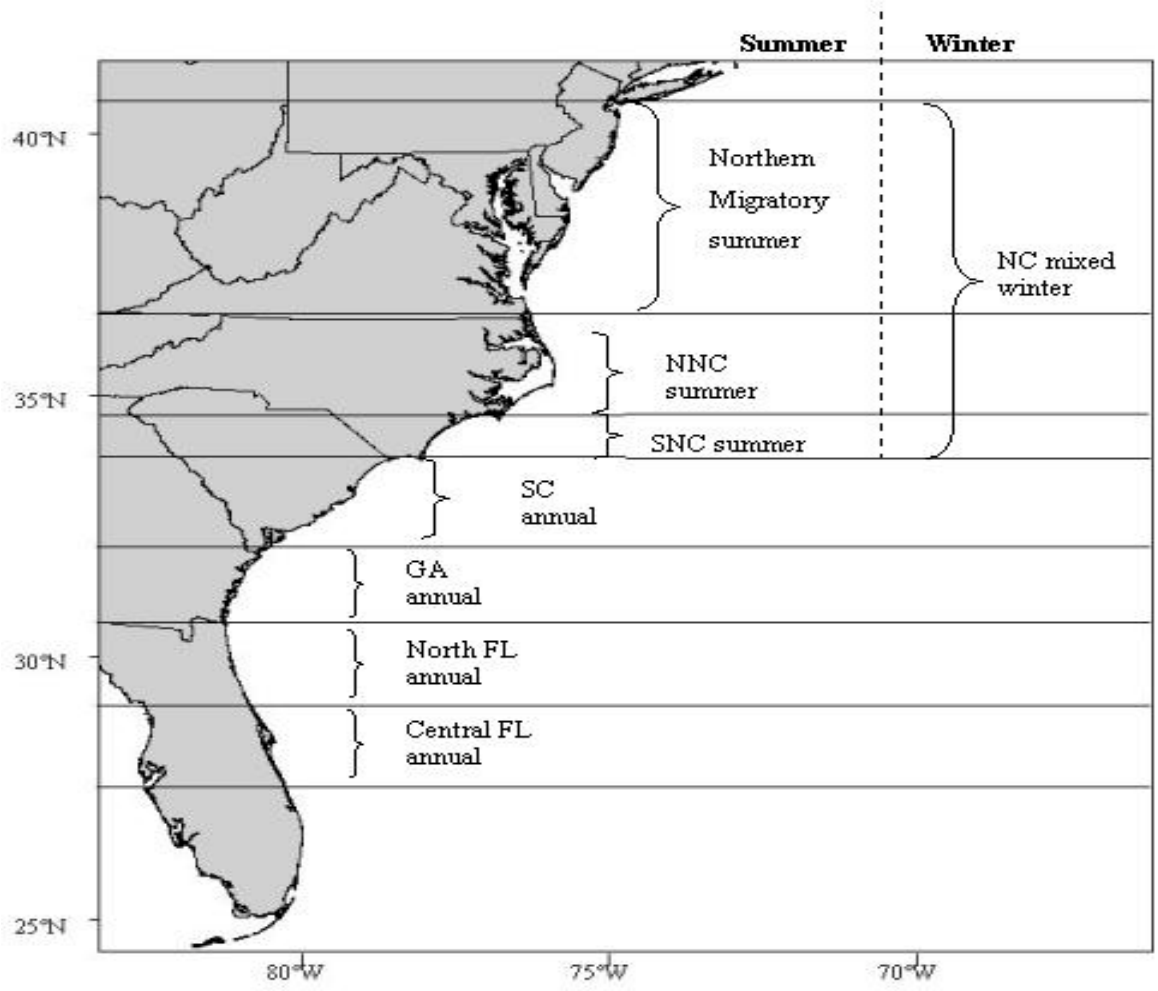

Figure 20. Current management unit delineations used by the Mid-Atlantic Bottlenose Dolphin Take Reduction Team.

in contiguous, enclosed, or semienclosed bodies of water adjacent to the Gulf of Mexico). For most of these stocks, abundance estimates are outdated and therefore unreliable. Existing information is insufficient for trend analysis for most currently recognized stocks of bottlenose dolphins in the Gulf of Mexico.

The lack of information on bottlenose dolphin stock structure in these regions is a major impediment to assessment of their status and trends, which are most meaningfully described on the basis of reproductively discrete stocks. Similarly, the lack of information on stock structure impedes the analysis of effects from die-offs, fisheries interactions, coastal development, oil and gas operations, and other factors that pose potential threats to bottlenose dolphins. However, determining the status of and risks to stocks will be difficult even after stocks have been identified.

Threats to Bottlenose Dolphin Stocks

A variety of factors, both natural and human-related, may threaten the well-being of individual dolphins or the status of dolphin stocks. Natural factors include predation by large sharks, disease, parasites, exposure to naturally occurring biotoxins, changes in prey availability, and loss of habitat due to environmental variation. Human-related factors include loss of habitat due to coastal development, exposure to pollutants, disturbance, vessel strikes, entanglement in debris, noise and pollution related to oil and gas development, direct and indirect interactions with recreational and commercial fisheries, and injury, mortality, or behavior modification that may result from direct human interactions such as the feeding of wild dolphins. These factors may act independently or synergistically. For example, exposure to pollutants may reduce immune system function, thereby lowering resistance to disease; human-related contamination of coastal waters may increase the likelihood of phytoplankton blooms that result in increased concentrations of biotoxins; or direct interactions such as feeding of dolphins may increase the likelihood of dolphin injury or mortality due to vessel strikes. Compared with offshore bottlenose dolphins, coastal dolphins may be at greater risk to human-related threats due to their greater proximity to human activities.

Die-Offs—The effects of various threats to bottlenose dolphins in the southeastern and mid-Atlantic United States have manifested themselves most obviously in a series of at least six die-offs observed over the past 15 years. Animals stranded on beaches provide the most obvious evidence of a die-off, but it is not clear that those animals provide a complete and reliable basis for characterizing total mortality during an event (e.g., some dead, stranded animals may not be found; some dead animals may not strand or wash ashore; and stranded animals may wash up great distances from the location of their death).

The most recent known die-off of bottlenose dolphins in the southeastern United States occurred from May to August 2001 in the vicinity of the Indian River Lagoon along the eastern coast of Florida. At least 35 animals died, and the cause of death is under investigation. During the height of the mortality event, fish, crab, and seabird kills also occurred in the lagoon. Scientists attributed these deaths to low levels of dissolved oxygen. Because of several cases of human illness due to the consumption of pufferfish containing saxitoxin, there have been subsequent investigations into whether the dolphin mortality event could be attributed to saxitoxin poisoning via pufferfish. Such events are of concern not only because of their impact on the local populations, but also because they may serve as general indicators of the health of coastal ecosystems.

The effect of a die-off on a particular stock of dolphins can only be determined if that stock has been identified and sufficient background information exists to put the die-off in perspective. Such information includes stock abundance, status and trends, and composition. Because the stock structure of bottlenose dolphins along the southeastern coast and in the Gulf of Mexico is poorly understood, as are the abundance, status, and trends of each stock, it is difficult to determine the significance of the observed die-offs.

Contaminants—Bottlenose dolphins, particularly those occurring in coastal and inland waters, are exposed to contaminants from a variety of sources including agricultural and residential runoff, deposition of airborne pollutants, vessel discharges, pollution from oil and gas exploration and drilling, and sewage and other waste from coastal developments. Although a considerable number of studies have documented the presence and increasing concentration of contaminants in marine mammal tissues (including those of bottle-

nose dolphins), the effects of those contaminants on the health of both individuals and marine mammal populations have been difficult to assess. Based on studies of other species, the potential effects of contaminants are direct health risks to individual animals (e.g., impairment of immune function) as well as impairment of their ability to reproduce. Contaminant loads for some chemicals may increase over time due to bioaccumulation, and some contaminants may be passed directly from mother to fetus.

In December 1998 the Commission recommended that the National Marine Fisheries Service consult with the Environmental Protection Agency, the Minerals Management Service, and relevant coastal state agencies to determine what was being done to assess the sources, levels, and effects of anthropogenic contaminants present in bottlenose dolphins in waters of the U.S. Atlantic and Gulf states. In December 2000 the Commission recommended that the Service initiate carefully controlled experiments and testing to clarify the effects of anthropogenic toxins on individual dolphins and on dolphin populations. The Commission noted that both the report of the Commission's October 1998 workshop on marine mammals and persistent ocean contaminants and a 1998 report by the International Whaling Commission Scientific Committee recommended using index populations of marine mammals, including bottlenose dolphins, in a multifaceted research approach combining behavioral observations, life history research, ecological assessment, health monitoring, and toxicology. The Service provided $25,000 and $36,000 in 2001 and 2002, respectively, for studies of the effects of organochlorine contaminants and mercury/selenium dynamics on the Sarasota Bay population of dolphins. Preliminary results from these studies indicate that concentrations of organochlorines in dolphin blubber, milk, and plasma are of potential health concern for first-born calves and for males as they age and accumulate high concentrations of contaminant residues. Females that have given birth to more than one calf carry lower concentrations in their tissues as a result of passing contaminants via placenta and milk.

Tourism and Direct Human Interactions—In recent years, commercial ventures that encourage close and sometimes illegal interactions between humans and dolphins have proliferated in the southeastern United States (see also Chapter IX). These ventures offer members of the public a variety of experiences from watching to swimming with wild dolphins. In some cases, these activities constitute harassment, whereas in others the legal status is less clear. The feeding of free-ranging dolphins, an activity explicitly prohibited under National Marine Fisheries Service regulations, also has persisted in various locations.

To document the extent, nature, and effects of such activities, the Commission contracted for a study to (1) review the literature on the topic of human-dolphin interactions and (2) quantify and describe the development of swim-with-the-dolphin programs in the Florida panhandle. The study was completed in April 2000 (see Appendix B; Samuels and Bejder 1998). Although the report acknowledged a lack of information about the effects of human-dolphin interactions, it concluded that (1) dolphins are vulnerable to injury and death as a result of human contact; (2) animals appearing tolerant or even seeking such contact have already been placed at risk by extensive habituation achieved through considerable human effort; (3) such contact can disrupt important natural behaviors of wild dolphins; and (4) a precautionary approach is necessary to ensure the protection of wild dolphins from the adverse effects of human-dolphin interactions.

At the Commission's 2000 annual meeting, representatives of the Service reviewed the status of such activities in the southeastern United States and expressed concern about the individual and cumulative effects of close interactions between humans and dolphins. They advised the Commission that new draft regulations to address these interactions would soon be circulated to the Commission and other agencies for comment. In its 12 December 2000 letter to the Service, the Commission commended such efforts and urged haste in adopting clear, rational regulations and guidelines. The Commission also urged the Service to consult with other involved agencies (e.g., the Fish and Wildlife Service and the public display industry) to assure that a consistent message reached the public. The Commission noted that patrons of public display facilities offering swim-with-the-dolphin or dolphin-feeding exhibits may be confused about what constitutes appropriate behavior with marine mammals in the wild and that regulations adopted by the Service should be consistent

with those issued by the Fish and Wildlife Service for species under its charge.

In July 2001 the National Marine Fisheries Service consulted with the Commission regarding a draft policy developed to address the issue of interactions between the public and marine mammals in the wild. The policy was intended to clarify those interactions constituting harassment. In its 16 July 2001 letter responding to the Service, the Commission expressed its understanding that the Service still intends to promulgate regulations clarifying those interactions between the public and wild marine mammals that constitute harassment. The Commission agreed that the policy would help provide the public with needed guidance regarding such activities until appropriate regulations could be implemented. On 30 January 2002 the Service published an advanced notice of proposed rulemaking in the *Federal Register* requesting comments on types of regulations and other measures that would be appropriate to prevent harassment of marine mammals. At the end of 2002 the Service had taken no further action on these regulations.

Enforcement is an important element of management efforts to avoid harassment of bottlenose dolphins (and other marine mammals) by direct human interaction. At the Commission's 2000 annual meeting, representatives of the Service discussed problems relating to inadequate and ineffective enforcement of regulations intended to protect bottlenose dolphins and other marine life. They noted that enforcement has been compromised by an inadequate number of enforcement officers, the extensive coastline to be covered, and the large number of competing, high-priority demands requiring attention (e.g., investigation of interactions between shrimp fisheries and turtles). In its 12 December 2000 letter to the Service, the Commission strongly recommended that staffing and efforts be increased significantly, not only for bottlenose dolphins, but also for other species for which the Service is responsible. The letter noted that the Commission also had urged both the Fish and Wildlife Service and the Florida Division of Law Enforcement to increase their enforcement capabilities. Finally, the letter recommended that the Service develop a coordinated enforcement strategy involving all three agencies in Florida. At the Commission's 2002 annual meeting in San Diego, the issue of enforcement arose again with respect to the harassment of Hawaiian spinner dolphins (see Chapter IX).

Fisheries Interaction and Take Reduction Efforts

Bottlenose dolphins interact with commercial and recreational fisheries throughout their range along the southeastern North Atlantic and Gulf of Mexico coasts. They may be killed or seriously injured incidental to a variety of fishing operations and gear types including gillnets, crab pots, haul/beach seines, long-haul seines, pound nets, and stop nets. They also may be injured or killed by consuming fish caught by hook-and-line fisheries or taken as bycatch in fishery-generated debris such as lost netting and lines.

Evidence and estimates of fishery interactions suggest that fishery-related mortality exceeds the potential biological removal level of several coastal stocks depleted by the 1987–1988 die-off and thus may be impeding their recovery. Therefore, the National Marine Fisheries Service convened a take reduction team in November 2001 to begin the process of developing a plan to reduce the fishery-related take of bottlenose dolphins along the eastern North Atlantic coast from New Jersey southward. The team consists of representatives of the different fisheries involved, that Atlantic States Marine Fisheries Commission, the Mid-Atlantic Fishery Management Council, the South Atlantic Fishery Management Council, the National Marine Fisheries Service, fishery management agencies of the affected states, universities in the regions affected, conservation organizations, animal welfare organizations, and the Marine Mammal Commission.

The take reduction team met four times in 2002. Progress was hampered by lack of scientific and observer data, particularly on abundance and bycatch mortality. Therefore, devising mitigation measures that were both palatable to all stakeholders and that the Service could show would significantly decrease bycatch proved difficult. Despite these problems, the team reached consensus on a plan on 25 April 2002. The plan consisted of a mix of education and outreach programs, research needs, and regulatory measures, such as limits on mesh size and soak times. On 15 August 2002 take reduction team members were notified by the National Marine Fisheries Service that, for some of the management units (i.e., stocks), the regulatory

measures were inadequate to reduce mortality and serious injury of bottlenose dolphins to below the potential biological removal level. Therefore, the team will reconvene in April 2003 to attempt to reach consensus on more effective measures.

On 4 November 2002 the Commission responded by letter to a *Federal Register* notice from the National Marine Fisheries Service requesting comments on its intent to prepare an environmental impact statement on the bottlenose dolphin take reduction plan. The letter highlighted the importance of obtaining adequate information to evaluate the alternatives in the environmental impact statement. Specifically, the Commission noted the need for reliable information on the stock structure of the affected bottlenose dolphins, abundance of each stock, potential biological removal levels, and levels of incidental mortality and serious injury in the fisheries after the implementation of take reduction measures.

Conservation Plan

As described in previous annual reports, the Commission has recommended repeatedly repeatedly that the National Marine Fisheries Service develop and implement a bottlenose dolphin conservation plan for the putative western North Atlantic coastal migratory stock. As noted above, this stock was declared depleted in 1993, based on estimates that it may have declined by more than 50 percent as a result of the 1987–1988 die-off. On 25 May 2001, almost 15 years after the die-off and 8 years after the depleted designation, a draft plan was forwarded to the Commission for review and comment. The draft plan provided an overview of the species' history, a review of its natural history characteristics, a summary of known and possible human-related and natural factors that may threaten the population or impede its recovery, an outline of needed and prioritized research and conservation actions, a schedule for implementing those actions, and their projected costs. Necessary actions included (1) identification of stock structure of coastal bottlenose dolphins, (2) estimation of abundance for each stock, (3) assessment of human-related sources of mortality for each stock, (4) assessment of the overall status of each stock, (5) retrospective analysis of the 1987–1988 die-off, (6) establishment of a biomonitoring program to assess the incidence of disease, (7) examination and characterization of factors that could change carrying capacity for bottlenose dolphin stocks, and (8) establishment of a coordinator position to ensure implementation of the plan.

The draft plan also suggested that, in the absence of information to determine the stock's optimum sustainable population level (i.e., that level above which the population would no longer be considered depleted), the time to recovery could be estimated using model simulations if human-related mortality of dolphins remains under the potential biological removal level.

By letter of 15 June 2001 the Marine Mammal Commission commended the Service and its contractors on the overall quality of the conservation plan and provided comments. The Commission's two main questions were whether the Service has adequate funding to implement the plan and whether the Service would prepare a similar plan for bottlenose dolphins in the Gulf of Mexico, where dolphin populations are threatened by many of the same problems observed along the Atlantic coast. The Commission also encouraged the Service to release the plan to the public for further comment. As of 31 December 2002 the Service was updating the plan with the new information on stock structure, abundance, and take reduction efforts. It anticipated release of the draft plan for public comment in early 2003.

Hawaiian Monk Seal (*Monachus schauinslandi*)

The Hawaiian monk seal is one of the world's most endangered seals. Numbering about 1,400 animals, it occurs only in the Hawaiian Archipelago. Most monk seals live in six major colonies (French Frigate Shoals, Laysan Island, Lisianski Island, Pearl and Hermes Reef, the Midway Islands, and Kure Atoll) in the remote, largely uninhabited atolls of the Northwestern Hawaiian Islands (Fig. 21). The dearth of historical records or accounts of monk seals in the main Hawaiian Islands suggests that they have been rare in that area throughout the islands' human history. However, over the past decade, both monk seal sightings and births have increased significantly in the main Hawaiian Islands, raising the possibility that the area could become a more important part of the species' range and enhance future recovery prospects.

In the 1800s monk seals in the Northwestern Hawaiian Islands were killed by sealers, shipwrecked sailors, and other visitors, resulting in a major decline in their abundance. Although some uncertain level of recovery likely occurred by the mid-1900s, human activities on several of the atolls, particularly the Midway Islands, probably limited that recovery. Between the mid-1950s (when the first monk seal counts were made) and the early 1980s, their numbers declined by nearly 50 percent. This was the result of steep declines at all but the easternmost colony (i.e., French Frigate Shoals), where seal numbers had increased steadily. Human activity associated with a naval air station on the Midway Islands and a Coast Guard LORAN station on Kure Atoll is thought to have been a significant factor in the declines at the westernmost atolls.

In the early 1980s efforts to protect and manage monk seals improved, and by the mid-1980s seal counts at all of the colonies west of French

Figure 21. The Hawaiian Archipelago. The Northwestern Hawaiian Islands contain all major breeding colonies of Hawaiian monk seals.

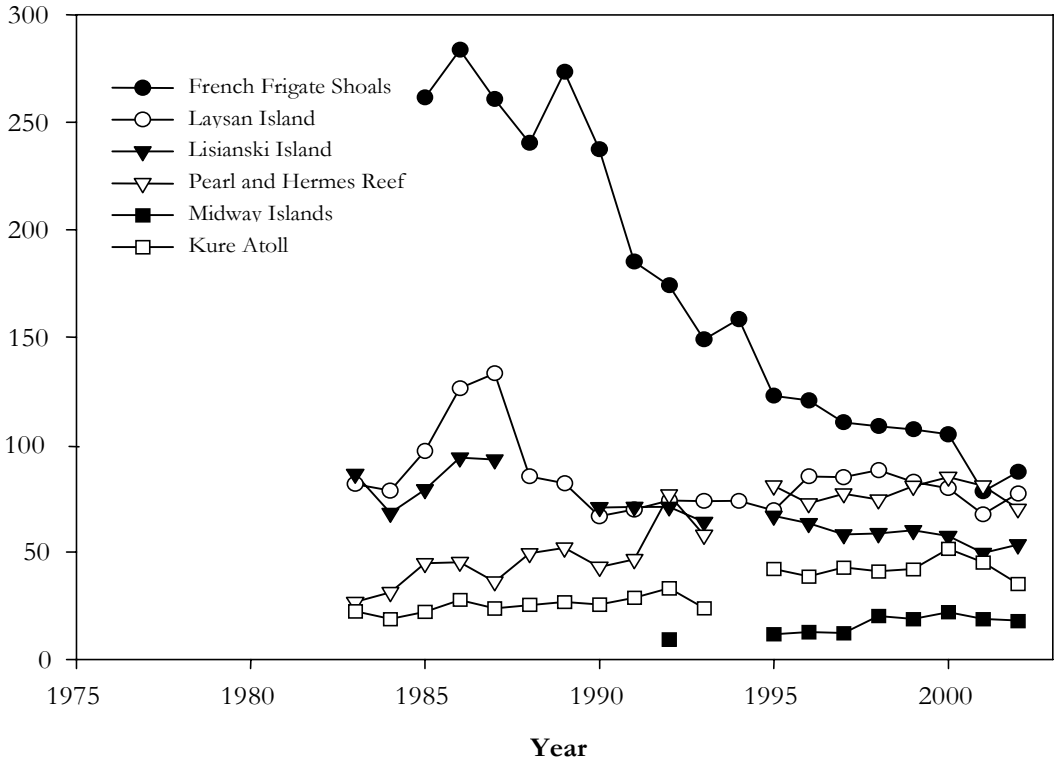

Figure 22. Mean beach counts of Hawaiian monk seals at major breeding colonies, 1982–2002. (Source: National Marine Fisheries Service, unpublished data; data for 2002 are preliminary.)

Frigate Shoals began to increase slowly (Fig. 22). However, in the late 1980s the colony at French Frigate Shoals, by then nearly three times the size of the second-largest colony, began a steep decline. This caused the total monk seal abundance to decrease even further through the early 1990s, even though all other colonies remained relatively stable or increased slowly. At French Frigate Shoals, the occurrence of underweight pups, very low juvenile survival, and comparatively small adult females strongly indicated that limited availability of prey for young seals and breeding females was the cause of the decline. Since the mid-1990s total population size has remained relatively stable. During this period, the decrease at French Frigate Shoals has slowed to a level roughly equal to the increases at the westernmost atolls. Because very few females born at French Frigate Shoals have survived to maturity over the past decade and juvenile survival rates have remained low, the number of breeding-age seals is beginning to decline, and both pup production and population size at that colony are expected to decline for at least several more years.

The small, isolated nature of islets and reef systems in the Northwestern Hawaiian Islands makes monk seals and other marine species in the area particularly vulnerable to human impacts and natural environmental change. It appears that trends in the size of monk seal colonies have been affected by combinations of factors that differ from colony to colony. The factors thought to have been most important include human disturbance of hauled-out seals, entanglement in marine debris (particularly derelict trawl nets and line from fishing gear), prey removal by commercial fisheries, changes in prey abundance due to shifts in regional climate and current patterns, naturally occurring biotoxins (e.g., ciguatera), shark predation, and aggressive behavior by some adult male monk seals toward pups, juveniles, and adult females.

As discussed in past annual reports, the Marine Mammal Commission held a review of the Hawaiian monk seal recovery program in 1995. Since then, several developments have occurred that could significantly affect the success of efforts to conserve and protect Hawaiian monk seals. Among other things—

• the National Marine Fisheries Service has significantly increased funding and staff support for research and recovery work in the Northwestern Hawaiian Islands;

• all federal waters within 50 nmi of major monk seal breeding colonies (except the Midway Islands) were designated in December 2000 as the North-

western Hawaiian Islands Coral Reef Ecosystem Reserve and are now being considered for national marine sanctuary status;
• new regulations for commercial fisheries in the Northwestern Hawaiian Islands have been developed and continue to be subject to scrutiny;
• the Navy closed its air station on the Midway Islands and transferred ownership of the atoll and surrounding waters to the Fish and Wildlife Service for use as a national wildlife refuge;
• efforts have been made to establish an ecotourism program at the Midway Islands;
• steps have been taken to improve information on monk seal foraging behavior;
• years of planning to replace a seawall at Tern Island in French Frigate Shoals have nearly reached the construction phase;
• the increasing occurrence of monk seals on beaches in the main Hawaiian Islands has raised new management challenges; and
• the National Marine Fisheries Service restructured its Hawaiian Monk Seal Recovery Team to update the Hawaiian Monk Seal Recovery Plan.

In light of these developments, the Commission convened a panel on 15–17 April 2002 in Honolulu, Hawaii, to reexamine Hawaiian monk seal recovery needs. The panel included seven marine mammal scientists and managers with experience in Hawaiian monk seals and marine mammal conservation. During the program review, representatives of the National Marine Fisheries Service (the lead federal agency responsible for monk seal recovery work) and other involved federal and state agencies and groups reviewed recent and planned activities related to monk seals. The panel summarized its findings and recommendations in a report to the Commission in August (see Appendix B, Marine Mammal Commission 2002). After considering its findings, the Commission transmitted the report and its recommendations on 10 September 2002 to the National Marine Fisheries Service, the Fish and Wildlife Service, the National Ocean Service, the Coast Guard, and the Hawaii Division of Aquatic Resources. Results of that review and other actions by the Commission and involved agencies undertaken in 2002 are described below. As of the end of 2002 most of the agencies had not yet replied to the Commission's letters.

Population Assessment

The Honolulu Laboratory of the National Marine Fisheries Service is responsible for assessing the status of monk seals in the Northwestern Hawaiian Islands and the main Hawaiian Islands. During the Commission's April program review, laboratory scientists described the current program.

In the Northwestern Hawaiian Islands, field crews annually visit each of the species' six major breeding colonies for various lengths of time between late winter and late summer to gather data on the status of the colony and undertake various management activities (e.g., disentangling seals, removing debris from beaches, moving weaned pups away from areas of high shark predation or aggressive male seals, removing individual sharks patrolling pupping beaches, and translocating aggressive male seals). Gathered data are analyzed and integrated into an evolving population model on a colony-by-colony basis to help evaluate their status and management needs. The personnel and logistics costs of working in such remote areas make the field program the most expensive element of the laboratory's monk seal recovery work (about $1.2 million of its $2 million 2002 monk seal program). Future plans call for continuing the assessment and recovery work, optimizing program results by adjusting deployment schedules and data collection priorities, assessing the use of satellite imaging to count seals on beaches, and developing photo-identification techniques to better track life history trends.

The review panel was impressed by the laboratory's field program. Funding support for the program has doubled since the Commission's 1995 program review, the fieldwork is well organized, and the data collected on this species over the past years now constitute perhaps the best long-term dataset for any seal species worldwide. The panel recommended that the laboratory continue its annual population assessment at all six breeding colonies. To optimize field work, the panel recommended that data collection focus on determining mortality causes at each colony—particularly Lisianski and Laysan Islands where the colonies have not been increasing and recently may have begun a downward trend. The panel also recommended that greater effort be made to tag and

monitor monk seals in the main Hawaiian Islands and that the laboratory contract or hire an additional scientist to help process and analyze data in a more timely manner. It also recommended that the population model be expanded to include data on monk seals in the main Hawaiian Islands and be used routinely to assess possible risks and benefits of management options.

The Commission concurred with the panel's findings. In its 10 September letter to the National Marine Fisheries Service, the Commission commended the Service for substantially increasing the laboratory's funding for monk seal recovery since 1995, and it recommended that additional funding be provided to hire one more staff member to process and analyze the data, and to expand monk seal monitoring in the main Hawaiian Islands.

In 2002 the Service continued its field research and mitigation work at all major breeding sites. At year's end preliminary results indicated that for the second year in a row, juvenile survival rates were low at all breeding sites. In the past, low juvenile survival had been a problem principally at Laysan and Lisianski Islands, and particularly at French Frigate Shoals. However, the total number of births in the Northwestern Hawaiian Islands increased slightly from 178 in 2001 to 196 in 2002. Also for the second year in a row, mean beach counts declined at the westernmost colonies (i.e., Kure, the Midway Islands, Pearl and Hermes Reef). Those declines reverse an overall trend of slow, steady increases at Pearl and Hermes Reef and Kure Atoll and a rapid increase at the Midway Islands since the early 1990s.

Hawaiian Monk Seal Foraging Ecology— Information on monk seal foraging areas, prey preferences, and prey availability is essential to understand the effects of commercial fisheries and other factors on the carrying capacity of atoll ecosystems that support monk seal colonies, particularly the colony at French Frigate Shoals. In the early 1990s the Honolulu Laboratory relied primarily on scat analyses for such information. It has since developed and tested several new techniques, including satellite tracking to locate feeding areas, time-depth recorders to determine foraging depths, video cameras mounted on individual animals ("crittercams") to film at-sea foraging behavior and habitat preferences, fatty acid analyses to identify the composition of monk seal diets from blubber samples, and assessments of reef fish populations.

Although these studies have vastly improved information, fundamental uncertainties about foraging patterns remain because these may differ by age and sex. Also until very recently, most work has avoided targeting juveniles and adult females whose diminished survival rates and poor condition appear most responsible for the declines at French Frigate Shoals. Work on these age and sex groups had been avoided because of concern over the possible effects of instrumenting and sampling the animals. However, reductions in the size of instrumentation and statistical analyses indicating that such research on adult males has not compromised their survival suggest that it may be safe to apply these techniques to juveniles and adult female seals. In 2001 the laboratory held a monk seal foraging research workshop to help plan future work. It advised the panel that for the 2002 field season, the laboratory planned to suspend most foraging fieldwork (except for crittercam studies) to analyze the backlog of foraging data already collected and plan future work based on those results. It also plans to continue to fund analyses of fatty acids from several hundred seal and prey samples already collected.

The panel supported the laboratory's decision to curtail fieldwork pending the ongoing data analyses and recommended that fatty acid analyses be completed as soon as possible. It also suggested that further crittercam work on adult male seals was unnecessary. To plan future work, the panel recommended that, by the 2004 field season at the latest, the laboratory develop a peer-reviewed foraging plan that sets forth specific hypotheses to be tested. It recommended focusing on the effect of prey availability on the condition and survival of weaned pups, juveniles, and adult females, particularly at French Frigate Shoals. It also urged that long-term studies be undertaken on individual seals to determine whether and how prey preferences and foraging patterns change as animals mature.

In its 10 September letter to the Service, the Commission concurred with the panel's foraging research recommendations. To assure that future studies are as cost-effective as possible, the Commission recommended that the Honolulu Laboratory develop a detailed foraging plan that identifies (1) the specific hypotheses to be tested, (2) the sample sizes by age, sex, and location for each of the various foraging study approaches (e.g., crittercam, satellite tracking, time-depth recorders,

fatty acid studies, etc.), (3) the rationale for the identified sampling regimes, and (4) how the various research components would be integrated.

Interactions with Commercial Fisheries— Hawaiian monk seals feed on a variety of prey, including small reef fishes, octopuses, lobsters, and other crustaceans. Many of these species are targeted or caught incidentally in lobster traps. Because of the sharp decline in monk seal numbers at French Frigate Shoals since the early 1990s, the Commission has repeatedly recommended to the National Marine Fisheries Service and the Western Pacific Regional Fishery Management Council that (1) research be undertaken to improve understanding of possible effects of the lobster fishery on monk seal prey availability, and (2) pending results of that research, a precautionary approach be followed to reduce fishing in areas where prey removal could adversely affect a colony. Although the Service provided research funding, the precautionary management recommendations were not adopted. Instead the Service maintained that information on monk seal foraging was not sufficient to conclusively document effects of the fishery on monk seals.

By the late 1990s lobster stocks at banks where monk seals from French Frigate Shoals feed were severely overfished. The Hawaiian Monk Seal Recovery Team, also concerned about effects of lobster fishing on the declining colony at French Frigate Shoals, recommended in 1999 that the fishery be closed for three years to allow the lobster stocks to recover. Early in 2000 Earthjustice, a public interest law firm, sued the Service for failing to properly manage the fishery and prevent impacts to monk seals. By that time the French Frigate Shoals colony had declined to about one-third the size it had been in the late 1980s. Concerned about the status of the lobster stocks, but without reference to the fishery's possible effect on monk seal prey availability, the Service subsequently closed the region's lobster fishery for the 2000 fishing season.

In December 2000 President Clinton signed Executive Order 13178 designating federal waters within 50 nmi of the Northwestern Hawaiian Islands as the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve (see below). The order imposed a cap on the number of commercial fishing permits and set harvests at levels authorized during the previous year. Because a catch limit on lobsters was in place through December 1999, and no lobster fishing occurred during the year prior to the order, it was unclear whether or at what level lobster fishing might be resumed under terms of the order. The Service has kept the fishery closed since the order was signed, but has also initiated studies to resolve questions about the status of the region's lobster stocks. The Western Pacific Regional Fisheries Management Council has questioned the legality of the Executive Order's fishery-related provisions and indicated its interest in reopening the lobster fishery.

Fishery Management of State Waters— Most waters within 3 miles of emergent land in the Northwestern Hawaiian Islands are under jurisdiction of the State of Hawaii (some are within the boundaries of two National Wildlife Refuges managed by the Fish and Wildlife Service — the Midway Islands National Wildlife Refuge and the Hawaiian Islands National Wildlife Refuge). In the past, the state has not imposed permit or regulatory restrictions on commercial fishing in its waters and has instead relied on management measures adopted by the Service at the recommendation of the Western Pacific Regional Fisheries Management Council. As noted in past annual reports, the Commission wrote to the Hawaii Department of Land and Natural Resources in May 1999, urging it to adopt measures to preclude lobster fishing in state waters pending results of ongoing monk seal foraging research.

In December 2001 the Department's Division of Aquatic Resources announced a proposed rule to designate state waters in the Northwestern Hawaiian Islands as a fishery management area to ensure sustainable use of the area's living resources. Under the measure, a permit would be required to enter and remove living marine resources from state waters in the Northwestern Hawaiian Islands. On 30 January 2002 the Commission wrote to the Division, noting that the rule would provide a needed mechanism to manage fishing vessels and other vessels in state waters in the Northwestern Hawaiian Islands. It commended the Division for its attention to the area's marine resource protection needs.

Noting its concern about the lobster fishery, the area's vulnerability to human impacts and exploitation, and the need to coordinate federal and state management actions in the area, the Commission recommended that the Division clarify and

expand the section of the proposed rule setting forth the goals of the management area. Specifically, it recommended adding language noting that a precautionary management approach would be used when deciding whether to issue permits and that management decisions would seek to complement those in the adjacent reserve and national wildlife refuges. To mitigate impacts caused by the accidental grounding of fishing vessels and other craft, which have occurred several times in recent years, the Commission also recommended that the rule require permittees to have insurance adequate to cover the costs of removing their vessel and associated debris, should they founder on area reefs.

Many others commenting on the proposed rule expressed similar concerns, and after consideration, the Division determined that further changes were needed to clarify management goals for the area. Late in 2002 a revised proposal was being transmitted to the Governor for approval before its release for a second round of public comment.

Panel Review—At the Commission's April 2002 program review, the panel was advised that at least six commercial fisheries have been proposed, authorized, or previously operated in the Northwestern Hawaiian Islands: a longline fishery for swordfish and other pelagic species, a lobster trap fishery, a hook-and-line fishery for bottomfish, a longline shark fishery, a precious coral fishery, and a fishery for reef-associated species. Few cases of hooked seals or other direct interactions with commercial fisheries have been reported in the Northwestern Hawaiian Islands since the early 1990s when steps were taken to prohibit pelagic longline fishing within 50 nmi of the Northwestern Hawaiian Islands. Since designation of the coral reef ecosystem reserve in December 2000, only one commercial fishery, the bottomfish fishery, has been authorized to fish in the Northwestern Hawaiian Islands.

As discussed below, the National Oceanic and Atmospheric Administration's National Ocean Service is considering action to convert the reserve to a national marine sanctuary. A Service official advised the panel that the Western Pacific Regional Fisheries Management Council would be responsible for recommending fishery management measures for the sanctuary and that, notwithstanding Executive Order restrictions in place for the reserve, it was possible that proposals to convert the reserve to a sanctuary could include measures to allow lobster fishing and possibly other fisheries.

The panel found that the Service and the Council had been responsive to direct interactions between monk seals and commercial fisheries, but also concluded that commercial fisheries may have contributed to the decline of prey species, particularly lobsters and octopuses, eaten by monk seals. It therefore recommended that the Service limit future fishing (including lobster fishing) within 50 nmi of the Northwestern Hawaiian Islands to that which is consistent with fishery restrictions set forth in Executive Orders for the reserve, and that the Council incorporate all of those measures into its fishery management recommendations for the national marine sanctuary proposal. The panel also recommended that the Hawaii Division of Aquatic Resources implement a management program for the proposed fishery management area in state waters that is consistent with fishery management provisions for the established reserve.

The Commission concurred with the panel's findings and recommendations. In its 10 September letters to the National Marine Fisheries Service and the National Ocean Service, the Commission recommended that all fishery management measures set forth in the Executive Orders be incorporated into any proposal for making the reserve a national marine sanctuary. In its 10 September letter to the Hawaii Division of Aquatic Resources, the Commission noted that the panel's recommendations relative to the proposed Northwestern Hawaiian Islands' fishery management area were consistent with the Commission's 30 January letter to the Division and it again urged that the Division adopt a management program that complements the management of marine species within the reserve.

Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve

As noted above, on 4 December 2000 President Clinton signed Executive Order 13178 establishing the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. Its purpose is to "ensure the comprehensive, strong, and lasting protection of the coral reef ecosystem and related marine resources and species of the Northwestern Hawaiian Islands." The reserve includes all submerged lands and waters (except those within the Midway Islands National Wildlife Refuge) from the

3-mile limit of state jurisdiction out to a distance of 50 nmi along the center axis of the island chain. The National Ocean Service was assigned management responsibility under provisions of the National Marine Sanctuary Act and directed to pursue steps to designate the area as a national marine sanctuary consistent with provisions established for the reserve. The order also directed that a reserve advisory council be established, made up of members representing state and federal agencies (including the Marine Mammal Commission) and nongovernmental stakeholders, to provide advice on reserve research and management matters.

The order placed a cap on the number of permits and harvest levels for commercial fisheries. It also called for designating marine preservation areas within which all fishing (except for the hook-and-line bottomfish fishery in some areas) was to be prohibited; limiting harvests of other living and nonliving resources; prohibiting oil and gas development; limiting discharges of materials; and preventing anchoring directly on coral reefs. After an opportunity for public comment, a second Executive Order (No. 13196) was signed on 8 January 2001 finalizing many of these restrictions. During 2001 the National Ocean Service provided staff and funding to begin administering the reserve and started a process for possible conversion of the reserve to a marine sanctuary.

Conversion to National Marine Sanctuary Status—Executive Order 13178 directed that steps be taken "to initiate the process to designate the Reserve as a national marine sanctuary (in order to) supplement or complement the existing Reserve." The National Ocean Service began a scoping process early in 2002 to solicit public comments and advice on issues to be addressed in a proposal to convert the reserve to sanctuary status. By letter of 23 May 2002 the Commission responded to the Service's request.

In its letter, the Commission noted that it had written more than a dozen letters between 1991 and 1999 to the National Marine Fisheries Service and the Western Pacific Regional Fishery Management Council recommending precautionary management measures to protect monk seals from the effects of lobster fishing. Those recommendations were rejected by the Service and the Council on grounds that information was insufficient to determine the importance of lobsters in the monk seal diet. In this regard, the Commission noted that Executive Order 13178 directs that "the Reserve shall be managed using available science and applying a precautionary approach with resource protection favored when there is a lack of information regarding any activity, to the extent not contrary to law." It also directs that action to designate a sanctuary supplement or complement reserve measures. Noting that past management of commercial fishing had not always embraced a precautionary approach, the Commission observed that the directive to apply a precautionary management approach was particularly important and needed, and it recommended that this approach, as well as other management provisions set forth for the reserve in the Executive Order, be included explicitly in any proposal to designate the area as a national marine sanctuary.

The Commission also recommended that, during the process of considering sanctuary status, (1) agreements be developed to include nearshore waters under jurisdiction of the state and the Fish and Wildlife Service within the sanctuary boundaries, (2) sanctuary resources be used to help meet logistical needs of researchers and natural resources managers with other federal and state agencies working in the Northwestern Hawaiian Islands, (3) a research and monitoring plan be developed, (4) cooperative agreements be established with other agencies involved in managing and protecting the region's living marine resources, and (5) cooperative measures be developed to ensure that the numbers, distribution, and activities of researchers and visitors to the Northwestern Hawaiian Islands do not adversely affect monk seals or other protected wildlife.

Draft Reserve Operations Plan—To guide management pending a decision on sanctuary designation, the reserve and sanctuary staff prepared and requested comments on a draft reserve operations plan. On 17 May 2002 the Commission, in consultation with its Committee of Scientific Advisors, commented on the draft plan. The Commission noted that the draft plan did not clearly or prominently identify the purpose of the reserve as set forth in the Executive Order or its directive that the reserve be administered using a precautionary management approach. The Commission therefore recommended that the National Ocean Service revise the draft plan to explicitly set forth the fundamental principles contained in Executive Order 13178.

The Commission also noted that the description of Hawaiian monk seals did not reflect the species' endangered status or identify any of the major threats, such as entanglement in marine debris, commercial fishing, and human disturbance, potentially affecting its recovery. The Commission therefore recommended that the draft plan be expanded to provide such information, specify what actions would be taken to foster monk seal recovery, and identify possible authorized activities (e.g., certain research, recreational, or commercial fishing activities) that could adversely affect monk seals and the steps that would be taken to avoid such impacts. As a related matter, a section of the draft on developing permit procedures did not appear to reflect that task's importance, and the Commission therefore recommended that it be revised to identify the development of permit regulations as a top priority.

The Commission also recommended that the draft plan be revised to identify the need for developing a comprehensive research and monitoring plan and for describing the reserve's role in evaluating and assisting regional research and monitoring activities.

Panel Review—During the Commission's April 2002 monk seal program review, a representative of the National Ocean Service advised the panel of efforts to implement the reserve and to begin considering its designation as a national marine sanctuary. In addition to points noted above, the panel was advised that a 36-foot research vessel was being constructed for the reserve and that a 225-foot research vessel also would be available periodically, the reserve had helped fund work to remove derelict net debris from Northwestern Hawaiian Islands reefs, and plans were being developed to construct a reserve interpretative center for the public.

The panel concluded that designation of the reserve was a constructive step that has increased protection for monk seals and other species in the Northwestern Hawaiian Islands. It recommended that the precautionary approach and fishery management measures in the Executive Orders be incorporated into any proposal to convert the reserve into a sanctuary. It also recommended that reserve managers establish an interagency task force or coordinating committee involving the National Marine Fisheries Service, the Fish and Wildlife Service, the Hawaii Department of Land and Natural Resources, and the Coast Guard to coordinate research and management activities in the region. The panel also recommended that a portion of the reserve's funding and vessel support be used to help provide logistical support for research and management activities carried out by other agencies involved in regional resource conservation.

The Commission concurred with the panel's recommendations on the reserve. In its 10 September letter to the National Ocean Service, the Commission noted that implementation of the reserve offers an unprecedented opportunity to further conservation goals and underscored the importance of communication and coordination with other agencies and groups. The Commission recommended that the National Ocean Service implement the panel's reserve-related recommendations.

As of the end of 2002 the National Ocean Service had not yet advised the Commission as to what steps were being taken to address its recommendations concerning the reserve. A representative of the Commission has participated in all meetings of the reserve advisory council and at the end of the year, the National Ocean Service was revising the draft reserve operations plan and reviewing comments on converting the reserve into a national marine sanctuary.

Entanglement in Marine Debris

Entanglement in marine debris constitutes a significant hazard for Hawaiian monk seals. Although many types of debris pose entanglement threats, most serious entanglements have involved derelict trawl nets and fishing line that drift into the Northwestern Hawaiian Islands from unknown locations around the North Pacific Ocean. Based on studies in the mid-1990s it appears likely that thousands and perhaps tens of thousands of derelict nets and net fragments have become lodged in reefs throughout the island chain. Derelict netting and line also entangles and kills sea turtles and other marine species and abrades, breaks, smothers, and otherwise damages fragile coral formations.

Most seal entanglements involve juvenile animals, perhaps because of their greater curiosity and smaller size. Seals are often able to free themselves with little or no injury, but those that cannot free themselves quickly are likely to die or sustain serious injuries. Although few entangled seals have

been found dead, the potential for significant impacts is high, given the amount of derelict net debris around monk seal colonies.

Since 1982 field teams deployed by the Honolulu Laboratory to monitor monk seal colonies have routinely disentangled seals whenever necessary and possible. They also routinely removed hazardous debris from island beaches. The number of observed entanglements averaged more than 15 per year in the late 1990s and reached a record high of 25 in 1999. In 2000 observed entanglements decreased abruptly to five, one of lowest totals since records were first kept in 1982. In 2001 eight seals were seen entangled. Because field seasons at most colonies typically last a few weeks to a several months, more entanglements undoubtedly occur than are reported.

Since 1996 teams of divers have been sent to the Northwestern Hawaiian Islands to remove derelict nets and lines from reefs and also ships to pick up debris gathered from beaches by monk seal field crews. This effort, which involves many cooperating agencies and groups, was initially funded primarily by the Honolulu Laboratory's monk seal recovery program and the National Fish and Wildlife Foundation, with contributions of labor and equipment from many sources. In 2001 support was significantly increased to more than $3 million, provided largely through the National Oceanic and Atmospheric Administration's coral reef conservation program and the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. With these funds, the duration of field visits and the number of dive teams were greatly expanded. Between 1998 and 2001 approximately 105 metric tons (116,000 kg) of net debris was removed from the islands and surrounding reefs. More than half of that total (approximately 57 metric tons, 62,800 kg) was collected in 2001. This expanded level of cleanup work is expected to continue through at least 2003.

Based on cleanup results and plans described at the Commission's April 2002 program review, the panel was impressed by the extent of work done to date. It recommended that the reef clean-ups and accumulation studies be continued and that monk seal field teams continue to disentangle seals and remove hazardous debris from atoll beaches. The panel also recommended that greater effort be focused on identifying the origins of the derelict netting and line so that education programs and other mitigation measures can be developed to

Figure 23. Hawaiian monk seal pups on Trig Island, French Frigate Shoals, have experienced high rates of shark predation. The pup in the foreground had its left hind flipper completely removed by a shark attack and died shortly after the picture was taken. (Photo by Brenda Becker, courtesy of the National Marine Fisheries Service.)

curtail the discharges or losses at the source. In its 10 September letters to the National Marine Fisheries Service, the National Ocean Service, and the Fish and Wildlife Service, the Commission noted its concurrence with the panel's recommendations.

During 2002, 10 entangled seals were observed by the field crews. One of those was a pup that apparently became entangled in debris on the beach at Lisianski Island and died. Of the other nine entanglements, six animals were released with human assistance and three were able to escape unaided. All but one entanglement occurred in the Northwestern Hawaiian Islands. The exception was an adult female found on Kauai with nylon line around its neck, which was removed by a biologist with the Division of Aquatic Resources. In 2002 cleanup work was extended to a six-month field season. A total of 107 metric tons (118,000 kg) of debris (more than all previous years combined) was removed and brought back to Oahu for disposal. Work was done at all atolls in the chain with most of the debris removed from Pearl and Hermes Reef. Accumulation study sites at Kure, Lisianski, and Pearl and Hermes Reef continued to be monitored and, as of the end of 2002, a paper on accumulation rates was nearing completion. Directed efforts to determine the sources of the debris have still not received funding.

Shark Predation and Aggressive Male Seals at French Frigate Shoals

As noted above, the colony of monk seals at French Frigate Shoals has declined to about one-third its size in the mid-1980s. Although there is strong evidence that this decline has been at least partly the result of limited prey availability, in recent years other factors have also been involved. In particular, there has been a significant increase in shark predation on pups (see Fig. 23). To date, such predation has been identified as a problem only at French Frigate Shoals. In 1999 more than 25 percent of the pups born at the atoll (25 of 92) were thought to have been killed by Galapagos sharks patrolling two main pupping islands as close as a few feet from the beach. Virtually all of the pups were lost at two of the atoll's several islands —Trig Island and Whaleskate Island. (Since then Whaleskate Island has virtually disappeared due to erosion and currently is not suitable as a pupping site.) Staff of the National Marine Fisheries Service believe that this problem may be the result of learned behavior by a few individual sharks.

Another problem at French Frigate Shoals has been aggressive behavior by adult male seals. This behavior, which also appears to be a learned one, is exhibited by just a few individual adult male seals at this atoll and is manifested in attacks on pups. The victims may drown or die from infected wounds. In 1991 after several such cases were documented, an adult male responsible for the attacks was euthanized under a permit. In 1998 after another series of attacks, two identified adult males were translocated. After both of these actions, the number of observed attacks and injuries declined.

A similar approach of identifying and removing problem animals has been tried to address the recent increase in shark predation. In 1997 and 1998 monk seal field teams began tagging sharks patrolling the pupping beach at Trig Island with spaghetti tags; they identified at least 14 individual Galapagos sharks exhibiting the behavior at that time. In 2000 a research project began using sonic tags to assess the sharks' behavior and movement patterns. National Marine Fisheries Service personnel also caught and killed two sharks in 2000 and five in 2001. Because the problem was limited largely to Trig and Whaleskate Islands, field crews also relocated some weaned pups to other islands within the atoll where shark predation was not observed or considered rare. In 2000 and 2001 shark-related deaths declined to six and nine animals, respectively. In 2002 the National Marine Fisheries Service, with strong support from the Hawaiian Monk Seal Recovery Team, sought permission from the Fish and Wildlife Service (which, as manager of the Hawaiian Islands National Wildlife Refuge, has jurisdiction over the atoll and adjacent waters) to expand the effort and take up to 15 sharks per year in 2002 and 2003.

Based on information provided at the Commission's April 2002 program review, the panel concluded that work to identify and remove problem sharks and aggressive adult male seals has been appropriate, but that efforts to address shark predation have proceeded too slowly. It therefore recommended that the National Marine Fisheries Service and the Fish and Wildlife Service consult on steps to accelerate progress to identify and remove problem sharks. It also suggested that the hypothesis that shark predation is a learned behavior prac-

ticed by a few sharks could be tested by removing sharks identified as exhibiting predatory behavior on pups. If such predation is not limited to a few sharks, further lethal taking may be ineffective and ill-advised.

In its 10 September letter to the Fish and Wildlife Service, the Commission noted that it shared the Service's concern about removing sharks from the reef ecosystem. It also believed, however, that a limited shark kill could mitigate a serious problem for monk seals with a minimal effect on the atoll shark population. It therefore recommended that the Service consult with the National Marine Fisheries Service to develop new permit conditions that would allow a more aggressive effort to identify and remove sharks observed patrolling Trig Island pupping beaches.

Following the April 2002 program review, the Fish and Wildlife Service authorized efforts to take up to 15 Galapagos sharks exhibiting predatory behavior through the 2003 field season. Recognizing the important role of sharks as top predators in the atoll's food chain and the need to justify their removal from nearshore waters at Trig Island, the Fish and Wildlife Service recommended that systematic observational data be collected to document shark attacks on pups and to determine the size of the Galapagos shark population at French Frigate Shoals. It also required that a report be provided on results of efforts after each increment of five sharks is taken. At the end of the 2003 field season, results of the effort are to be reexamined.

During the 2002 field season, two sharks were killed at Trig Island and only three shark-related pup deaths were recorded on the island. However, efforts to tag and kill sharks patrolling the beach have made them more wary and difficult to tag and catch. Thus, tagging efforts have had limited success. Also, shark-related deaths at atoll islands other than Trig and Whaleskate rose sharply in 2002 to eight pups. Whether these were sharks accustomed to preying on monk seal pups at Trig and Whaleskate or new individuals is not known.

During the 2002 field season, observations of injuries to pups due to aggressive male seals remained low at levels not considered to be a problem.

Construction of a New Seawall at Tern Island—Tern Island at French Frigate Shoals is the only island between the main Hawaiian Islands and the Midway Islands with buildings and an airstrip to support a permanent human presence. The island was expanded from about 11 acres to more than 40 acres by the Navy during World War II, and its current buildings were erected by the Coast Guard for use as a LORAN station in the 1960s and 1970s. The island is now occupied year-round by Fish and Wildlife Service staff as a field station for the Hawaiian Islands National Wildlife Refuge. The facilities provide vital support for fieldwork at the atoll.

The future of the field station and the island itself is in doubt because the sheet-metal bulkhead built by the Navy more than 50 years ago to protect the island and its airstrip has rusted through at many points. The bulkhead must be replaced soon to prevent (1) the loss of facilities and the support they provide for essential research and management, (2) the dispersal of contaminants and debris buried on the island at unknown locations, (3) the loss of limited terrestrial habitat used by monk seals and many other species, and (4) the creation of entrapment hazards for seals and sea turtles. Over the past 15 years the Fish and Wildlife Service has contracted for the design of a new seawall, obtained about $11 million for its construction (about $4.1 million short of the estimated replacement cost), and taken many other steps to plan for construction that could begin as soon as 2003.

In 2000 a former Coast Guard dump site contaminated with PCBs was discovered in an erosion pocket behind a breach in the bulkhead. The Coast Guard promptly took steps to remove contaminated soils. Although most of the contaminated soils were removed, the extent of contamination was larger than anticipated and the cleanup effort did not remove all contaminants to levels meeting Environmental Protection Agency standards. Remaining cleanup work is estimated to cost $1.3 million. The Coast Guard District Office requested additional funds for cleanup work, but in early 2002 it was unclear whether they would be made available. Failure to complete the cleanup could allow contaminants to erode into the surrounding lagoon, delay construction plans, and increase construction costs.

Based on information provided at the Commission's April 2002 program review the panel recommended that the Fish and Wildlife Service take all possible steps to secure the funds necessary to complete the seawall project as quickly as

possible, and that the Coast Guard ensure that funding is made available to complete cleanup of the dump site. The panel also recommended that the National Marine Fisheries Service and the Fish and Wildlife Service consult to ensure that everything possible is done to allow monk seal field crews at French Frigate Shoals to continue their monitoring and mitigation work during the construction.

The Commission concurred with the panel's findings. In its 10 September letter to the Fish and Wildlife Service, the Commission reiterated the panel's recommendation that everything possible be done to secure the funding needed to complete the Tern Island seawall project as quickly as possible. In its 10 September letter to the Coast Guard, the Commission commended the Coast Guard for its past work to clean up the Tern Island dump site and recommended that it approve funding to complete the cleanup and that it consult with the Fish and Wildlife Service on how best to integrate additional cleanup work into the seawall construction schedule.

On 11 October 2002 the Coast Guard responded to the Commission's letter, noting that it had spent approximately $3 million to clean up the Tern Island dump site and removed 95 percent of the contaminants. Although recognizing the concerns expressed in the Commission's letter, it noted that it believed that additional cleanup work at the site would achieve nominal results at an exorbitant cost. Given other more pressing cleanup needs, the agency was not planning to approve the funding request. As of the end of 2002 the Fish and Wildlife Service had not responded to the Commission's letter.

Ecotourism at the Midway Islands

Since the early 1900s the Midway Islands have been used for various purposes, including a trans-Pacific cable station, a stop for early trans-Pacific clipper flights, and a naval air station. The naval air station was expanded substantially in the 1960s to handle large jets and support a crew of nearly 3,000 people. During the 1960s and 1970s monk seals virtually disappeared from the atoll. In the mid-1990s the Navy closed the facility and, after spending $50 million to clean up contaminants on the island, it transferred ownership of the atoll to the Fish and Wildlife Service in 1996 for use as the Midway Islands National Wildlife Refuge. Since closure of the air station, monk seals have reoccupied the atoll. By 2001 the colony was estimated to number about 65 seals and was growing slowly.

When the Fish and Wildlife Service took ownership of the atoll, it assumed an obligation to maintain the airfield, which serves as an emergency landing site for trans-Pacific jets and a refueling station for Coast Guard air patrols and certain other aircraft. To meet these obligations and defray operational costs, the Service contracted with a concessionaire to maintain the airfield and other island facilities and to operate a public visitation program consistent with the purposes of the refuge. Although there were concerns that visitors could disturb monk seals and impede their recovery at the atoll, education and management actions to protect the seals were put in place and proved effective.

The concessionaire, however, reported that it was unable to make a profit and requested approval to conduct new activities for visitors that might increase revenues. Also fishery interests proposed a project to develop a fisheries support base on the Midway Islands that could provide revenues for the concessionaire. The Service rejected these proposals due to their incompatibility with refuge objectives. Therefore, in 2002 the concessionaire withdrew from the agreement and, pending the development of new plans to maintain the runway and operate a refuge visitor program, the Service has suspended visitor access to the atoll indefinitely.

Based on information provided by representatives of the Fish and Wildlife Service at the April 2002 monk seal program review, the panel commended the Service for its efforts to manage visitor activities at the atoll in a manner compatible with protection needs for monk seals and other wildlife. It recommended that the Service consult with the National Marine Fisheries Service if plans are developed to reinstate a visitor program or to allow new human uses. The Commission expressed its concurrence with the panel's findings and recommendations in its letter of 10 September to the Fish and Wildlife Service. At the end of 2002 a public access program at the atoll had not been reinstated.

Hawaiian Monk Seal Recovery Planning

The National Marine Fisheries Service formed a Hawaiian Monk Seal Recovery Team in 1980 and adopted a Hawaiian Monk Seal Recovery Plan in

1983. For most of the past 15 years the recovery team, made up primarily of marine mammal scientists, met annually in early December to review past and ongoing recovery actions and provide advice on planning for the following spring and summer field season.

In November 2000 the Service unexpectedly canceled the team's December meeting and rescheduled it for late March 2001. The Service subsequently decided to reconstitute the team and to request that it update the 1983 recovery plan. The new team, which is larger than the former team, includes one former team member and a greater number of representatives from agencies and groups with interests related to monk seal conservation. Most of the new members, however, have had little direct experience with past monk seal conservation issues.

In March 2002 the new team met for the first time. It developed an outline for a revised draft recovery plan and assigned drafting responsibilities to team members and the staff of the National Marine Fisheries Service, with a view toward developing a final draft plan by December 2002.

Based on information provided during the Commission's April 2002 program review, the panel concluded that the new team provided a good mix of agency officials and scientific experts and that updating the monk seal recovery plan was urgently needed. Given the limited familiarity of most team members with past monk seal recovery efforts, the panel also concluded that it was appropriate and necessary for the Service's staff to help draft parts of the plan and it recommended that, to the extent possible, the Service's staff draft background sections of the plan. The panel also recommended that the updated plan define specific research and management objectives, describe the various tasks required to meet those objectives in sufficient detail to estimate needed costs and time frames, and identify the specific agencies or groups to be assigned lead responsibility for tasks such as public outreach, marine debris cleanup, responding to monk seal haul-outs in the main Hawaiian Islands, and mitigating shark predation impacts.

Although the panel believed that a new recovery plan should be completed as soon as possible, it considered it more important that the plan be done well, which might not be possible, given the planned schedule. It therefore recommended that the Service consider holding a team meeting before December 2002 to review plan elements and, if necessary, defer finalizing a draft plan until a meeting in 2003. The panel also recommended that the new team assume the role of the former team with regard to annually reviewing research and management plans for the next field season and that it meet each year in December for this purpose.

The Commission concurred with the panel's findings and recommendations. In its 10 September letter to the Service, the Commission commended the Service for its efforts to update the recovery plan and recommended that the Service implement the panel's recommendations.

In the fall of 2002 it became apparent that limited progress had been made on drafting a plan since the team's March meeting and that it was unlikely that an additional team meeting would be held before December. Therefore, upon learning of the situation, the Commission after consulting with the National Marine Fisheries Service, contracted with an individual to work with the recovery team to help assemble and complete a draft plan.

Figure 24. Hawaiian monk seals recently have begun hauling out at popular swimming beaches on the island of Kauai. Volunteers post signs with yellow tape to keep people at a respectful distance. (Photo by Shawn C. Farry/David W. Laist, courtesy of the Hawaii Division of Aquatic Resources/Marine Mammal Commission.)

The contractor assembled a preliminary draft plan based on the 1983 plan and new text written by recovery team members and scientists from the Service's Honolulu Laboratory. At its second meeting on 4–6 December 2002 the team reviewed the draft and identified issues and recommendations to highlight in the document. It was agreed that the Commission's contractor would edit and incorporate those points in a revised draft of the background sections of the plan that would be reviewed by the team at its next meeting in April 2003. The chair of the recovery team will take the lead on developing a set of recommendations that will be included in the plan. The team is expected to provide a draft recovery plan to the Service by the end of 2003.

Monk Seals in the Main Hawaiian Islands

Historical information indicates that monk seal occurrence in the main Hawaiian Islands has been rare but that sightings and births have increased significantly in recent years. Whereas only one birth was recorded in the main Hawaiian Islands before 1988, one to four births per year were documented in the following decade, and seven and eleven births were reported in 2000 and 2001, respectively. Based on a minimum count of 52 seals in 2001, the total number now in the main Hawaiian Islands likely numbers at least 100. Most animals occur on the westernmost islands, including Kauai and Niihau; however, births and sightings have been reported on all islands.

Although their increase in the main Hawaiian Islands raises promising prospects for the species' recovery, it also poses new management challenges. Monk seals haul out regularly on some popular recreational beaches where they sometimes are harassed by people. They also have given birth on popular beaches and on at least two occasions in the past two years they have bitten swimmers. Interactions between seals and both domestic pets and feral animals also pose threats of disease transmission to the seal population.

The Pacific Islands Area Office of the National Marine Fisheries Service is responsible for management activities related to monk seals, but currently it has only one staff member and one full-time contract employee to address management needs for monk seals, sea turtles, and all other protected marine species throughout Hawaii and the Pacific Islands region. As a result, volunteers and officials with state and local governments respond to most monk seal haul-outs. In many cases, they cordon off the immediate area around seals to limit how closely people can approach them (Fig. 24). In one case, however, a popular beach on Kauai was closed by the State of Hawaii at the recommendation of the Service to protect a mother and pup. Such actions can have significant impacts on local tourist-based economies and have raised concerns among some residents and local businesses about the presence of seals on beaches.

To improve response efforts, the Pacific Islands Area Office considered holding a workshop to examine possible approaches for managing interactions between monk seals and people in the main Hawaiian Islands, but because of funding constraints, it was unable to plan or schedule such a meeting. The Hawaii Division of Aquatic Resources has helped to respond to many haul-out events and is interested in expanding its role in response work, but also has limited staff and funding. It is, however, considering steps to address this need by establishing a cooperative agreement with the Service and requesting a grant to help develop a program under provisions of section 6 of the Endangered Species Act.

Panel Review—Based on information provided at the Commission's April 2002 program review, the panel concluded that occupation of the main Hawaiian Islands by seals could significantly enhance the species' recovery and, if properly managed, could provide a valuable economic benefit, given widespread interest in ecotourism and marine mammals. It also was apparent that the staff and funding to address related management needs are inadequate and that an effective, coordinated strategy to minimize harmful interactions between people and seals was lacking. The panel concluded that developing a cooperative federal-state strategy to address these issues was perhaps the recovery program's most urgent need.

The panel therefore recommended that (1) the Service's Pacific Islands Area Office provide additional staff and funding specifically to address monk seal management needs in the main Hawaiian Islands, (2) the Hawaii Division of Aquatic Resources proceed with plans to develop a cooperative agreement with the Service under section 6 of the Endangered Species Act to help address monk seal management needs, and (3) the Marine

Mammal Commission, in collaboration with the Service and the Hawaii Division of Aquatic Resources, convene a workshop at the earliest possible date to develop a multiagency plan of action to respond to monk seal haul-out events.

The Commission concurred with the panel's recommendations. In its 10 September letter to the National Marine Fisheries Service, the Commission recommended that the Service (1) provide such additional funding as may be needed to hire at least one additional fulltime staff member to coordinate and carry out work to manage human interactions with monk seals in the main Hawaiian Islands, (2) develop a cooperative agreement with the Hawaii Division of Aquatic Resources under section 6 of the Endangered Species Act to expand and formalize that agency's role in responding to monk seal haul-out events, and (3) establish a monk seal management task force with appropriate state and local agencies and volunteer groups to coordinate haul-out response work. In making these recommendations, the Commission noted that it was essential that added support for the Pacific Islands Area Office not come at the expense of funding provided to the Honolulu Laboratory for its monk seal recovery work.

Workshop Preparations—In light of the panel's findings, the Marine Mammal Commission took steps shortly after the April program review to organize the recommended workshop. On 7 June 2002 it wrote to both the National Marine Fisheries Service and the Hawaii Division of Aquatic Resources transmitting draft terms of reference for the workshop and offering to provide funding for a workshop in the fall of 2002. It asked each agency to help defray meeting costs and to participate on a workshop steering committee. The terms of reference proposed a meeting of monk seal biologists, resource managers, veterinarians, and other interested parties to (1) review information on monk seal haul-out patterns, pinniped behavior, and interactions between people and seals on beaches, (2) develop a plan of action to address interactions between seals and people on main Hawaiian Island beaches, and (3) recommend related research and management actions.

Both agencies agreed to help cover workshop costs and participate on the steering committee. Because most interactions between people and seals occur on Kauai, it was agreed that the meeting should be held on Kauai in late October. The steering committee developed final terms of reference, a draft agenda, and a list of prospective participants. It also invited a series of background papers on monk seal distribution and haul-out patterns, the effects of human disturbance on monk seals, the potential role of monk seals in the main Hawaiian Islands in the species' recovery, disturbance, disease considerations, legal requirements, experience in managing seals on recreational beaches in California, management actions to date by federal and state agency officials and volunteers, possible management options, and the use of an adaptive management approach.

Management Actions on Kauai—While preparations were being made for the workshop, representatives of the Service and the Division met several times with key individuals involved in responding to monk seal haul-outs on Kauai, including county officials, volunteers, and representatives of the hotel and tourist industry. During the meetings, they discussed and agreed on steps to better coordinate efforts to respond to haul-out events.

In addition, the Service transferred funds to the Division to contract for a person to serve temporarily as a monk seal coordinator on Kauai. The role of the coordinator was to assist the Service and the Division in monitoring and managing monk seal haul-outs on Kauai by documenting and responding to such events (especially those on crowded beaches); meeting with volunteers, hotel managers, county officials, and others to help clarify their respective roles in monk seal haul-out response efforts; and serving as liaison between local response efforts and staffs of the Service and the Division. Shortly before the workshop the Division hired a coordinator to serve through at least January 2003.

Results of the Workshop—On 29–31 October the Commission, the National Marine Fisheries Service, and the Hawaii Division of Aquatic Resources jointly convened the Workshop on the Management of Hawaiian Monk Seals on Beaches in the Main Hawaiian Islands in Koloa, Kauai, Hawaii. A representative of the Commission chaired the meeting, which involved more than 70 participants from federal, state, and local agencies, volunteer groups, the local hotel and tourist industry, environmental organizations, and the scientific community.

Because of resource limitations within the National Marine Fisheries Service for responding

to monk seal haul-out events, state and local agency officials, volunteers, environmental groups, and local businesses had stepped forward with little or no support to assist in protecting hauled-out seals in the main Hawaiian Islands. Although most seals appear to have received adequate protection, response efforts were sometimes undertaken with little guidance. At times this led to great frustration and strained relations among those attempting to help. Recognizing the importance of the work, however, participants of all groups expressed a strong desire to continue assisting response efforts to ensure that monk seals are able to coexist with people in harmony in the main Hawaiian Islands.

To help forge partnerships and cooperation in this regard, workshop participants recommended that island coordinators be designated or hired to work closely with local officials, businesses, residents, environmental groups, and volunteers to address haul-out events. It was agreed that this was most urgently needed on Kauai and that the recent hiring of a temporary coordinator for Kauai was an important step in that direction. It also was recommended that a single toll-free telephone number be set up for the public to report monk seal sightings and that the coordinators should determine on a case-by-case basis who, if anyone, should respond and what follow-up actions are necessary.

To clarify who should be involved and how, it was suggested that a three-tier system be developed. Persons designated as "Level 1" would assist with tasks that did not involve the "taking" of seals as defined under the Marine Mammal Protection Act and Endangered Species Act. Such tasks would include posting seal safety zones (i.e., signs and yellow tape around seals), monitoring seals from a safe distance, and public education. "Level 2" would include people who would do those activities and also be authorized to disturb or handle seals for certain limited purposes, such as assessing potential injuries, herding seals out of hazardous situations, disentangling some seals not seriously entangled or injured, or assisting people in Level 3 activities. "Level 3" would include people authorized and trained to treat sick or injured seals, translocate seals to other locations, or address other serious intervention needs.

Because of the need to respond quickly to situations that could require legal authorization to disturb or handle animals, it was recommended that the Service train and authorize a pool of people on each island to carry out Level 2 activities. Those people could include agency officials and interested volunteers. Although Level 1 activities would not require such authorization, those participating at that level were recognized as fundamental for addressing most haul-out events and it was felt that people involved at that level should receive training and certificates of participation to ensure that their activities are carried out in a consistent, safe manner. The greatest number of people will be needed to carry out Level 1 activities and many, if not most, of them could be volunteers.

Other management recommendations included—

- reviewing existing education materials and efforts to evaluate their effectiveness;
- posting seal safety zones that are as small as possible to be effective;
- providing volunteers, agency officials, and other response participants cards or other means of identifying what they have been certified or authorized to do;
- avoiding the use of physical barriers to limit seal access to areas except perhaps to keep animals off roads;
- herding or translocating seals be undertaken only when (1) seals are in high-risk situations (e.g., on roads or boat ramps), (2) weaned pups are in populated areas where they could become acclimated to human attention, (3) seals are at risk from an unusual event (e.g., a hazardous substance spill), and (4) seals exhibit behavior that poses risks to human safety;
- developing a graduated set of methods for herding seals to safety such that least-disruptive methods are tried first; and
- convening a forum annually to review and share new information and new management approaches.

The workshop participants also identified steps and individuals to help implement those recommended management measures. They urged that agency or foundation funding be sought to extend the appointment of the temporary monk seal coordinator on Kauai and that efforts be pursued to make the position permanent through grants under section 6 of the Endangered Species Act or establishing it as a new position within the National Marine Fisheries Service. Workshop participants also were identified to—

• define roles and responsibilities for work at different levels based on the three-tier system noted above;
• develop a framework for training people involved at the different response levels;
• develop protocols for herding, capturing, and moving seals; and
• identify procedures to authorize individuals to carry out work that may constitute "taking" as defined under the Marine Mammal Protection Act and Endangered Species Act.

Finally, workshop participants identified 50 specific research needs under the topics of population dynamics, life history and ecology, abundance and distribution, foraging and food needs, genetics, health and disease, interactions between seals and people, and the effectiveness of management activities.

At the end of the year, a final workshop report was being readied by the Commission for publication early in 2003.

Steller Sea Lion (*Eumetopias jubatus*)

Steller sea lions are found along the rim of the North Pacific Ocean from the Channel Islands in southern California to Hokkaido, Japan, and north into the Bering Sea and Sea of Okhotsk. Their center of abundance has been in the Aleutian Islands and Gulf of Alaska where historically nearly three-fourths of all Steller sea lions inhabiting U.S. territory were found. Steller sea lions haul out on land to mate, bear their young, nurse, avoid predators, and rest (Fig. 25). The location of rookeries is probably based on proximity to food sources, protection from terrestrial and marine predators, topography, surf conditions, and other factors. Steller sea lions are generally considered nonmigratory although some individuals, particularly juveniles and adult males, may disperse widely outside the summer breeding season. Most adult

Figure 25. Steller sea lion rookery. (Photo courtesy of the National Marine Fisheries Service.)

Table 5. Counts of adult and juvenile (nonpup) Steller sea lions at U.S. rookery and haul-out trend sites[1] by region[2], 1975–2002

	Gulf of Alaska			Aleutian Islands			Western Stock in Alaska	Southeast Alaska
Year	Eastern	Central	Western	Eastern	Central	Western		
1975	—	—	—	19,769	—	—	—	—
1976	7,053	24,678	8,311	19,743	—	—	—	—
1977	—	—	—	19,195	—	—	—	—
1979	—	—	—	—	36,632	14,011	—	6,376
1982	—	—	—	—	—	—	—	6,898
1985	—	19,002	6,275	7,505	23,042	—	—	—
1989	7,241	8,552	3,800	3,032	7,572	—	—	8,471
1990	5,444	7,050	3,915	3,801	7,988	2,327	30,525	7,629
1991	4,596	6,270	3,732	4,228	7,496	3,083	29,405	8,621
1992	3,738	5,739	3,716	4,839	6,398	2,869	27,299	7,555
1994	3,365	4,516	3,981	4,419	5,820	2,035	24,136	9,001
1996	2,132	3,913	3,739	4,716	5,524	2,187	22,211	8,231
1997	—	3,352	3,633	—	—	—	—	—
1998	2,110	3,467	3,360	3,841	5,749	1,911	20,438	8,693
1999	1,952	—	—	—	—	—	—	—
2000	1,975	3,180	2,840	3,840	5,419	1,071	18,325	9,862
2002	2,500	3,366	3,221	3,953	5,480	871	19,391	9,951

[1] "Trend" sites are selected sites that are counted regularly to provide an index of trends in population abundance.
[2] Sources are NMFS (unpublished data and a 20 September 2002 memorandum to the record from J. Sease regarding Steller sea lion survey results, June and July 2002) and Sease, J. L., and T. R. Loughlin, 1999, Aerial and land-based surveys of Steller sea lions (*Eumetopias jubatus*) in Alaska, June and July 1997 and 1998; U.S. Department of Commerce, National Oceanographic and Atmospheric Administration Technical Memorandum NMFS-AFSC-100.

sea lions return to their birth site for reproduction. The various rookeries are therefore considered a "metapopulation" (i.e., a population consisting of smaller populations) with limited exchange between sites.

Trends in Abundance

In the 1950s worldwide abundance of Steller sea lions was estimated at 240,000 to 300,000 animals. Since then, abundance has declined severely throughout the central and western part of the species' range (Table 5). The western population has declined by about 85 percent since the mid- to late 1970s, and at some sites sea lions have nearly disappeared. The decline was first noted in the eastern Aleutian Islands, but then spread westward and eastward to include all areas west of 144ºW longitude (i.e., Cape Suckling, approximately 100 km east of Prince William Sound, Alaska). The rate of decline appears to have been most severe in the late 1980s when the number of sea lions in the central and western Gulf of Alaska and eastern and central Aleutian Islands dropped precipitously. Counts have generally continued to decline since then.

Over the last decade, counts in the central and eastern Gulf of Alaska declined at an average of about 8 to 10 percent annually. In the far-western region of the Aleutian Islands, only 871 adults and juveniles were counted in 2002, compared with 2,869 in 1992, indicating a decrease of 70 percent in a single decade. The large decrease in the count for the western Aleutian region and the continuing decline of the total western population (overall, about 4 percent annually) heighten concern for the status of this population and underscore its vulnerability. For the U.S. western population, counts of animals older than pups were generally higher

in 2002 than in 2000 (5.5 percent at trend sites), but pup counts continued to decline. Additional counts are needed to determine if the decline is continuing.

Counts of Steller sea lions in Russia reveal a similar decline over the past three decades. Counts in Russian territory have been infrequent and limited, but recent data suggest that abundance at rookeries in the Sea of Okhotsk and some regions of the Kuril Islands may be stable or increasing slightly, but counts at rookeries on the Kamchatka Peninsula are still depressed and some rookeries have been abandoned altogether.

In contrast to the observed trends of the western population, combined counts from the eastern population (along the western coast of North America east and south of Prince William Sound) have increased at about 1–3 percent annually over the last three decades. The observed population growth in this region reflects recovery from periods of intentional sea lion killing in the early to mid-1900s.

Status under the Endangered Species Act

The National Marine Fisheries Service has lead responsibility for management of Steller sea lions. Its research and management partners include the Alaska Department of Fish and Game, North Pacific Fishery Management Council, University of Alaska, Alaska SeaLife Center, North Pacific Universities Marine Mammal Research Consortium, Alaska Sea Otter and Steller Sea Lion Commission, the tribal governments of the Pribilof Islands, and a number of other nongovernmental entities including environmental organizations.

Figure 26. Steller sea lion critical habitat.

In 1990 the Service designated the Steller sea lion as threatened under the Endangered Species Act. At the recommendation of the Marine Mammal Commission and others, the Service established the Steller Sea Lion Recovery Team in 1990 and adopted the Steller Sea Lion Recovery Plan in 1992 to help guide recovery efforts. The designation in 1990 treated the species as a single population. In 1993 critical habitat was designated as (1) all waters within 20 nmi (37 km) of rookeries and major haul-out sites west of 144ºW longitude; (2) three special foraging areas in Shelikof Strait, the southeastern Bering Sea, and Seguam Pass in the central Aleutian Island chain; and (3) waters and lands within 0.9 km (3,000 feet) of rookeries and major haul-out sites east of 144ºW longitude (Fig. 26).

Subsequent research indicated that the species consists of at least two populations distinguishable on the basis of geography, demography, and genetic composition. On 5 May 1997 the Service therefore published final rules designating the population west of 144ºW longitude (Fig. 26) as endangered while maintaining the threatened status for the population east of that line. The Steller Sea Lion Recovery Team and the Marine Mammal Commission supported those revisions. The Service concluded that it was not necessary to modify designated critical habitat for Steller sea lions, but noted that it was reassessing the effectiveness of existing protective measures with a view toward improving them.

Causes of the Decline

The causes of the decline of the western population of Steller sea lions have been a matter of extensive debate and controversy. Available baseline information on the population prior to the mid-1970s is sparse. As noted in a recent National Research Council report (see below), "...the cause, or causes, of the early phase of the sea lion decline will likely remain a source of speculation and debate." Existing information does not indicate that disease, pollution, and entanglement in marine debris have been significant contributors to the decline. Some recent evidence suggests that sea lions in Alaska have relatively large contaminant levels, but the evidence is not consistent with the geographic pattern of the decline. Known contributing factors include commercial harvests of sea lions from the late 1950s to the early 1970s, subsistence harvests by Alaska Natives, other legal and illegal killing (which has not been and probably cannot be quantified), killer whale predation, and incidental catch in the trawl fisheries in the Bering Sea and the Gulf of Alaska and other fisheries. Suspected contributors to the decline include natural environmental changes and competition with commercial fisheries.

Existing data and analyses indicate that the decline of the western population has resulted from poor growth and survival of juveniles and low reproductive success. The evidence for poor juvenile growth and survival is based on field observations and population modeling. The evidence for low reproductive success is based on observations of low pregnancy and birth rates, slow growth (leading to older age at maturity), and changes observed in the age structure of the population. These data are all consistent with the hypothesis that nutritional stress has been an important part of the cause of the decline.

In the late 1990s debate regarding the causes of the nutritional stress focused on the relative importance of fisheries versus natural environmental changes as they may affect the quality and quantity of prey available to sea lions. Scientists recognized the potential for competition between fisheries and Steller sea lions in the late 1970s and early 1980s when fishery management plans were being developed. In the last three years Congress has appropriated more than $100 million to investigate the decline of Steller sea lions. Results of that largely increased research effort have yet to bear light on the debate. An alternative hypothesis has been that the sea lion decline was due to a shift in environmental conditions that led to a change in available prey to species that are of less nutritional value to sea lions. Distinguishing between these two possibilities has been difficult because both may have similar effects on sea lions and because the existing fishery management strategy allows fishing throughout the regions of concern and does not provide suitable control regions for comparing environmental versus fishery-related effects.

Recently killer whale predation also has been suggested as an explanation for the decline of sea lions, or at least their failure to recover. One "cascade" hypothesis posits that the killing of large numbers of large cetaceans in Alaskan waters from the 1950s to the 1970s reduced prey for transient (mammal-eating) killer whales. The killer whales

then shifted their foraging patterns by increasing predation on Steller sea lions and other smaller marine mammals. As sea lion numbers declined, the killer whales increased predation on sea otters, thereby causing their abundance to decline. Another hypothesis is that killer whales are impeding recovery of Steller sea lions irrespective of any cascade effects initiated by whaling. Although this is a plausible hypothesis and there is no doubt that some killer whales prey on sea lions, there is little direct evidence that the rate or amount of predation has been a significant factor in the sea lion decline in the Bering Sea/Aleutian Islands region or the Gulf of Alaska. Recent surveys indicate that there are few transient killer whales in the waters around the Aleutian Islands, particularly when compared with the number of transient killer whales in Southeast Alaska where sea lion numbers are growing. As noted in the earlier section on killer whales, research on killer whales is being expanded and will require continued support to determine the role and status of killer whales in North Pacific marine ecosystems.

Multiple factors have contributed to the sea lion decline, with the importance of different factors changing over time (e.g., commercial harvesting, incidental mortality in fishing gear). Much of the debate regarding "the cause" has pitted one factor against another, but the causes are most likely not mutually exclusive. For example, if Steller sea lions are nutritionally stressed, they may spend more time foraging at sea, thereby increasing their vulnerability to predators such as killer whales. If natural oceanographic changes have reduced the quantity and quality of prey available to sea lions, then they may be more vulnerable to competition with fisheries. Thus, focusing on a single cause belies the complex interactions leading to the decline of the western population of Steller sea lions. In 2002 two review panels were convened to consider potential causes of the sea lion decline. Their reports are summarized at the end of this section.

Steller Sea Lion Subsistence Harvests and Co-Management

For centuries Alaska Natives have hunted Steller sea lions for subsistence. Little is known about historic harvest levels. From 1992 to 2001 the National Marine Fisheries Service contracted with the Alaska Department of Fish and Game to conduct a statewide assessment of annual subsistence harvests of Steller sea lions and harbor seals. The assessment was based on household surveys in 60 coastal villages where sea lions or harbor seals were taken for subsistence purposes. In 2002 funding was provided to the Alaska Native Harbor Seal Commission to conduct this assessment. The harbor seal commission will continue to use household surveys as its basic harvest monitoring tool but is initiating some changes to increase confidence in the accuracy of the surveys.

Virtually all sea lions taken in the subsistence harvest are from the western population. The majority are taken around the Pribilof Islands in the Bering Sea. Harvesting also occurs near Akutan and Kodiak Islands and in Prince William Sound. The estimated number of Steller sea lions harvested in Alaska in recent years declined from 549 in 1992 to 178 in 1998, 164 in 2000, and 198 in 2001 (Table 6). A survey was not conducted in 1999 and the survey estimate for 2002 is not yet available.

In July 2000 and June 2001 the National Marine Fisheries Service signed co-management agreements with the tribal governments of St. Paul and St. George Islands (the only inhabited islands in the Prbilofs). The agreements cover both Steller sea lions and northern fur seals and establish two six-member co-management councils (one for each island) composed of three representatives from the Service and three from the tribal authority. The councils develop annual management plans for the subsistence harvests, identify monitoring and re-

Table 6. Estimates of Steller sea lions harvested and struck and lost in the annual subsistence harvest by Alaska Natives, 1992–2001

Year	Harvested	Struck and Lost	Total
1992	370	179	549
1993	348	139	487
1994	336	80	416
1995	307	32	339
1996	152	34	186
1997	146	18	164
1998	131	47	178
1999	—	—	—
2000	142	22	164
2001	156	42	198

Source: Alaska Department of Fish and Game.

search needs, and provide for local decisionmaking on the harvests, including which rookery or rookeries to harvest, the numbers to be taken, and the timing of the harvests. Under the agreements, tribal ecosystem officers oversee the harvests to ensure that they are humane and nonwasteful. Measures are being taken to reduce the number of animals struck and lost, fully utilize harvested animals, accurately monitor hunting effort, and obtain biological samples in support of research efforts. Finally, the agreements provide for gradual transfer of some National Marine Fisheries Service activities related to monitoring and management of fur seal and sea lion rookeries and haul-out areas; removal of marine debris from the rookery/haul-out areas and, when possible, disentangling animals caught in debris; management of tourist and other public interactions; and providing mentors and employment opportunities for local youth and adults regarding natural resource research and management.

From 2000 to 2002 representatives of the National Marine Fisheries Service met intermittently with the Alaska Sea Otter and Steller Sea Lion Commission, the Aleutians East Borough, and the Alaska Department of Fish and Game, Subsistence Division, to consider real-time harvest monitoring at sites where most harvesting occurs. Such an approach integrates annual community-based monitoring of these primary sites with information from biennial statewide surveys. The goal is increase the accuracy of estimated harvest levels, particularly for the Steller sea lion. The Alaska Sea Otter and Steller Sea Lion Commission and the Aleutians East Borough would participate by coordinating the community-based harvest monitoring in much the same manner as the tribal governments in the Pribilof Islands are monitoring harvests at those islands.

The Alaska Sea Otter and Steller Sea Lion Commission is also preparing a draft co-management agreement to present to the National Marine Fisheries Service during the first half of 2003. The draft agreement will call for an expansion of the role of the Commission and recognition of the tribal government as an equal partner with respect to subsistence harvesting as well as other management issues for Steller sea lions.

Fisheries Management and the Debate Regarding Fishery Effects

The Alaska groundfish fisheries are managed under fishery management plans required by the Magnuson-Stevens Fishery Conservation and Management Act. The plans are developed by the North Pacific Fishery Management Council and the National Marine Fisheries Service. Because they establish the conditions under which the fisheries are conducted, the plans ultimately determine the nature and extent of fishery effects that may occur on the associated marine ecosystems, including listed species and critical habitat. The Service and the Council are required to assess the potential environmental effects of the fisheries in accordance with the National Environmental Policy Act and the Endangered Species Act.

Fisheries managers have been aware of the potential for competition between Steller sea lions and the Alaska groundfish fisheries since the development of the fishery management plans in the late 1970s and early 1980s. Between 1990 (when the species was first listed under the Endangered Species Act) and 1998 the Service took a number of actions and established a number of regulations to reduce possible effects of commercial fisheries on Steller sea lions. Those measures are too detailed to list here, but they generally have aimed to provide protection from competition in areas around rookeries and haul-out sites and to spatially and temporally disperse the fisheries to avoid the potential for localized depletion of prey.

At the same time, questions were raised regarding the suitability and sufficiency of those actions to protect these ecosystems in general and Steller sea lions in particular. From 1998 to the end of 2002 debate over the adequacy of fishery measures intensified further and involved a range of actions by the Service and the Council, section 7 consultations under the Endangered Species Act, supplemental environmental impact statements under the National Environmental Policy Act, lawsuits, and external reviews by outside scientists. The chronology of these events from 1998 to the end of 2001 is described in the Commission's 2001 annual report.

On 8 January 2002 the National Marine Fisheries Service published in the *Federal Register* an

emergency interim rule implementing measures pertaining to the effects of Alaska groundfish fisheries on the western population of Steller sea lions. The measures had been developed by a committee convened by the North Pacific Fishery Management Council to address concerns about fishery effects as described in two documents—a November 2000 programmatic biological opinion on the fishery management plans and a second opinion in October 2001 that was based on telemetry information describing sea lion distribution at sea and foraging patterns. The emergency interim rule was to be in effect through 8 July 2002 but on 16 May 2002 was extended to 31 December 2002.

On 22 February 2002 Greenpeace, the American Oceans Campaign, and the Sierra Club submitted a supplemental complaint against the Service alleging inadequate management of the Alaska groundfish fisheries and their effects on Steller sea lions. On 24 April 2002 the plaintiffs filed their motion challenging the November 2000 and October 2001 biological opinions, including the reasonable and prudent alternative developed by the Council's committee, passed with some modification by the Council, and accepted and implemented by the Service. A reasonable and prudent alternative is a recommended action developed during section 7 consultations to avoid a conclusion that the action would likely jeopardize the species or adversely modify its critical habitat. The plaintiffs asserted that the measures incorporated into the reasonable and prudent alternative of the October 2001 biological opinion were less-protective than those in the November 2000 opinion and that the Service had failed to explain how the less protective measures would avoid jeopardizing the western population or adversely modifying its critical habitat. The plaintiffs also challenged the Service's contention that the large-scale reductions in prey availability occurring as a direct result of the fishery's harvest strategy would not likely jeopardize the species or adversely modify its habitat.

On 4 September 2002 the National Marine Fisheries Service published in the *Federal Register* a proposed rule to implement the measures devised by the Council on a permanent basis (i.e., 2003 and beyond).

On 21 November 2002 a report entitled "Scientific Review of the Harvest Strategy Currently Used in the BSAI [Bering Sea/Aleutian Islands] and GOA [Gulf of Alaska] Groundfish Fishery Management Plans" was presented to the Council (see below under "Related Reviews."

On 18 December 2002 the U.S. District Court for the Western District of Washington ruled on three claims in the lawsuit against the National Marine Fisheries Service. The court ruled that the Service had not acted in an arbitrary and capricious manner when it concluded in its November 2000 biological opinion that the overall harvest strategy and the global control rule do not cause jeopardy and adverse modification. However, the court did rule that certain elements of the Service's October 2001 biological opinion were arbitrary and capricious. The November 2000 and October 2001 opinions differed in a number of respects but particularly with regard to the level of protection provided around rookeries and haul-out sites. In the 2001 opinion the Service put forth a zonal approach that subdivided critical habitat to provide differing levels of protection based on telemetry studies of sea lion foraging patterns. The court ruled that the Service failed to account for known nearshore bias in these data and therefore had failed to rationally connect its zoning approach to the available data. The court also found that the Service had failed to conduct the required analysis of the effects of fishing within the proposed zones with respect to the jeopardy and adverse modification standards required by the Endangered Species Act. For those reasons, the court remanded the 2001 biological opinion back to the Service. At the end of 2002 representatives of the two parties met to decide a course of action subsequent to the court's ruling. An agreement was reached that the fisheries would go forward as planned based on measures stemming from the reasonable and prudent alternative of the October 2001 biological opinion, and that the Service would have until June 2003 to revise its biological opinion in accordance with the court's order.

Recovery Planning and Research

Recovery Planning—The National Marine Fisheries Service, Steller Sea Lion Recovery Team, Alaska Department of Fish and Game, North Pacific Universities Marine Mammal Research Consortium, Alaska SeaLife Center, and North Pacific Fishery Management Council are conducting research on the Steller sea lion and its decline. The recovery team completed a recovery plan, adopted by the Service in 1992, and then focused primarily

on research needs related to the decline. Between December 1997 and February 1999 the recovery team held two meetings and four workshops to consider past and future research directions. The workshops focused on four main areas: behavior, telemetry studies, physiology, and foraging ecology. The motivation for these workshops and other recovery team recommendations was to provide a basis for updating research and recovery objectives in the revised recovery plan. In general, those recommendations emphasized that Steller sea lion research efforts should be considered in a broader ecological or ecosystem context; the research agencies should develop a strategic plan to guide and coordinate research efforts; the plan should include a Steller sea lion model with both demographic and bioenergetic components; research should be continued and expanded on life history patterns (particularly with respect to pups and juveniles), vital rates (reproduction and survival), age structure, physiological condition, and foraging ecology; management and research efforts should address the effects of fisheries managed by the state (e.g., salmon and herring) as well as federally managed fisheries; pollock removals from critical habitat should be reduced; adaptive management strategies should be developed to assess the efficacy of existing protection measures including exclusion zones; and methods for assessing subsistence harvests of Steller sea lions should be improved.

In October 2001 the National Marine Fisheries Service reconstituted the Steller Sea Lion Recovery Team, which then met in January, March, August, and November 2002. At its January meeting the team reviewed the recovery planning process under the Endangered Species Act, the Service's recovery planning guidelines, activities of the previous recovery team, draft terms of reference for the team, and current research efforts related to Steller sea lions. Revision of the recovery plan is the team's primary task. At its March meeting the team reviewed its final terms of reference, genetics research to characterize Steller sea lion population structure, and recovery criteria using population viability analysis and indicator checklists. The team then had additional discussions regarding revision of the recovery plan. At its August meeting, the team reviewed research budget projections; ongoing research efforts by the Alaska Department of Fish and Game, National Marine Fisheries Service, and Alaska SeaLife Center; and the research permitting process. The remainder of the meeting focused on developing recovery criteria and revising the recovery plan. The November meeting focused primarily on revision of the plan, but also included additional review of population viability analyses and genetic research indicating that two distinct population segments may exist within the current western population.

Research—At the Marine Mammal Commission's 2001 annual meeting, staff from the National Marine Fisheries Service provided an overview of research related to Steller sea lions being conducted in 2001. In fiscal year 2001 Congress increased the Service's funding for Steller sea lion research from $4.85 million in 2000 to $43.15 million. The Service dispersed this funding among 25 research institutions for a total of about 150 different studies. More than half ($27.3 million) of the total 2001 budget was provided to research organizations outside the federal government. A research coordinator was appointed at the Service's Alaska Fisheries Science Center, and coordination meetings were held in January, July, and September 2001. Research themes included studies to investigate Steller sea lion life history, foraging, and vital rates; fish stock assessment; ecosystem composition and dynamics; predation by killer whales and sharks; disease and contaminants; and other anthropogenic effects. A substantial portion of the 2001 funding ($15 million) supported about 30 competitive grants. Those grants were aimed at investigating hypotheses about the effects of fishing, environmental change, disease, contaminants, predation, and other anthropogenic factors.

The total research budget in 2002 was about the same ($40.15 million), but a larger portion ($25.65 million) was directed to federal agency research. The Service used 2002 funds to support nearly 200 research projects, all of which were consistent with the general research framework developed the previous year. A number of research coordination meetings were held in 2002, with focus on modeling, evaluation of killer whale predation, fatty acid analyses of sea lion prey, and the presence and effects of contaminants.

The increase in funding resulted in a corresponding increase in applications for scientific research permits received by the National Marine Fisheries Service. Historically, although a number of research agencies and organizations have conducted research on Steller sea lions, the research

has been authorized under three permits held by the National Marine Mammal Laboratory, Alaska Department of Fish and Game, and the Alaska SeaLife Center. As a result of the new funding and a competitive grants process for dispersing a portion of those funds, the National Marine Fisheries Service received 12 permit applications over a two-year period.

Taken together, the research permits requested authorization to harass, capture, sample, or otherwise take a total number of sea lions equivalent to several times the maximum population estimate, including the capture and handling of approximately 18 percent of the estimated number of pups born each year. On 27 July 2001 and again on 2 August 2002 the Marine Mammal Commission wrote to the Service to raise concerns and make recommendations regarding the potential for adverse effects resulting from the marked increase in Steller sea lion research. The Commission's letters noted that unless carried out in a well-designed and integrated manner, the adverse effects of multiple projects may confound an already complex investigation into causes of the decline of the western population. For that reason, the Service should, among other things, review research permits carefully to ensure that research projects are essential, well designed, and carried out by suitably experienced personnel; avoid unnecessary duplication of research activities and ensure coordination of efforts, including sharing of data; identify potential adverse effects of research projects; monitor those effects (both to determine if, when, and how adverse effects occur and also because such effects may affect interpretation of research results); and assess the cumulative significance of adverse effects. In particular, the Commission encouraged completion of the recovery plan, which should serve as the overall guide for the research effort.

In compliance with the National Environmental Policy Act, the Service prepared an environmental assessment on the proposed issuance of the new permits and modifications of the existing permits. The assessment was signed in June 2002 with a finding of no significant impact. The finding was based, in part, on the requirement that all research participants cooperate in the development of a plan for research collaboration and monitoring. The plan was intended to provide a framework to ensure that (1) the research does not involve unnecessary duplication and will not result in unnecessary harassment of sea lions, (2) potential adverse effects are minimized, (3) information on the cumulative and synergistic impacts of the research is collected, and (4) future research addresses the conservation and recovery needs of the Steller sea lion. In November 2002 the Service also issued a biological opinion on the proposed research. The opinion concluded that the issuance of the proposed permits was not likely to jeopardize the continued existence of the endangered western population or threatened eastern population or result in the destruction or adverse modification of their critical habitat.

The substantial funding for Steller sea lion research in 2001 and 2002 should provide important insights into possible causes of the decline and the nature of North Pacific marine ecosystems. Summaries of much of the research conducted in 2001 and 2002 were to be presented at a symposium in early January 2003.

Marine Mammal Commission Recommendations

Since 1998 much of the debate about effects of the Alaska groundfish fisheries on Steller sea lions has focused on the question of whether the two compete for the same prey resources. The potential for competition has been assessed on the basis of two questions: (1) do the fisheries and sea lions use the same resources (same prey or target species, in the same geographic regions, during the same seasons, of the same size, from the same depth), and (2) is removal of those resources by the fisheries contributing to the decline of the western Steller sea lion population or impeding its recovery. The first question has been confirmed for pollock, Atka mackerel, and Pacific cod fisheries.

The second question has been addressed by considering the potential for fisheries to cause local depletion of prey relative to the needs of Steller sea lions. That is, the term "local depletion" has been used to describe a reduction in available prey occurring as a result of fishing concentrated in time (within a given season or year) or space (particularly in Steller sea lion critical habitat) and of sufficient magnitude to diminish foraging success of sea lions and, consequently, their ability to reproduce and survive. The potential for such depletion cannot be evaluated directly for several reasons: (1) information on prey stocks is not sufficiently accurate and precise to reliably assess their

local distribution and abundance; (2) stock assessments have been conducted during the summer, and stock distributions change between the time of assessment and the fall, winter, and spring seasons, when most fishing occurs; and (3) the absolute abundance and density of prey needed to support a recovery of the Steller sea lion population is unknown. Because the absolute abundance or density of prey, and fisheries-induced changes in such, cannot be described reliably by season and location, relative measures of change have been used to indicate the potential for local depletion. Specifically, local depletion has been considered more likely when a local harvest rate significantly exceeds the overall harvest rate or when various measures of the fisheries (e.g., catch per unit effort) indicate a detectable and significant reduction of the target stock during a particular fishing season in a particular area.

The manner in which the concept of local depletion has been analyzed to date leads to two important concerns. First, because the potential for local depletion has been evaluated only in the context of annual fishery effects, the assumption is made that long-term fishery effects (i.e., those that occur over more than one year) do not contribute to local depletion. This is important because, under a fishing strategy based on maximum sustainable yield (MSY), the long-term goal of fisheries is to reduce spawning biomass of target stocks to approximately 40 percent of the level expected in the absence of fishing. In fact, the harvest strategy that the Service and the Council use in these fisheries is based on the assumption that reducing the prey stock by 80 percent (i.e., to 20 percent of its expected level in the absence of a fishery) does not jeopardize the western population of Steller sea lions or adversely modify its critical habitat. Furthermore, this assumption is applied to a whole suite of groundfish stocks that are prey of sea lions.

The assumption that such changes do not have significant ecological effects was formalized in the global harvest control rule used by the Council and the Service to determine the appropriate fishing mortality rate for the target stock and incorporated into the reasonable and prudent alternative of the November 2000 programmatic biological opinion. The rule, in modified form, was also included in the substitute alternative developed by the Council's reasonable and prudent alternative committee. The assumption that it is ecologically safe seems questionable. A November 2002 report to the North Pacific Fishery Management Council suggested that such a reduction could propagate through the food web and cause large changes in other populations. The Marine Mammal Commission does not believe that the assumption has been adequately analyzed in either section 7 consultations or in environmental impact statements on the fisheries. In its letters of 31 July 2001 and 19 October 2001 to the Service, the Commission commented on these analytical shortcomings and recommended that the Service conduct the required analyses of the ecological effects of the MSY-based fishing strategy used to manage these fisheries.

The second concern regarding the assessment of localized depletion is that the appropriate baseline for assessing fishery effects is, in essence, the environment under fished, or status quo, conditions. The draft supplemental environmental impact statement on the fisheries evaluated the effects of various alternatives relative to the environment as it currently exists under fished conditions. In its 31 July 2001 letter to the Service, the Marine Mammal Commission noted that comparisons of alternatives based on the status quo may indicate potential effects relative to current conditions, but may not indicate the full effects of the alternatives because the comparisons fail to account for the long-term effects of fishing under the MSY-based fishing strategy. For that reason, the Commission recommended that the Service revise its supplemental environmental impact statement to include a no-fishing alternative to ensure that a proper baseline is used for assessing and disclosing the full effects of different fishery management alternatives.

The concept of local depletion of prey has also been a central concern in developing reasonable and prudent alternatives. The measures composing these alternatives have been designed to (1) avoid competition for prey in areas around sea lion rookeries and haul-out sites, particularly during the winter when sea lions appear to be most vulnerable to reductions in prey availability; (2) disperse fishing spatially (in accordance with the distribution of the stock) over the remaining area of the fishery; (3) disperse fishing temporally during the remainder of the year; and (4) linearly reduce fishing mortality when the target stock spawning biomass is between 40 and 20 percent of the expected

level in the absence of fishing and prohibit fishing when it drops below 20 percent of that reference level.

In its 19 October 2001 letter to the Service, the Marine Mammal Commission pointed out that the first three principles noted above are based largely on temporal and spatial measures that may mitigate within-year effects of the fisheries but do not address long-term effects of catch levels set under an MSY-based fishing strategy. The global harvest control rule determines harvest rate on the basis of current stock biomass relative to expected biomass in the absence of fishing. It assumes that spawning biomass of the target stock can be reduced by 60 to 80 percent without significant ecological consequences. However, the analytical rationale necessary for this assumption and for ensuring that the fisheries are not likely to cause jeopardy to Steller sea lions has not been provided.

In addition to the above recommendations regarding analysis of the MSY-based fishing strategy and incorporating a no-fishing alternative into the programmatic supplemental environmental impact statement for analytic purposes, the Marine Mammal Commission's 19 October 2001 letter made three other recommendations to the Service. The first pertained to the Service's ability to correlate specific management measures to actual changes in the rate of sea lion population growth (or decline). In its October 2001 biological opinion on the conservation measures developed by the Council's reasonable and prudent alternative committee, the Service based its no-jeopardy determination on an analysis of expected growth rates under the alternative in the November 2000 biological opinion. The analysis assumed an understanding of the efficacy of management measures that does not accurately reflect the uncertainty associated with the Service's ability to explain the past decline of the western population or predict the near-term population trend. Because the analysis may therefore mislead decisionmakers and the public regarding the confidence they can have in the proposed reasonable and prudent alternatives, the Commission recommended that the Service revise its supplemental environmental impact statement either to include a basis for the implied level of understanding or to more accurately reflect the uncertainty associated with the expected effects of the measures being considered.

In its 19 October 2001 letter to the Service the Commission also pointed out the general need for explicit descriptions of important uncertainties regarding fishery effects, the studies needed to address those uncertainties, and the power of existing studies to detect and explain significant effects when they occur. Finally, the Commission noted important uncertainties regarding the telemetry data and the assumptions made by the Service in support of its new strategy for protecting sea lions and their prey around rookeries and haul-out areas. The Commission recommended that the Service review its interpretation of the satellite telemetry data and corresponding protective measures in light of (1) the uncertainties associated with the existing data and (2) its obligation to assure that the western population of Steller sea lions is not jeopardized and its critical habitat not adversely modified by the effects of the groundfish fisheries.

Related Reviews

During the last two years the North Pacific Fishery Management Council commissioned three reviews related to possible causes of the Steller sea lion decline and potential effects of the Alaska groundfish fisheries.

National Academy of Science—In December 2002 a panel convened by the National Academy of Science, National Research Council, released the executive summary of its report entitled "The Decline of the Steller Sea Lion in Alaskan Waters: Untangling Food Webs and Fishing Nets." The panel was convened at the request of Congress through the North Pacific Fishery Management Council. The summary divided potential causes into those that may affect sea lions (1) from the top down (i.e., from higher in the food web such as predation by killer whales or sharks, incidental catch in fishing gear, illegal shooting or subsistence harvests in excess of reported levels, pollution, or disease) and (2) from the bottom up (e.g., reduced availability or quality of prey due to fisheries or climate regime shifts, nonlethal factors affecting sea lion foraging efficiency, or pollutants extracted through the food web).

The summary concluded that "[i]n the existing body of information about Steller sea lions, there is no conclusive evidence supporting either the bottom-up or top-down hypotheses." The panel

also concluded that bottom-up hypotheses invoking nutritional stress are unlikely to represent the primary threat to recovery and that top-down sources of mortality (e.g., predation on sea lions) appear to pose the greatest threat to the current population. The panel also concluded that "there is insufficient evidence to fully exclude fisheries as a contributing factor to the continuing decline." It noted that resolution of this conflict requires a management approach that not only improves the chances for recovery of the western population of Steller sea lions but also facilitates scientific study of associated management measures. The summary listed a number of possible approaches for investigating the effects of fishing on Steller sea lions, including their preferred approach — contrasting rookeries around which fishing would be prohibited with rookeries around which fishing would be allowed.

The summary noted that multiple factors probably contributed to the early phases of the decline, but the data are insufficient to identify or describe them fully. It also stated that finer-scale spatial analysis would be required to understand region-specific causes of the decline. Finally, the summary listed a number of key areas in need of research and monitoring including population trends, vital rates, critical habitat, environmental conditions, and the feeding habits and population size of sea lion predators.

November 2000 Programmatic Biological Opinion—The North Pacific Fishery Management Council convened a panel of four independent scientists to review the November 2000 programmatic biological opinion prepared by the National Marine Fisheries Service on the effect of the Alaska groundfish fisheries management plan on Steller sea lions. In its report, completed in September 2001, the panel concluded that the fisheries may have negative effects on Steller sea lions, but that few data are available to assess the key hypotheses and most of the data indicating effects is circumstantial. It also noted that much of the data indicating potential effects is outdated and that the factors driving the current decline could be entirely different from those that were most important in the earlier stages of the decline. The report noted the lack of crucial information on vital rates and sea lion distribution and expressed skepticism about the utility of scat studies as a tool for monitoring seasonal trends in sea lion diets.

With regard to the design of field experiments to investigate Steller sea lion/fishery interactions, the panel was pessimistic about the utility of a research design in the November 2000 opinion. The design was based on subdivisions of critical habitat into fishing zones and no-fishing zones. The panel also considered a range of response variables that could be used to investigate these interactions and concluded that it would be very difficult to distinguish fishery effects from ecosystem effects and the effects of other fish predators. The panel questioned whether large-scale manipulative experiments were timely, given the limited fine- and meso-scale data on sea lion foraging and the effects of fishing on prey behavior but also noted that the desire to learn whether fishing is having an effect on sea lions may outweigh the desire to conduct preliminary studies leading to the large-scale experiment.

With regard to reports on other stressed pinnipeds, the panel was unaware of direct evidence that prey depletion by fisheries had affected the demography of seal populations although it noted that there is clear evidence that environmentally induced changes in prey availability have had such effects. The review indicated that demographic or population changes from prey reductions either are clearly apparent without scientific study or are relatively subtle and require time series of monitoring data. It also noted that changes had occurred in first-year survival of affected pinnipeds in all the examples identified.

With regard to the draft biological opinion on the conservation measures developed by the Council's reasonable and prudent alternative committee, the panel expressed little confidence in the new analyses of telemetry data as a sound basis for drawing conclusions about the effectiveness of the reasonable and prudent alternative on the population dynamics of Steller sea lions. It attempted to simulate the effects of the proposed measures but concluded that there were considerable doubts about the reliability of such simulations. The panel noted that under all the alternatives simulated, local populations at the western and eastern extremes of the range were predicted to continue their decline over the next 20 years. The panel reviewed the biomass ratio estimate used by the Service to

address the question of whether the fishery caused adverse modification of critical habitat. It concluded that this analysis did not address the central issue of local depletion and is inconsistent with the Service's position that such depletion is a likely cause of the recent decline of sea lions. They concluded that the biomass ratio analysis has little merit with respect to the assessment of adverse modification.

With respect to research recommendations, the panel gave priority to assessing population trends and vital rates, and better understanding of mechanisms underlying the current decline in the western population of Steller sea lions. Research recommendations (not in order of priority) were listed as monitoring trends in population size and distribution, estimating vital rates, investigating the temporal and spatial scales of foraging, investigating sea lion diet, modeling efforts to integrate foraging and reproductive energetics, retrospective data analysis, and investigating the hypothesis of local depletion of prey.

***$F_{40\%}$* Fishery Harvest Strategy**—In November 2002 the Council received a report from a different committee of seven scientists it had convened to provide an independent scientific review of the current harvest strategy implemented in fishery management plans for the Bering Sea/Aleutian Islands region and the Gulf of Alaska. The purpose of this review was to examine, among other things, the ecosystem effects of maintaining fished populations at or near 40 percent of their expected levels in the absence of fishing, also known as the $F_{40\%}$ fishery harvest strategy. The North Pacific Fishery Management Council uses this strategy to determine catch levels for Alaska groundfish. The panel concluded that in a single-species context, the use of the $F_{40\%}$-based approach appears to have worked well for most of the fished stocks in the Bering Sea/Aleutian Islands region and the Gulf of Alaska. Rockfish and pollock in the Gulf of Alaska were noted as exceptions. The review cautioned that species that have low productivity or episodic recruitment may be particularly vulnerable to this system for determining catch levels. With respect to ecosystem effects, the panel concluded that the current harvest strategy "makes only a slight adjustment for *possible* ecosystem needs" and that the procedure for doing so is ad hoc.

The panel noted that fishing to achieve maximum sustainable yield in a single-species context "will inevitably reduce the equilibrium biomass very substantially from the unfished condition, and will inevitably shift considerably the age and size structure of the target stock. These changes to the target stock *could* propagate through the food web, and effect large changes in the populations of other species." (Emphasis in original.)

> The panel further noted that
>
> (a) harvest management strategy, such as $F_{40\%}$, that by design reduces the biomass of the target stock ... by a large fraction, will, all other things being equal, reduce the total consumption by higher trophic levels by a similar large fraction, and we would expect the predator populations to be reduced accordingly.... And, in fact, all other things often are not equal, especially in ecosystems, and there are a variety of mechanisms whereby the reduction in target stock biomass by a harvest strategy such as $F_{40\%}$ could cause a more than proportional reduction in the populations of predators dependent on those same stocks for prey.

The panel noted that the level of protection required for species that prey on target fish stocks is a policy decision. In this regard, the Magnuson-Stevens Fishery Conservation and Management Act is not sufficiently explicit with respect to conflicts between utilization of fishery resources and protection goals. Finally, the panel noted the importance of marine reserves in management aiming to take into account ecological and ecosystem considerations and emphasized the importance of systematic and well-designed monitoring to an ecosystem-based management approach.

Pacific Walrus (*Odobenus rosmarus divergens*)

Walruses are subdivided into two subspecies: the Atlantic walrus (*O. r. rosmarus*) and the Pacific walrus (*O. r. divergens*). The Pacific walrus is distributed along the continental shelf of the Bering and Chukchi Seas (Fig. 27). In winter, they mostly occur in polynyas and open leads in two major concentrations—one south of St. Lawrence Island and the other in Bristol Bay. In the summer, most follow the retreating pack ice, migrating north into the Chukchi Sea. However, many adult males remain in the Bering Sea to rest and molt at terrestrial haul-out sites.

Because of their large size (they can weigh more than 3,500 lbs.) and prominent tusks, they are one of the most recognizable pinnipeds (Fig. 28). Walruses do not use their tusks to dig for food as is commonly believed. Rather, they use them for fighting and displays of dominance with other walruses, for defense against predators, as picks to pull themselves out of the water onto ice floes, and to kill and tear apart seals.

Pacific walruses can live for up to 40 years. Unlike most pinnipeds, which produce pups every year, walruses produce calves every two to three years. They breed in late winter and usually give birth in mid-May of the following year. Walruses feed mostly on clams and other benthic invertebrates in shallow waters, usually less than 80 m; however, some have been known to feed on marine mammals such as seals. The species' only nonhuman predators are polar bears and killer whales, but adult walruses are formidable fighters and do not make easy prey.

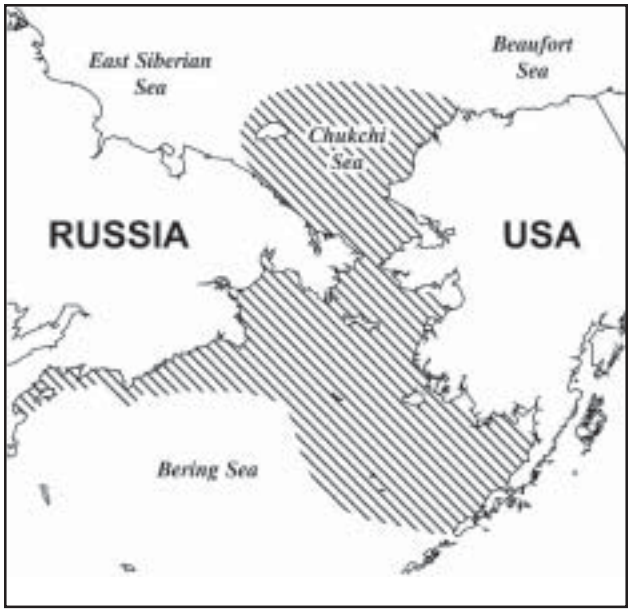

Figure 27. Range of the Pacific walrus.

The preexploitation population size of the Pacific walrus is estimated at about 200,000 to 250,000 animals. For several thousand years, Native communities have hunted walruses for food, their hides, and their ivory with little or no apparent effect on the population's abundance. Commercial hunting of the Pacific walrus began in earnest in the mid-1800s, causing wide fluctuations in abundance over the next century. Hunting effort was intense in the 1860s and again in the 1930s, with a peak in 1937–1938, when more than 8,000 Pacific walruses were taken in Russia alone. By the 1950s the population was reduced to approximately 50,000 to 100,000 animals. In the 1960s the Soviet Union and the State of Alaska independently established conservation measures to protect the Pacific walrus, and the population subsequently rebounded. From 1975 to 1990 U.S. and Russian scientists conducted joint rangewide aerial surveys every five years to estimate abundance of the Pacific walrus population. The last such survey in 1990 resulted in an estimate of 201,039 animals.

No surveys of Pacific walrus have been conducted since 1990, partly because they are expensive and difficult to coordinate. In addition, past surveys produced population estimates with such wide-ranging confidence intervals that they were of little value for detecting population trends. Given the age and limitations of past surveys, there is no reliable information on current trends in abundance. However, reports from Native hunters and scientists of thin animals and low calf production and survival have led to concerns about the population's status.

The Fish and Wildlife Service is the lead federal agency responsible for conservation of walruses. The Service carries out its walrus conservation program in close cooperation with the Alaska Eskimo Walrus Commission, an organization of Native walrus hunters established in 1978 to help conserve the walrus population, the Alaska Department of Fish and Game, and the U.S. Geo-

Figure 28. Walruses are easily distinguished from other pinnipeds by their prominent tusks. Their genus name, *Odobenus*, is from the Greek word for tooth. (Photograph by Lloyd Lowry and Kathy Frost.)

logical Survey. They are also aided by university researchers and environmental groups.

In 1994 the Fish and Wildlife Service adopted a Pacific walrus conservation plan to help guide research and management of walruses. As discussed in previous annual reports, the plan was developed following recommendations by the Marine Mammal Commission, the Alaska Eskimo Walrus Commission, and Native communities.

At its 2001 annual meeting in Anchorage, Alaska, the Marine Mammal Commission conducted a comprehensive review of the walrus research and management program. Following that review, the Commission wrote to the Fish and Wildlife Service on 28 December 2001 making recommendations regarding population assessment, harvest monitoring, international cooperation, and co-management activities. The Service replied on 20 March 2002. The details of the recommendations and the Service's responses are described below.

Subsistence Harvest

Walruses are an essential economic and cultural resource for Native communities in Alaska and Russia. They provide food, as well as ivory and hides for Native handicrafts. The annual walrus hunts and handicrafts they support are important for maintaining cultural traditions and as a source of income for Native communities.

The Marine Mammal Protection Act allows the harvest of marine mammals by Alaska Natives for subsistence purposes or for making authentic Native articles of handicrafts and clothing, provided the take is not wasteful. If a marine mammal population is below its optimum sustainable population level, Native takes are subject to regulation by the Fish and Wildlife Service. Because the most recent abundance survey was conducted in 1990, there is no reliable current estimate of population size. As noted, there are some signs that the population may have declined in recent

decades, but in the absence of recent survey data, it is not known if the Pacific walrus population is at or below its optimum sustainable population level or precisely what level of harvest would be safe.

The Service and the walrus commission work together with Native communities to manage the subsistence harvest, collect biological samples from harvested animals, and monitor the walrus population. The subsistence harvest in Alaska is monitored two ways: through ivory tagging and a data collection and biological sampling program. The Fish and Wildlife Service initiated the walrus ivory marking, tagging, and reporting program in 1988 to help monitor the harvest and prevent illegal trade in ivory. It requires that all walrus tusks be tagged within 30 days after a walrus is taken. Because calves, which lack tusks, are also taken, and because compliance with tagging requirements is less than 100 percent in some villages, tagging data do not reflect all walruses that are landed. In the 1960s and 1970s the Alaska Department of Fish and Game carried out a harvest monitoring program that the Service took over in 1980. The program employs people in the four principal walrus hunting villages to record catch data and collect biological samples as hunters return from their hunts. The Service derives its harvest estimates by comparing and extrapolating data from the two programs.

Some walruses sink and are not recovered after they are shot. No current records are kept on the number of walruses struck and lost; however, an analysis of data collected between 1952 and 1972 suggested that 42 percent of walruses shot during the hunt in Alaska were not recovered. Using this ratio as a correction factor results in annual estimates of the number of walruses struck and lost, and therefore the total number of walruses killed in Alaska Native hunts (Table 7). Based on the harvest monitoring program and tusk tagging, the estimated catch level in Alaska for

Table 7. Estimated subsistence harvest and total kills of Pacific walruses in Alaska and Russia, 1992–2001

	Alaska		Russia			
Year	Harvest[1]	Struck/Lost[2]	Harvest[3]	Struck/Lost[2]	Total Harvest	Total Removal
1992	1,857	1,345	1,670	1,209	3,527	6,081
1993	1,493	1,081	856	620	2,349	4,050
1994	1,715	1,242	1,013	734	2,728	4,704
1995	1,729	1,252	1,071	776	2,800	4,828
1996	2,530	1,832	941	681	3,471	5,984
1997	1,798	1,259	731	529	2,469	4,257
1998	1,854	1,343	950[4]	688	2,804	4,835
1999	2,837	2,054	1,670[5]	1,209	4,507	7,770
2000	2,420	1,752	1,212[6]	878	3,632	6,262
2001	1,806	1,308	1,332[7]	965	3,138	5,411

[1] Estimates provided by the Fish and Wildlife Service following method described in J. Garlich-Miller and D. M. Burn, 1999, Estimating the harvest of Pacific walrus *Obobenus rosmarus divergens* in Alaska. Fish Bull. 97 (4): 1043–1046.

[2] Based on a struck/lost ratio of 42 percent cited in F. H. Fay and C. E. Bowlby, 1994, The harvest of Pacific walrus, 1931–1989. Technical Report MMM 94-2. Fish and Wildlife Service, Anchorage, AK. 44 pp.

[3] Smirnov, G. P. 1999. Monitoring the Pacific walrus harvest in Russia: History and present time. Pages 29–34 in: Proceedings of a workshop concerning walrus harvest monitoring in Alaska and Chukotka. J. Garlich-Miller and C. Pungowiyi (eds.), Technical Report MMM 99-1. Fish and Wildlife Service, Anchorage, AK. 59 pp.

[4] Data from Smirnov, G. Chukotka TINRO. Otke, 56, Anadyr, P.O. Box 29, Chukotka, Russia.

[5] Rinteimit, V., M. Agnakisyak, and G. Smirnov. 2000. Walrus harvest monitoring in Chukotka in 1999. Technical report available from U.S. Fish and Wildlife Service, 1001 East Tudor Road, Anchorage, AK 99503.

[6] Smirnov, G., V. Rinteimit, and M. Agnakisyak. 2001. Walrus harvest monitoring in Chukotka in 2000. Technical report available from U.S. Fish and Wildife Service, 1001 East Tudor Road, Anchorage, AK 99503.

[7] Smirnov, G., V. Rinteimit, and M. Agnakisyak. 2002. Walrus harvest monitoring in Chukotka in 2001. Technical report available from U.S. Fish and Wildife Service, 1001 East Tudor Road, Anchorage, AK 99503.

2001 (the latest year for which complete data are available) was 1,806 walruses, much lower than in 1999 or 2000. Preliminary data from the marking, tagging, and reporting program in 2002 include 1,475 walruses as of the end of the year. This suggests that the 2002 catch level will be similar to the number taken in 2001 when 1,404 tusks were tagged.

Walrus Harvest in Russia

The Fishery Department in the Russian Federation's Agricultural Ministry is the agency responsible for managing walruses in Russia. Since 1992 only Native people have been allowed to harvest walruses in Russia. Current harvest limits set by the Fishery Department are 3,000 walruses annually. Due to severe economic constraints, Russia suspended its walrus harvest monitoring and research programs in 1998. Recognizing the need for estimates of the Russian subsistence harvest, in 1999 the Alaska Eskimo Walrus Commission and the Fish and Wildlife Service secured funding from various sources, including the North Slope Borough and the National Park Service, to train and support Native villagers from the Chukotka region in Russia in the collection of walrus harvest data. That support continued through 2002. Harvest monitors reported a Russian catch of 1,332 walruses in 2001.

In its 28 December 2001 letter to the Fish and Wildlife Service, the Marine Mammal Commission commended the Service and the Alaska Eskimo Walrus Commission for their cooperative and effective efforts to estimate harvest levels in Alaska. The letter also recommended that the Service advise the Native hunters of the uncertain status of the Pacific walrus population and the potential risk of overexploitation, and that it would be unwise to increase the number of walruses taken for subsistence purposes, given the current uncertainties. In its 20 March 2002 response, the Service agreed with the Commission's concerns and outlined ways that it planned to work with the Alaska Eskimo Walrus Commission to communicate with Native hunters and communities. Identified methods included annual visits to walrus-harvesting villages, presentations at meetings of the Alaska Eskimo Walrus Commission, and preparation and distribution of a bulletin to walrus hunters.

Research

Section 117 of the Marine Mammal Protection Act requires that the Secretaries of Commerce and the Interior prepare and periodically update stock assessment reports for each marine mammal population in U.S. waters. Those reports are used to help manage interactions between marine mammals and commercial fisheries and must take into account all sources of human-related mortality. The reports must include estimates of each population's size and a potential biological removal (PBR) level. The latter is calculated using a formula designed to estimate how many animals can be removed annually from the marine mammal stock (not including natural mortality) while maintaining a high degree of assurance that the stock will remain at or increase toward its optimum sustainable population level. Variables include the best estimate of minimum population size. In 2002 the Service completed a new stock assessment report for the Pacific walrus population. Because of the lack of recent survey data, the assessment did not include a population estimate or an estimate of PBR. As a result, it is not possible to determine if subsistence harvests are sustainable.

A rangewide walrus population survey has not been done since 1990, partly because surveys produced abundance estimates with very wide confidence intervals. Factors limiting the precision of rangewide aerial surveys are the vast and remote areas to be covered; frequent fog and bad weather; the patchy, unpredictable distribution of walruses; uncertainty as to the proportion of walruses in the water and not visible to observers at the time of a survey; and difficulty in counting animals that are visible only briefly from passing survey planes and that tend to haul out in large, tightly packed groups.

In 2000 the Fish and Wildlife Service and U.S. Geological Survey held a workshop to evaluate methods for determining the abundance and status of Pacific walruses. Participants recommended a series of studies to develop or improve survey methods: (1) develop and test techniques to use satellite telemetry to develop a correction factor for the proportion of walruses at sea during the time of the survey; (2) investigate new remote sensing technologies (i.e., using satellite imaging and thermal sensors) to count animals on land and to assess haul-out distribution patterns on sea ice; (3) assess mark-recapture methods as an alterna-

tive to rangewide aerial surveys; (4) reexamine past survey designs for insights into optimal time and amount of survey effort required; and (5) test video systems to verify and document observer counts during aerial surveys.

After reviewing research in each of these areas at its October 2001 annual meeting, the Marine Mammal Commission wrote to the Fish and Wildlife Service in December 2001, recommending that it design, schedule, and complete a new rangewide walrus population survey by 2005 or sooner if prospects for effective new techniques prove promising. The Commission also recommended that, as soon as a new survey is scheduled, the Service produce a draft survey design and sampling protocol and convene a meeting with representatives of the U.S. Geological Survey, the Alaska Eskimo Walrus Commission, Russian scientists, the Alaska Department of Fish and Game, the Marine Mammal Commission, and other interested parties to review the survey design. In its 20 March 2002 response to the Commission, the Service agreed that 2005 was a reasonable target for conducting a new walrus survey and that it would develop a timeline and survey design for review by all parties. Based on promising results from remote sensing studies (see below), the Service is optimistic about developing a survey design by the end of 2003.

Satellite Telemetry—One of the highest-priority recommendations by participants at the 2000 workshop was for satellite telemetry studies to develop more accurate correction factors for survey counts. One of the problems with previous population estimates has been a lack of information on the amount of time that walruses spend in the water and thus are unseen by survey teams. Satellite tagging was identified as a way to determine the proportion of time walruses spend in the water versus time spent hauled out on ice. Because Pacific walruses live in the pack ice far from shore for much of the year, they are often difficult to access. In addition, they are large animals that are difficult to sedate and dangerous to handle. Thus, safe, reliable techniques for applying satellite tags to walruses are not yet available. The U.S. Geological Survey embarked on a project in 2002, partially funded by the Marine Mammal Commission (see Chapter VIII), to develop remote tagging capability so that a large number of animals can be tagged without having to be captured.

Remote Sensing—Participants at the 2000 workshop also recommended investigating the use of remote sensing to help in the population assessment. The original goal was to use remote sensing to identify walrus distribution at the time of the survey to help stratify aerial survey effort. However, results of studies in 2001 at Bristol Bay showed that counts derived from IKONOS satellite imagery corresponded closely to actual counts made that same day, indicating that this technique may be useful in deriving abundance estimates. In addition, thermal imaging has shown promise in accurately estimating walrus abundance in real time. Therefore, in 2002 the Fish and Wildlife Service continued efforts to explore the possibility of using remote sensing and thermal imagery to aid in estimation of abundance.

Biomonitoring—In its December 2001 letter to the Service, the Marine Mammal Commission recommended that the Service and the Alaska Eskimo Walrus Commission organize and implement an expanded long-term program to annually collect and archive a representative sample of walrus tissues from animals harvested at the various hunting villages in Alaska and, as possible, Russia. The Commission believed that the subsistence harvest offered an underutilized opportunity to collect biological samples for several areas of research, including age-specific reproduction, prey selection, contaminant levels, and other life history parameters. A sample series extending across a time span of decades could offer valuable insights into the population's status and causes of population trends that would not be possible otherwise. In its 20 March 2002 response, the Service advised that it anticipated receiving funding under a co-management initiative under the Marine Mammal Protection Act to identify sample collection priorities. As a related matter, the Service noted that results from samples obtained from past subsistence harvests had shown that contaminant concentrations were considerably lower than values reported for Atlantic walrus and populations of other arctic pinnipeds. In 2002 the Service received $1.27 million to support work under cooperative agreements. Approximately one-third of that amount went to the Alaska Eskimo Walrus Commission, which

planned to use part of those funds to convene a workshop in 2003 to formulate a detailed research plan, including a harvest biomonitoring program.

Co-Management Activities

Section 119 of the Marine Mammal Protection Act allows for the Fish and Wildlife Service to enter into cooperative agreements with Alaska Native organizations to conserve marine mammals and manage subsistence harvests. In 1997 the Fish and Wildlife Service entered into such an agreement with the Alaska Eskimo Walrus Commission to formalize and strengthen joint walrus conservation efforts. In 2002 the Service disbursed approximately $400,000 to the walrus commission to support its annual meeting, harvest monitoring programs, and a youth internship program.

International Cooperation

Recognizing mutual interests in conserving marine mammal populations that range across the U.S.–Russian border, the Fish and Wildlife Service initiated steps after the breakup of the former Soviet Union to formalize cooperative arrangements for research and management activities on Pacific walruses, as well as polar bears. A protocol expressing mutual interests in negotiating a bilateral agreement on polar bears was signed in 1992 and a similar agreement was signed on Pacific walruses in 1994.

U.S. and Russian officials agreed to complete negotiations on the polar bear agreement before proceeding to negotiate the walrus agreement. The polar bear agreement was signed in October 2000 and sent to the Senate on 15 July 2002 where it awaits ratification. No steps were taken in 2002 to advance a similar agreement with respect to the Pacific walrus. As noted, however, the Service and members of the Alaska Native community continue to cooperate on efforts to monitor walrus harvests in both the United States and Russia and to carry out various walrus research initiatives.

Harbor Seals in Alaska (*Phoca vitulina richardii*)

Harbor seals (Fig. 29) are nonmigratory marine mammals found in subarctic and temperate waters of the North Atlantic and North Pacific Oceans and contiguous seas. In the North Pacific, their distribution extends from San Ignacio Lagoon, Mexico, around the North Pacific Rim to Hokkaido, Japan, and into the Bering Sea to the Pribilof Islands and northern Bristol Bay. They generally are found near shore in estuaries or protected waters but may range far out to sea in deep pelagic waters or up freshwater rivers and into lakes.

The National Marine Fisheries Service is the lead federal agency responsible for the management and conservation of harbor seals in U.S. waters. The Protected Resources Division of the Alaska Regional Office has the lead management responsibility in Alaska. Harbor seals are taken by Alaska Natives for subsistence purposes and are co-managed by the Service and the Alaska Native Harbor Seal Commission. Research support is provided by the Service's National Marine Mammal Laboratory of the Alaska Fisheries Science Center and the Southwest Fisheries Science Center. Research is also conducted by the Alaska Department of Fish and Game, the Alaska Native Harbor Seal Commission, the Alaska SeaLife Center, scientists from various universities, and the National Park Service in Glacier Bay National Park and Preserve.

Figure 29. New genetic information on harbor seals may result in a redefinition of stock structure. (Photo courtesy of Lloyd Lowry and Kathy Frost.)

Stock Identification

Until recently, the National Marine Fisheries Service recognized three management units of harbor seals in Alaska. However, it recently determined that these units are no longer consistent with the best available scientific information on stock structure. New genetic information shows that harbor seals in Alaska have limited dispersal patterns and may be divided into 12 or more stocks. For that reason, the Alaska Regional Scientific Review Group wrote to the Service on 13 December 2000 recommending that the Service redefine harbor seal stocks and stock boundaries in Alaska. Redefinition is required to (1) establish appropriate management units, (2) interpret counts and trends and determine stock status, (3) identify stock-specific research needs, and (4) ensure that appropriate management measures are in place for each stock. At the Commission's 14–16 November 2001 annual meeting in Anchorage, the Service presented the new genetic information and indicated that they would be proceeding with redefinition of stock structure based on that and other information. The Marine Mammal Commission concurred with that decision in a 31 December 2001 letter to the Service.

On 26 August 2002 the Service published in the *Federal Register* a notice indicating that the Service and the Alaska Native Harbor Seal Commission had outlined a process for redefining harbor seal stock structure. The process includes (1) public notification of the genetics results that indicated multiple stocks, (2) solicitation of additional information pertinent to the stock structure question, and (3) discussion and recommendations regarding the use of the existing information to designate stock structure. The genetics data have been peer-reviewed at a number of scientific meetings and published in a scientific journal. The *Federal Register* notice solicited additional information pertinent to this issue.

On 25 September 2002 the Marine Mammal Commission responded to the Service's notice and concurred with the overall importance of the genetics data in stock identification. The Commission questioned a reference by the Service to the use of nonscientific information for the purposes of determining harbor seal stock structure and requested that all information be made publicly available to allow meaningful review. The letter emphasized the need first to describe stocks on the basis of the best available information and then adapt management programs to that information, rather then define stocks to suit existing management. Finally, the letter indicated that a number of harbor seal stocks in Alaska may be below their optimum sustainable population range. Suitable management responses to these declines have been delayed due, in part, to the need for resolving the stock structure issue. For that reason, the Marine Mammal Commission recommended that the Service, with the Alaska Native Harbor Seal Commission, move forward expeditiously to (1) redefine stock structure in accordance with the new scientific information, (2) review the status of the newly defined stocks, and (3) develop and implement suitable recovery and conservation measures. At the end of 2002 the Service and the Alaska Native Harbor Seal Commission had not yet held final discussions on the use of the new information to redefine stock structure.

Abundance and Trends

In Alaska, the Service monitors harbor seal abundance by dividing the state into five regions and counting seals in a different region each year. Thus, the harbor seal population of the entire state is assessed every five years. In addition, the Alaska Department of Fish and Game assesses population trends in five areas by conducting annual or biennial counts near Ketchikan and Sitka, in Prince William Sound, around the Kodiak Archipelago, and in Bristol Bay. Additional research is conducted by the Service and the Department to (1) characterize haul-out patterns so that the number of seals counted can be adjusted or expanded to a total abundance estimate and (2) correct the counts by removing variability due to factors such as tide, time of day, weather, wind speed, direction, cloud cover, and visibility.

Southeast Alaska—The Service's most recent estimate of harbor seals in Southeast Alaska was 37,450 based on adjusted counts during the autumn molt in 1993. Trend surveys have shown that harbor seal numbers near Ketchikan increased about 7.4 percent annually from 1983 to 1998, with a slowing of population growth to about 5.6 percent annually from 1994 to 1998. Before passage of the Marine Mammal Protection Act, tens of thousands of harbor seals were killed in Alaska for commercial purposes and because they were considered to be competitors for commercially valu-

able fish species. The recent increase in harbor seal abundance near Ketchikan may represent recovery from the preceding period of population reduction. Near Sitka, adjusted counts increased at about 0.7 percent annually from 1984 to 2001, but suggest a decrease from 1995 to 2001 at about -0.4 percent annually. In Glacier Bay, recent analyses of data from 1992 to 2002 indicate an unexplained harbor seal decline of 14.5 percent annually. Although harbor seals in Southeast Alaska are generally thought to be increasing, this conclusion is based largely on trends in the Ketchikan region and is not consistent with the trends near Sitka or in Glacier Bay.

Gulf of Alaska and Aleutian Islands—The Service's most recent estimate of harbor seal numbers in the Gulf of Alaska (including the Aleutian Islands) is 35,981 based on surveys conducted in 1996. This number appears to have declined significantly over the past several decades. Counts in Prince William Sound decreased by about 63 percent from 1984 to 1997. The decline started before the *Exxon Valdez* oil spill in 1989, but was most severe in the year of the spill. Over the past decade seal abundance in this area has declined at 3 to 4 percent annually. Counts in the Kodiak Archipelago from 1976 to 1992 revealed an even more severe decline. During that period, counts on Tugidak Island (south of Kodiak Island) dropped from nearly 7,000 to fewer than 1,000, a decline of 85 to 90 percent. From 1993 to 2001 adjusted counts in the Kodiak area increased at about 6.6 percent annually although the number of harbor seals in this region still remains significantly depressed relative to numbers observed in the 1970s.

The first survey specifically designed to census harbor seals in the Aleutian Islands was conducted by the Service in 1994 and resulted in an unadjusted population estimate of 3,489. Because counts were not conducted in the Aleutian Islands before 1994, trends in this region cannot be assessed. The Service conducted harbor seal surveys in the Aleutian Islands in 1999 and in the Gulf of Alaska in 2001 but the results of these surveys are not yet available.

Bering Sea—The Service's most recent estimate of harbor seal abundance in the Bering Sea is 13,312, based on surveys conducted during the autumn molt in 1995. In this region, the status and trends of harbor seals are less clear due to limited baseline data and the undetermined influence of covariates (e.g., some counts were conducted during the pupping season whereas others were conducted during the molting season; the effects of tides may be considerable but were not accounted for in the surveys). Nonetheless, the available data suggest a significant decline, at least in some areas. Counts on Otter Island in the Pribilof Islands declined by more than 80 percent from 1,175 in 1974 to 202 in 1995. Counts on the north side of the Alaska Peninsula declined by more than 60 percent from 1975 to 1995, or about 3.5 percent per year. Harbor seal numbers in northern Bristol Bay also declined in the 1970s and 1980s. In the 1990s counts during the pupping and molting periods in Nanvak Bay in the northern Bristol Bay region increased at 9.2 percent and 2.1 percent annually, respectively, indicating that some reversal of the previous decline may be occurring. However, counts in this region (and elsewhere in the Bering Sea region) may be unreliable because of the possible misidentification of spotted seals as harbor seals. Adjusted counts in Bristol Bay from 1998 to 2001 indicate that harbor seal numbers in this region may be stable or declining slowly. The Service conducted a survey of harbor seals in the Bering Sea in 2000, but the results are not yet available.

Factors Contributing to the Harbor Seal Decline—A range of factors may have contributed to the observed declines of harbor seals in Alaska. These may vary by region and by time. Natural factors could include ecosystem changes that alter the quality and quantity of available food or habitat; predation by killer whales, sharks, and Steller sea lions; disease; and emigration. Human-related factors could include past commercial harvests, illegal killing, subsistence harvests by Alaska Natives, incidental mortality in fisheries, reduced fitness due to contaminants, entanglement in marine debris, and changes in the quality or quantity of available food or habitat due to fisheries removal of prey (e.g., competition for important prey species). Available data are not sufficient to evaluate the relative importance of each of these factors in the decline of harbor seals in Alaska.

Co-Management of Harbor Seals

Beginning in 1992 the National Marine Fisheries Service contracted with the Alaska Department of Fish and Game to survey Native house-

holds to estimate the number of harbor seals taken annually for subsistence purposes. From 1992 to 2001 (excluding 1999), estimates of the annual harvest were between about 2,000 and 2,900 animals. The most recent survey was for 2001 and indicated 1,797 seals were harvested and 234 were struck and lost for an estimated total of 2,031 seals. Estimates of the subsistence harvest in 2002 are not yet available.

Because harbor seals are a traditional subsistence resource for Alaska Natives, the Service works with Alaska Native groups on matters pertaining to subsistence hunting and related research. On 29 April 1999 the Service and the Alaska Native Harbor Seal Commission signed a co-management agreement pursuant to section 119 of the Marine Mammal Protection Act. The purposes of the agreement were to (1) develop an annual action plan for co-management of the subsistence harvest of harbor seals, (2) promote the sustained health of harbor seal populations to protect Alaska Native culture, (3) promote scientific research to support management decisions, (4) identify and resolve management conflicts, and (5) provide information to subsistence hunters and the public at large to increase understanding of the sustainable use, management, and conservation of harbor seals. The agreement establishes a harbor seal co-management committee comprising three members each from the Alaska Native Harbor Seal Commission and the National Marine Fisheries Service. The primary purpose of the committee is to develop the annual action plan, the main elements of which are population monitoring, harvest management, education, and research recommendations.

In September 2000 the Service and the harbor seal commission held a workshop in Juneau, Alaska, to identify specific objectives for the first action plan under the co-management agreement. Workshop participants were invited from academia, federal and state governments, and Alaska Native tribes on the basis of their expertise in population monitoring, harvest management, and education. The workshop resulted in the formulation of an action plan for 2001 setting forth responsibilities for both the Service and the commission.

The co-management agreement between the Service and the Alaska Native Harbor Seal Commission provides for cooperative monitoring of the subsistence harvest and an opportunity for researchers and Alaska Native hunters to conduct cooperative research using biological samples collected from harvested animals. The sampling efforts provide tissues and information that can be used to address research questions on topics including, but not limited to, stock structure, diet, health and condition, contaminant loads, and age and sex composition of harvested animals and the wild population. By taking advantage of the sampling opportunities provided by the subsistence harvests, scientists and hunters provide important information that is difficult to collect with nonlethal study methods.

At its 2001 annual meeting, the Marine Mammal Commission was informed that the Alaska Native Harbor Seal Commission and the Service were working to improve cooperation on joint research efforts. The Alaska Department of Fish and Game, which has played a key role in harbor seal research in Alaska for several decades, has also participated in cooperative research on harbor seals. The contributions of these and other research participants (e.g., the Alaska SeaLife Center and researchers from various universities) should enhance the results of the sample program, but the infrastructure for such cooperation appears to require additional development. For that reason, in its letter of 31 December 2001 the Commission recommended that the Service continue to work closely with the Alaska Department of Fish and Game and the Alaska Native Harbor Seal Commission to ensure that they are able to take full advantage of the sampling opportunities associated with the subsistence harvest.

Funding

Over the past decade Congress has allocated funds for various research and management projects related to harbor seals in Alaska. Those funds have been administered through the National Marine Fisheries Service in the form of grants and contracts, and have provided the support for basic research on harbor seals, monitoring of subsistence harvests, and related activities. In each of fiscal years 2000 and 2001, the total amount to be allocated for these purposes was about $900,000. Although historically the majority of these funds were directed toward the harbor seal research program in the Alaska Department of Fish and Game, Congress revised the allocation of those funds for fiscal year 2002, dividing the allocation between the

Alaska Native Harbor Seal Commission and the Alaska SeaLife Center. The state's research program was continued through cooperative efforts with the Service and the Alaska SeaLife Center. At the end of 2002 funding to maintain the state's program in 2003 and beyond had not been identified. This program carries out important long-term research to provide scientific information needed for management. Such research includes studies of population abundance and trends, vital rates (survival and reproduction), other life history characteristics (e.g., pupping and molting phenology), foraging patterns and diet, distribution and movement patterns, and contaminant levels in seals and their effects. The loss of funding for the state program will likely have a significant impact on management of harbor seals in Alaska.

In 2002 the Alaska Native Harbor Seal Commission received $439,000. The commission used those funds to assess statewide subsistence harvests of harbor seals and Steller sea lions (in collaboration with the Subsistence Division of the Alaska Department of Fish and Game); hire a survey coordinator; support collection, processing, and archiving of tissue samples from harvested animals; coordinate with researchers who may use the samples for research; and hold a workshop of researchers from around the state to review studies of vessel disturbance and its effects on harbor seals.

In 2002 the Alaska SeaLife Center also received $439,000. They used those funds to deploy remote-controlled video cameras to monitor harbor seal numbers and haul-out activity in Aialik Bay; document vessel traffic in the region and the effects of vessels on harbor seal activity patterns; study the health, condition, and diet of harbor seals using captive animals; monitor movement patterns, health and condition, and vital rates of wild seals; process and distribute samples from the subsistence harvest to examine contaminant levels; and obtain reproductive tracts to investigate reproductive parameters.

Each of these organizations—the Alaska Department of Fish and Game, the Alaska Native Harbor Seal Commission, and the Alaska SeaLife Center—has the potential to contribute significantly to research needed for management and conservation purposes. The amount of funding and the manner in which the funds are distributed among these programs could have significant implications for harbor seals in Alaska. At the end of 2002 it was not clear how much funding will be available from federal sources in fiscal year 2003 or how the funds would be distributed.

Sea Otter (*Enhydra lutris*)

Before commercial hunting began in the mid-1700s, an estimated 150,000 to 300,000 sea otters occurred in coastal waters throughout the rim of the North Pacific Ocean from northern Japan to Baja California, Mexico. In 1911 hunting was prohibited under the terms of an international treaty for the protection of North Pacific fur seals and sea otters signed by the United States, Japan, Great Britain (for Canada), and Russia. By then, only a few thousand otters remained. The survivors were scattered among small colonies in remote areas of Russia, Alaska, British Columbia, and central California.

After 1911 sea otters recolonized or were reintroduced into much of their historic range. By 1972, when the Marine Mammal Protection Act was passed, the California population had grown from as few as 50 to more than 1,000 individuals and had recolonized more than 370 km (200 mi) of the California coast. By the 1980s, remnant groups in Alaska had recolonized much of their historic range and grown in abundance to levels that may have approached historic levels. Several hundred otters were moved from Amchitka Island and Prince William Sound, Alaska, in the late 1960s and early 1970s to reestablish populations in southeastern Alaska and along the outer coasts of Washington and Oregon. The Oregon translocation failed, but the Washington population has grown steadily after a slow start. However, by the early to mid-1990s surveys indicated that populations in certain regions of Alaska had experienced sharp declines, and that growth and recovery had unexpectedly ceased in California. This section reviews the status and major issues pertaining to research and management of sea otters in Alaska, Washington, and California.

Sea Otters in Alaska

The range of sea otters in Alaska extends from the southeastern tip of the state to Attu Island near the western end of the Aleutian Islands in a nearly

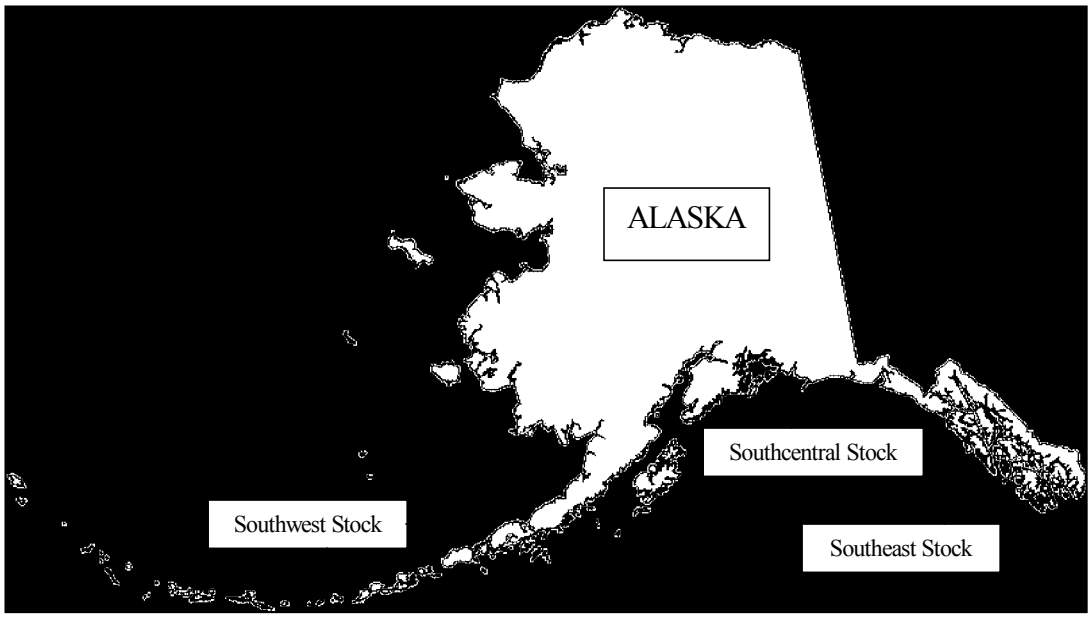

Figure 30. Range of Alaska sea otter stocks. (Figure courtesy of D. Burn.)

continuous arc stretching nearly 2,000 miles (Fig. 30). Because of their vast geographic range, research and management of sea otters present significant challenges due to the logistical difficulties associated with working in remote sites and the accompanying expense. As a result, abundance and trends of the species and the variable factors affecting them are evaluated by combining information from various subregions to provide an overall assessment.

Abundance and Trends—The Fish and Wildlife Service's most recent estimate of abundance in southeastern Alaska (from Cape Yakataga to the Dixon Entrance) is based on a combination of adjusted boat and aerial surveys conducted between 1994 and 1996. They indicate a best estimate of 12,632 otters and a minimum estimate of 9,266 otters, but the data are becoming outdated and less reliable as indicators of current abundance. The current population descended from 412 animals translocated from Prince William Sound in the late 1960s, and the translocation undoubtedly has been a success. Unpublished results of surveys conducted in the Cross Sound/Icy Strait area and in Glacier Bay since 1994 indicate continued growth, at least in these areas. Nonetheless, it is not clear that these observations are representative of trends throughout southeastern Alaska and, currently the overall trend in this region is uncertain.

The Service's most recent estimate of abundance for south-central Alaska (from Cape Yakataga to Cook Inlet, including Prince William Sound, the Kenai Peninsula coast, and Kachemak Bay) is based on surveys conducted in the northern Gulf of Alaska in 1996, Prince William Sound in 1999, and the Cook Inlet/Kenai Fjords region in 2002. The sum of these surveys provides a best estimate of 16,552 otters and a minimum estimate of 13,955 otters. The majority of those animals occur in Prince William Sound, where an estimated 750 to 2,650 otters were killed in 1989 as a result of the *Exxon Valdez* oil spill. Scientists from the U.S. Geological Survey estimate that, after the initial mortality from the spill, sea otter numbers in the western portion of the Sound increased by about 750, but have not changed since 1994. The 2002 estimate of sea otters in the Cook Inlet/Kenai Fjords area is slightly higher than an estimate from 1989. Based on these estimates, the Service believes that the number of sea otters in south-central Alaska is stable or increasing slightly.

Estimates of sea otter abundance and trends for southwestern Alaska (Alaskan Peninsula and Bristol Bay coasts, and Aleutian, Barren, Kodiak, and Pribilof Islands) contrast significantly with those in other regions of the state. A combination of surveys conducted throughout this region during the period from 2000 to 2002 indicates a best estimate of the total population of 41,474 otters and a minimum estimate of 33,203 otters. Surveys in the late 1950s and early 1960s indicated that sea otters in this region were recovering from the exploitation before 1911 and data collected in the 1980s indicate that they may have reached 55,000 to 74,000 animals. Beginning in 1992, however, evidence indicated that sea otter numbers

were declining in a number of areas in the southwestern part of the state. An aerial survey of the Aleutian Islands in 1992 revealed declines of more than 50 percent since 1965 in the central Aleutian Islands. These results were corroborated by independent boat surveys in the 1990s. In 2000 the aerial survey was repeated and found an overall decline of 70 percent since 1992. Surveys of the Alaskan Peninsula in 2000 and 2001 indicated that, since 1986, otter numbers had declined by more than 90 percent along the southern coast of the Alaskan Peninsula and between 30 to 50 percent along the northern coast. A 2001 survey of the Kodiak Archipelago indicated a decline of as much as 40 percent since 1994.

Causes of the Declines—The causes of the declines in southwestern Alaska are uncertain. Some evidence suggests that in certain regions (i.e., the central Aleutian Islands) the declines are due to increased mortality, perhaps due to killer whale predation. One hypothesis put forth to explain the declines is that the harvesting of nearly 500,000 large whales in the North Pacific (including the Gulf of Alaska and the Bering Sea) in the 1950s to 1970s may have reduced the availability of prey for killer whales, which then shifted their foraging to Steller sea lions. Because sea lion numbers have declined by 85 percent or more since the 1970s, the killer whales may have again altered their foraging patterns to include sea otters, leading to their decline. In view of the extensive range of sea otters in southwestern Alaska and recent reports that the number of marine mammal–eating killer whales is relatively small, the extent to which this hypothesis may explain the decline of sea otters is not clear. It is also not clear that the factors causing the decline are the same in all areas or have been the same throughout the period of the decline.

Stocks and Status—Immediately after its 2000 survey, the Fish and Wildlife Service designated the sea otter in the Aleutian Islands (Unimak Pass to Attu Island) as a candidate species for listing under the Endangered Species Act. Due to lack of funding no action was taken on the listing proposal in 2000 or the first half of 2001. In August 2001 the Center for Biological Diversity petitioned the Service to list the entire Alaska stock of sea otters as depleted under the Marine Mammal Protection Act. The Service denied the petition in November 2001. It based its determination on phylogeographic evidence that sea otters in Alaska actually comprise three se-parate stocks (southeast, south-central, and southwest) and that the southeastern and south-central stocks appear to be stable or increasing. In its notice, the Service stated that it planned to formally recognize three separate stocks by completing new assessments for each and then would propose to list the southwest stock under the Endangered Species Act. On 28 March 2002 the Service published a *Federal Register* notice requesting comments on the draft stock assessment reports. At the Marine Mammal Commission's annual meeting on 8–10 October 2002 representatives of the Service advised the Commission that, in late September 2002, the Alaska Regional Office had forwarded a proposal to list the southwest stock under the Endangered Species Act to the Service's headquarters in Washington, D.C. On 9 October 2002 the Service published in the *Federal Register* a notice announcing the availability of the final 2002 stock assessment reports for the three newly recognized sea otter stocks.

On 6 December 2002 the Marine Mammal Commission wrote to the regional director of the Fish and Wildlife Service commending the Service and other contributors for completing the stock assessment reports, reviewing research and management needs, and initiating the Endangered Species Act listing process for the southwest Alaska stock of otters. The Commission also recommended that the Service complete its listing process expeditiously and, assuming that the stock is listed, assemble a recovery team to develop a recovery plan. The Service responded to the Commission on 26 December 2002, noting that, due to a backlog of court-ordered Endangered Species Act rules, their goal was to publish the proposed rule in the first quarter of 2003.

Research—As noted in the Commission's 2001 annual report, representatives of the Fish and Wildlife Service presented an overview of the status and trends of sea otters in Alaska, related research, and anticipated management actions at the Commission's 2001 annual meeting in Anchorage, Alaska. As a result of the meeting, the Commission wrote to the Service on 31 December 2001 to recommend that the Service develop and implement a plan to investigate the nature of the decline of sea otters in southwestern Alaska and to facilitate recovery. Although listing under the Endangered Species Act would eventually lead to re-

search and recovery actions, the listing process, convening a recovery team, and developing a recovery plan could take several years. The Commission therefore recommended that the Service proceed immediately with research and recovery planning until such time as an official team and plan are in place. The Commission also recommended that the Service review its existing research program to ensure that funding and studies were being appropriately directed in view of the declining status of sea otters in southwestern Alaska. On 18 January 2002 the Service responded that, among other things, it had begun preparation for a workshop to develop a research and management plan.

The workshop was held on 3–4 April 2002 and included participants from federal agencies, Alaska Native organizations, academic institutions, the Alaska SeaLife Center, and conservation organizations. The participants identified needed research on reproduction, foraging and condition, disease, contaminants, human impacts, and predation. They emphasized the need to continue and to expand trend indices and develop standardized large-scale aerial surveys to better monitor abundance and trends. Finally, they emphasized the need for additional studies where declines were observed, collaboration with the National Marine Fisheries Service on predation studies, and use of the Commander Islands (where sea otter populations have not been declining) as a research control site.

Co-Management—Under section 119 of the Marine Mammal Protection Act, the Fish and Wildlife Service entered into an annual cooperative agreement with the Alaska Sea Otter and Steller Sea Lion Commission on 10 July 2002. This commission is composed of village representatives from Kodiak Island, the Chugach region, the Aleutian and Pribilof Islands, Cook Inlet, Bristol Bay; and southeastern Alaska. Under the agreement, the Service is to provide the Alaska Sea Otter and Steller Sea Lion Commission with $465,000 over two years to support its co-management efforts related to subsistence uses of sea otters in Alaska. The commission serves to coordinate Alaska Native activities related to sea otters within the region represented by its membership. Such activities include monitoring population trends, collecting biological samples to support research, and developing regional sea otter management plans.

Requests to Capture and Export Sea Otters—On 15 June 2001 the Fish and Wildlife Service published a notice in the *Federal Register* seeking comments on applications from Aquamarine Fukushima to collect three sea otters and Ibaraki Prefectural Oarai Aquarium to collect five sea otters from Alaska for export to Japan for public display. On 31 July 2001 the Marine Mammal Commission responded by noting that the Fish and Wildlife Service and the National Marine Fisheries Service had recently conducted a joint review of export provisions in the Marine Mammal Protection Act. The review indicated that the Act does not authorize the issuance of export permits, although transfers of marine mammals from domestic facilities to foreign facilities are authorized if certain requirements are met. On that basis, and because the applicants did not meet the requirements to obtain a permit to take the requested animals for purposes of public display, the Commission recommended that the Service refrain from issuing the requested permits, or any other export permits, until the Act is amended to accommodate those activities. The Service denied the permit applications on 26 July 2002 based on other grounds. In response to the Commission's comments, the Service said that it did not agree with the view that an export permit could not be issued but did not provide any rationale for its position.

In its comments on these applications, the Commission also noted that the 1994 amendments precluded the issuance of a permit to take marine mammals from areas subject to U.S. jurisdiction and export them directly to a foreign facility. Because it is not clear that this was the intent of Congress, the Commission encouraged the Service to work with appropriate congressional committees to identify and correct any unintended consequences of the 1994 amendments prohibiting the exportation of marine mammals.

Sea Otters in Washington

At the Marine Mammal Commission's 2002 annual meeting representatives of the U.S. Fish and Wildlife Service and the Washington Department of Fish and Wildlife provided an overview of the Washington sea otter population and major issues affecting research and recovery efforts. Prior to 1911 sea otters were extirpated from Washington by commercial hunting. In 1969 and 1970 a total of 59 otters was translocated from the Aleutian

Islands to the outer coast of Washington. After a period of adjustment, the translocated population began to grow, and in 1987 a survey revealed about 100 otters. Subsequent annual surveys indicate that the population has grown at about 8–10 percent annually (Fig. 31). In 2001 a total of 555 sea otters was counted. In 2002 a total of 551 sea otters was counted. The current population of sea otters in Washington is found primarily in the region between Pillar Point in the Strait of Juan de Fuca and Point Grenville on the outer coast, with most of the population concentrated between Cape Alava and Destruction Island (Fig. 32).

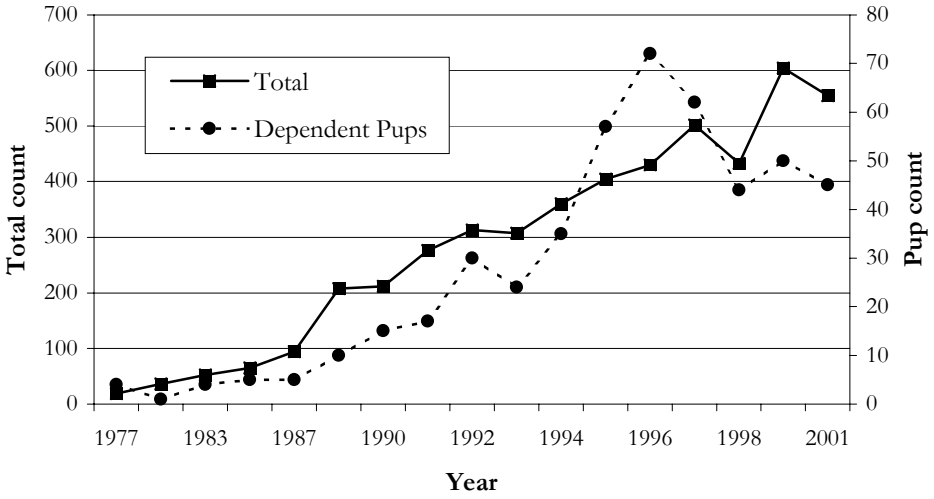

Figure 31. Washington sea otter spring counts, 1977–2001.

Status—At the Commission's meeting a representative of the Service indicated that the Service was preparing to solicit information for a status review of the Washington sea otter population. The need for a status review was prompted, in part, by recent genetic studies and estimates of the environmental carrying capacity for otters in their historic range in Washington (Columbia River to Port Townsend). The status of the population relative to its optimum sustainable population is unknown due to a number of uncertainties, such as habitat quality and use, population expansion, and preliminary evidence of declining growth rates in rocky habitat along the Olympic Peninsula. The Service representative indicated that a *Federal Register* notice announcing initiation of the status review would be published in the near future to inform the public about the review and to seek comments and other pertinent information. The notice had not been published as of the end of 2002.

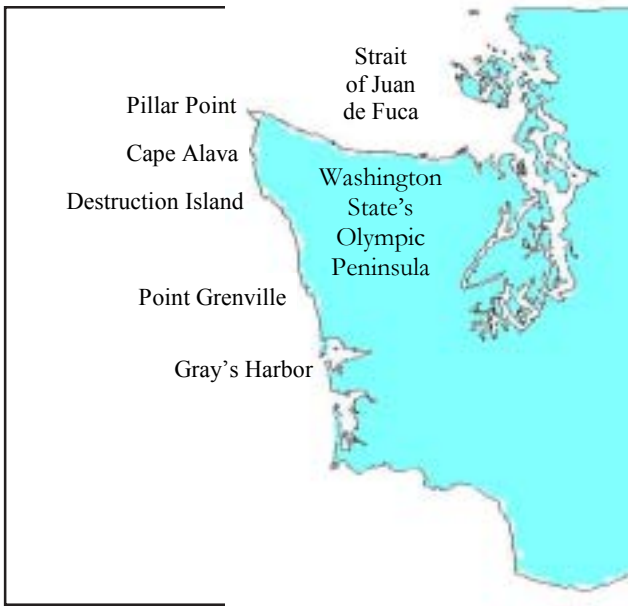

Figure 32. The current range of Washington sea otters extends primarily from Pillar Point to Point Grenville.

The Service and the Washington Department of Fish and Wildlife are updating the stock assessment report for Washington sea otters as required by the Marine Mammal Protection Act. The previous assessment was completed in 1996 and is outdated. Progress on the report was delayed while the agencies solicited information on sea otter interactions with tribal fisheries. That information has now been provided and the draft revised stock assessment report is expected to be available early in 2003.

The State of Washington has designated the sea otter population along its coast as endangered under state law and is in the process of revising their draft recovery plan originally released for public comment in 2000. The plan is expected to provide useful information for the Service's status review and to identify criteria for downlisting and delisting the Washington population of sea otters for the state's purposes if the population continues to grow.

Factors Affecting Recovery—At the Commission's meeting, representatives of the Service and the Washington Department of Fish and

Wildlife also described a number of factors that may be affecting sea otter recovery in Washington or may do so in the foreseeable future. The potential effects of oil spills are considered a significant concern because of the amount of shipping activity in nearby coastal regions (e.g., the Strait of Juan de Fuca, Gray's Harbor, Columbia River). Oil spills have occurred in this area in the past (e.g., spills from the vessels *Tenyo Maru*, *Nestucca,* and *New Clarissa*), and currents may carry oil to areas inhabited by sea otters.

Sea otter/fishery interactions are also a significant concern because sea otters occur in areas where salmon are fished with drift and set gillnets and where other fisheries occur for crabs, clams, and sea urchins. Interactions are expected to increase if the sea otter population expands its range to the south or into the Strait of Juan de Fuca, where commercial and recreational shellfisheries are more common.

Disease and mortality also may affect sea otter recovery in Washington. Twenty-two otter carcasses were reported in 2000 and 27 were reported in 2002. Investigations into the causes of death indicate that the otters had been exposed to a number of diseases including leptospirosis and protozoal encephalitis and, as should be expected, were infected with various parasites. Samples taken from live-captured animals also indicate that this population has come into contact with morbillivirus.

Management Needs—Finally, at the Commission's meeting, representatives of the Service and the Washington Department of Fish and Wildlife identified a number of resource and other needs to ensure effective management of sea otter recovery in Washington. Those included the following—

• *Funding to support recovery activities.* At present, Service support for management activities required by the Marine Mammal Protection Act (e.g., preparation of stock assessment reports) is largely limited to the allocation of year-end funds, if they are available.

• *Better coordination among federal, state, and tribal agencies and organizations involved in issues pertinent to sea otter recovery.* In addition to the U.S. Fish and Wildlife Service and the Washington Department of Fish and Wildlife, involved agencies include the U.S. Geological Survey, the National Park Service, the National Marine Sanctuary Program, the National Marine Fisheries Service, and tribal organizations. Cooperation is important to ensure sharing of information and coordination of activities where multiple parties have recovery-related responsibilities (e.g., sharing of fisheries bycatch information and responding to sea otter mortalities).

• *Funding to support an effective research and monitoring program.* Research and monitoring of the sea otter in Washington has been conducted by the U.S. Geological Survey and the lead scientist studying this population has retired. In the absence of his leadership and contributions to research and monitoring, funds historically allocated to the Survey for research on sea otters in Washington may no longer be available.

• *Collaboration with Canadian scientists and managers.* Sea otters were also reintroduced to the Vancouver Island region of southern British Columbia, and that population has grown to about 2,000 animals. The Vancouver and Washington populations may soon merge into a single transboundary stock if they have not done so already. Representatives of the Fish and Wildlife Service and Washington Department of Fish and Wildlife currently serve on the recovery team for the Canadian population, as is the retired scientist from the U.S. Geological Survey. Continued collaboration is needed to ensure that research and management efforts are consistent and coordinated across the border.

On 23 December 2002 the Marine Mammal Commission wrote to the Fish and Wildlife Service recommending that the Service (1) provide adequate resources to complete the stock assessment report for Washington sea otters, (2) establish a position for a Washington State sea otter coordinator or take other steps as may be necessary to ensure that the efforts of all cooperating agencies and groups are well coordinated, and (3) continue to support and facilitate cooperative research and management in Washington and British Columbia to resolve questions regarding the relationship between these two sea otter populations.

Sea Otters in California

Pelt hunters and trappers nearly eliminated sea otters in California prior to the early 1900s. Only a remnant population of about 50 animals or fewer remained along the central coast near Big Sur when hunting and trapping of sea otters was prohibited by international treaty in 1911. Since then the population gradually has spread north as far as Half Moon Bay, with occasional sightings

near or north of San Francisco, and south to Santa Barbara and the Channel Islands. Counts conducted since the early 1980s indicate that the population grew fairly steadily until 1995, then declined through 1999. The counts have been both higher and lower since then without a clear trend (Fig. 33). Counts of pups during the same period have been considerably more variable but indicate a coincident increase to 1996 and 1997, a sharp drop in 1998, and a return to mid-1990s levels since then. The apparent decline in total numbers since 1995 was not expected, given recent estimates that the state's coastal ecosystem could support as many as 16,000 otters. Recent counts indicate that the current statewide population is probably about 2,100 to 2,300 animals (Fig. 33).

Factors Affecting Recovery—At the Marine Mammal Com-mission's 2002 annual meeting representatives of the U.S. Geological Survey, Fish and Wildlife Service, California Department of Fish and Game, and various stakeholder groups presented information on potential factors that may be impeding recovery of sea otters in California. The existing evidence suggests that the lack of recovery since 1995 is probably not due to a reproductive failure. Instead, the available data suggest that the lack of recovery is due to additional mortality of all age classes, including the prime age classes from age three to ten. Factors known or suspected of causing mortality include starvation, entrapment or entanglement in fishing gear, disease, contaminants, sharks, and illegal shooting. Starvation does not appear to be a significant factor inasmuch as the majority of the dead animals recovered in past years appear to have been in relatively good condition at the time of death. Few animals are found each year with gunshot wounds, which suggests that shooting is not a large source of mortality. However, existing evidence, which is based on stranded animals, may not reliably indicate the number of animals actually shot. Nonetheless, at the Commission's meeting most of the discussion about factors affecting recovery focused on fisheries, disease, and contaminants.

Two types of fishing gear have caused most concern regarding bycatch mortality of sea otters in California waters. The first is large-mesh, set gill and trammel nets. Those nets were first banned in limited areas off southern California in September 2000, and in October 2002 the California Department of Fish and Game imposed a permanent ban on the use of gill and trammel nets in waters less than 60 fathoms deep between Point Reyes and Point Arguello. The prohibition was intended to protect sea otters as well as common murres and other marine life taken as bycatch in fisheries using these nets. In December 2002 a group of independent halibut and sea bass fishermen from San Luis Obispo County filed suit against the California Department of Fish and Game challenging the closure to 60 fathoms. Several conservation groups, led by the Defenders of Wildlife, are seeking to intervene on behalf of the Department. The plaintiffs claimed that the Department had unreasonably combined gill and trammel nets in the prohibition, that it had unreasonably combined the sea bass fishery with the halibut fishery, that there was no evidence of adverse impact on the common murre population from gill and trammel nets set between 30 and 60 fathoms, and that the prohibition was applied to an overly large area consisting of discrete, unrelated oceanic regions or geographic strata. That matter was pending as of the end of 2002.

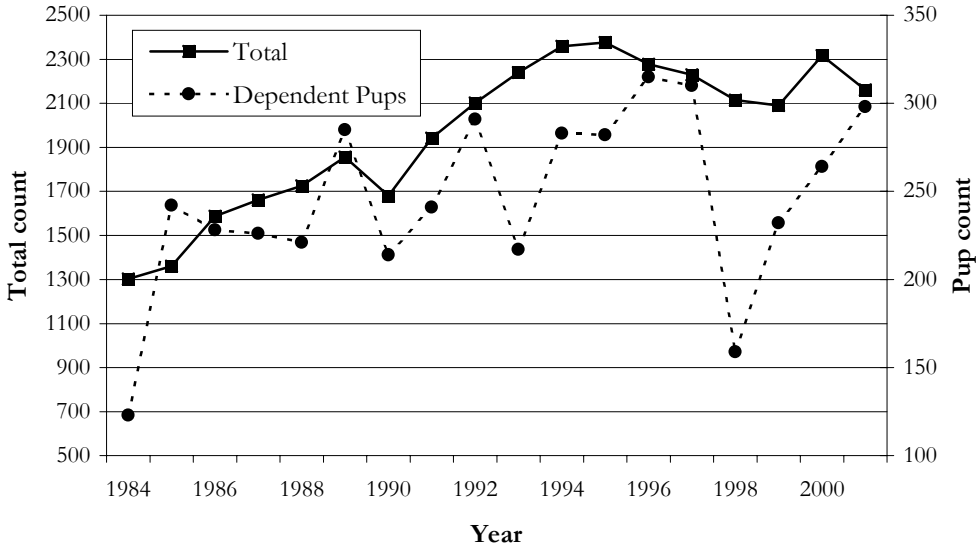

Figure 33. California sea otter population spring counts, 1984–2001.

Pots and traps are the other type of fishing gear that may cause sea otter mortality. Along the central California coast traps are used to catch cabezon, grass bass, sea trout, and gopher cod. In southern California they target sheepshead, lobster, and crab. The landings from trap fisheries in central California increased considerably and coincidentally with the halt of sea otter recovery after 1995. It is not clear that the two are related because little direct evidence is available to evaluate whether there is a cause-and-effect relationship. A trap fishermen from central California present at the Commission's 2002 meeting indicated that he had never taken a sea otter in his traps and that trap fisheries in central California must use 5-in.-dia .rings in the entrances to their traps, which are thought to be too small to allow most otters to enter or become entrapped. However, it is not clear that a 5-in. ring is sufficient to preclude small otters from entering the traps. The 5 inch restriction on ring diameter has been required by the California Department of Fish and Game since 2001 in waters north of Point Conception. The fisherman indicated that he did not believe that similar ring restrictions would work in waters south of Point Conception because they would preclude capture of the targeted species (sheepshead, lobster, and crab). Whether trap fisheries have contributed to the recent sea otter decline off central California is uncertain because only a small fraction of the fishing effort is monitored by observers.

At the Commission's meeting a representative of the California Department of Fish and Game also reviewed evidence pertaining to the role of disease in the dynamics of the California sea otter population. The available data from freshly dead animals indicate that disease was a significant factor in 35 to 45 percent of the deaths. Protozoan infections by *Toxoplasma gondii* or *Sarcocystis neurona* accounted for 20 to 25 percent of the disease findings, and evidence from live animals indicates that these infectious agents are common, particularly in waters near human population centers. Such results should be viewed with some caution because it is not yet clear that the freshly dead carcasses found are reliable indicators of all deaths in the population. Nonetheless, disease appears to play an important role in the population dynamics of the California sea otter and the evidence suggests that some of that disease results from human activities. The term "pathogen pollution" has recently been used to describe the prevalence of pathogens in certain areas due to human population or the translocation and introduction of nonnative or domestic fauna. The introduction or increasing prevalence of these pathogens may overwhelm the immune systems of native animals such as sea otters. Other diseases, such as acanthocephalan peritonitis (inflammation of the peritoneum due to infestation by acanthocephalan worms), and bacterial and fungal infections also were observed and their prevalence may vary geographically and temporally.

Contaminants also may affect California sea otters by impairing reproduction or compromising immune function, thereby increasing susceptibility to disease. In late January 2002 The Otter Project sponsored a workshop of experts on contaminants, disease, and the biology of sea otters to consider the possible effects of contaminants and to develop a research plan for investigating those effects. Potentially important contaminants include DDT and related compounds, PCBs, metals, and tributyltin. Because such contaminants often originate from or are concentrated by human activities, their effects may vary throughout the range of sea otters depending on human demographics.

Other factors affecting or potentially affecting the recovery of the sea otter in California include the risks of an oil spill and the translocation program initiated in 1987. The following sections describe those issues.

Oil Spill Prevention and Response—Concern that a large oil spill could kill a large portion of the California sea otter population has had significant influence on recovery efforts since 1977, when the population was listed as threatened. A number of steps have been taken to avoid such an impact, including the development of the translocation program described below. At the Marine Mammal Commission's 2002 annual meeting, a representative of the California Department of Fish and Game described the current state of efforts to prevent an oil spill and to respond, should one occur. In 1991 the Department created the Oil Spill Prevention and Response Division specifically for this purpose. The division assumes a number of responsibilities pertaining to oil spills, including monitoring and inspecting sites and activities that may result in spills, developing regulations to prevent such events, and developing con-

tingency plans describing what needs to happen should an event occur. In 1996 the division also initiated the Oiled Wildlife Care Network at the University of California at Davis. The network has since been expanded to include other facilities with the capacity to care for oiled wildlife, including otters. The division, in concert with various stakeholder groups and other management agencies (e.g., International Maritime Organization, California Department of Fish and Game, U.S. Coast Guard), has succeeded in moving oil tanker lanes 50 miles offshore, has developed a vessel traffic information system, and has established a monitoring program to determine the distribution of otters and other wildlife so that it can identify areas of particular concern and conduct appropriate prevention and response operations when necessary.

Translocation Program and Zonal Management—The potentially serious consequences of an oil spill, and concerns about sea otter effects on fisheries that had developed in the absence of the otters, led to the development of a translocation program. In 1980, after consultation with the Fish and Wildlife Service and the California Department of Fish and Game, the Marine Mammal Commission recommended to the Service that it address both concerns by developing a translocation program with zonal management.

The history of the program and the Marine Mammal Commission's involvement in it are described in detail in past reports. The potential utility of the program was recognized in the sea otter recovery plan completed in 1982. Although the Endangered Species Act at that time included provisions for translocating species, the Marine Mammal Protection Act did not. Therefore, Public Law 99-625 was passed in 1986 to address that problem and allow a translocation program to proceed. In 1987 the Fish and Wildlife Service developed regulations implementing Public Law 99-625, developed a plan for the program, and signed a memorandum of understanding with the California Department of Fish and Game to help coordinate the program. The program called for the establishment of a colony of sea otters within a "translocation zone" around San Nicolas Island. The goal was to build the colony to the point where it contained at least 150 otters and produced at least 20 offspring annually so that it could be used as a source of animals should a disaster make it necessary to seed recovery of the parent population along the central California coast. To avoid fishery interactions in southern California, other islands and coastal regions south of Point Conception to the Mexican border were incorporated into a "management zone" that was to be kept free of otters.

From 1987 to 1990 a total of 140 sea otters was released at San Nicolas Island. All but one of the otters were taken from the wild parent population. From 1987 to 1993 the Fish and Wildlife Service removed 24 otters from the management zone. The translocated population did not grow as expected, and many of the translocated animals and their offspring either returned to the mainland parent population, moved to other locations where they were not observed, or died. The number of independent animals at the island dropped from 27–28 during 1987–1990 to a low of 13 in 1992–1993. From 1987 to 2002 a total of 75 pups was born. Since 1993 the number of animals at the site has increased, albeit slowly. No animals were removed from the management zone after 1993 due to several factors, including the deaths of animals in 1993 during capture and release efforts. Beginning in the late 1990s relatively large numbers of otters from the parent population to the north started showing up seasonally in the management zone. Subsequent tracking studies have shown that those animals were not simply moving south of Point Conception from neighboring areas. Rather, many of them were males moving considerable distances from central California after the reproductive season. From 1998 to 2002, 50 to 150 animals have been observed in the management zone. The Fish and Wildlife Service, in consultation with the California Department of Fish and Game, decided not to remove those otters because of the expense and the difficulty of capturing the animals and moving them safely.

In 1998 the Service held public meetings to discuss the future of the translocation program and reinitiated consultation on it under section 7 of the Endangered Species Act. In April 2000 the Commercial Fishermen of Santa Barbara, Inc., and several other groups filed suit in the U.S. District Court for the Central District of California seeking to compel the Fish and Wildlife Service to remove the sea otters that had moved into the management zone. A number of conservation organizations (Friends of the Sea Otter, Defenders of Wildlife, Humane Society of the United States) in-

tervened on behalf of the Service. The plaintiffs contended that the Service's failure to remove the otters violated the regulations implementing Public Law 99-625. The Service completed its section 7 consultation on the translocation program in July 2000. The biological opinion issued as a result of that consultation concluded that continued efforts to contain sea otters north of Point Conception would likely jeopardize the continued existence of the population. The conclusion was based on the evidence of a decline in the parent population since 1995, concerns about potentially lethal effects of capturing otters from the management zone and potential disruption of the parent population with reintroduction, and a conclusion that expansion of the sea otters' range in California appears to be necessary to ensure recovery. At the same time the Service issued a press release indicating that it was undertaking a comprehensive review in accordance with the National Environmental Policy Act to determine whether the translocation and containment program should be continued, modified, or terminated. In January 2001 the Service published a notice in the *Federal Register* stating that it would not capture and remove otters from the area south of Point Conception pending completion of its reevaluation of the translocation and containment program. In July 2001 the Commercial Fishermen of Santa Barbara and other plaintiffs withdrew their lawsuit seeking to compel the Service to remove otters from the management zone, pending the Service's final decision as to whether the translocation program should be continued, modified, or terminated.

In 2002 the Service continued its evaluation of the translocation program. At the Commission's annual meeting a representative of the Service advised the Commission that the draft environmental impact statement could be released for review as early as February 2003. The statement would consider three alternatives: maintaining the management zone, reducing the size of the management zone, or declaring the translocation program a failure. Within the third alternative, the Service was also considering three options: removing all sea otters from the management zone and from the translocation zone in accordance with regulations implementing Public Law 99-625, removing all the otters from the translocation zone but leaving those in the management zone, and leaving all otters in place, whether in the management zone or the translocation zone.

At the Commission's 2002 annual meeting representatives of a number of groups urged the Commission to recommend to the Service that it declare the translocation program a failure. At the end of 2002 deliberations regarding the future of the translocation program were ongoing.

Recovery Planning—The California sea otter was listed as threatened under the Endangered Species Act in 1977, and the first recovery plan was completed in 1982. Among other things, the original plan recognized the threat posed by possible oil spills and aimed to minimize the associated risks; recommended the development of new sea otter colonies outside the then-existing sea otter range; advocated a reduction in vandalism, harassment, and incidental take; emphasized the importance of incorporating recovery measures into local coastal development plans; set the optimum sustainable population range as a target for recovery; and sought to establish an effective research program to assess and monitor the status of sea otters and their habitat.

In 1988 the Service informed the Commission that it was considering reconstituting the recovery team to help revise the recovery plan. The Commission concurred that a number of tasks identified in the original plan had been completed and that a review seemed appropriate but also suggested that the review and subsequent development of an implementation plan might be accomplished by the agencies and parties involved in recovery efforts without reconvening the team. The Service did not agree and reconstituted the team, which met once in 1989 and several times in 1990. The meetings considered, among other things, needed revisions to the recovery plan.

By 1991 a revised plan had been drafted and submitted to the Commission for review. After reviewing the draft plan the Commission replied that it reflected intuitively reasonable conclusions, but that they were not adequately supported by the information and analyses in the draft. A second draft was prepared by the Service and circulated to the recovery team late in 1994. It was under internal review by the Service until mid-1996, when it was released to the Commission and others for review. In September 1996 the Commission provided comments, but no further action

was taken to complete the recovery plan in 1996 or 1997. At the Commission's 1999 annual meeting in Seaside, California, the Service informed the Commission that it had developed a new schedule and planned to complete a draft revision of the recovery plan for public review early in 2000 and have the revised plan in place by midyear.

The Service released the new draft plan in February 2000. In April 2000 the Commission commented on the plan, noting that it failed to focus on what appeared to be the task of greatest immediate importance—identifying and eliminating or mitigating the cause or causes of the apparent ongoing population decline. The Commission therefore recommended that the revision be restructured to give priority to those measures necessary to stop and reverse the decline. At the Commission's October 2002 annual meeting, the Service informed the Commission that it expected to release a final revision of the draft recovery plan in January 2003.

At the 2002 meeting the Service and the Commission discussed the importance of finalizing the recovery plan and the complications imposed by the lack of an up-to-date plan to guide the recovery effort. Both recognized that progress had been made in some important areas and that revision of the plan clearly had been confounded by the number of difficult and controversial management issues to be addressed and the multiple stakeholder groups involved or interested in sea otter recovery. In a December 2002 follow-up letter from the Commission to the Service, the Commission recommended that the Service make every effort to meet its schedule for completing the final revised recovery plan in January 2003 and ensure that the plan describes how the recovery effort will be implemented, including the role of the recovery team, tasks to be accomplished, agencies or parties responsible for each task, means of coordinating recovery efforts, and the staffing and other resources needed to carry out those efforts. The Commission also recommended that the Service reconstitute the recovery team and convene periodic meetings to discuss recovery-related issues and develop advice for the Service and, as needed, facilitate common-ground meetings for the affected parties to express their concerns and seek resolution of recovery-related issues.

Florida Manatee (*Trichechus manatus latirostris*)

The Florida manatee is a subspecies of the West Indian manatee that occurs only in the southeastern United States, occupying the northern limit of the species' range. Under the Endangered Species Act, West Indian manatees are listed as endangered throughout their range, which extends along the Atlantic coast of the Americas from the southeastern United States to northern Brazil. Like all manatees, Florida manatees are herbivores that inhabit coastal waters and rivers and feed on aquatic plants, particularly sea grasses.

Although Florida manatees have ranged as far north as Rhode Island in summer, they are unable to survive long periods in waters below about 18ºC (65ºF). Thus, in winter they are confined almost exclusively to the lower two-thirds of the Florida peninsula. Before the 1950s the availability of warm water likely restricted their winter range even more. Historical information on their winter distribution and abundance is limited, but it seems likely that manatees were largely restricted to the Everglades in southern Florida, where areas of warm water within the manatee's thermal tolerance occur year-round, and perhaps a few small areas north of the Everglades (e.g, natural springs or deep holes that retain heat), such as those used by manatees today.

Since the 1950s warm-water outfalls from power plants on both coasts of Florida have effectively extended the manatee's winter range to coastal areas north of the Everglades. Those outfalls actually may have improved the ability of manatees to survive cold winter periods by providing more reliable warm-water refuges. A large majority of Florida manatees now retreat to artificial warm-water sources during prolonged winter periods of cold weather that lower water temperatures. As water temperatures rise in the spring, manatees disperse throughout Florida, with some animals regularly moving north along the Atlantic coast to Georgia and South Carolina and others west along the Gulf of Mexico coast to Louisiana.

Reliable estimates of the total number of Florida manatees are not available because turbid coastal water and rivers make them difficult to count during aerial surveys. However, winter surveys carried out during cold periods, when a majority of animals congregate at warm-water refuges, have established a minimum population size. The highest manatee count was made during a January 2001 survey when 3,276 animals were seen. Roughly half that number occur on Florida's Atlantic coast and half on its Gulf of Mexico coast, with almost no movement from one coast to the other. Because winter counts can vary by 50 percent or more, and it is not known how many animals are away from refuges or not seen when counts are made, it has not been possible to use these survey data to estimate total abundance. Nevertheless, increasing counts from other databases since the late 1970s strongly suggest that the population has increased by some uncertain amount. However, recent trends for some areas, principally southwestern Florida, are unknown.

The greatest threats to Florida manatees are human-caused deaths, principally collisions with watercraft, and the loss or alteration of habitat. To evaluate the causes of death, the Florida Marine Research Institute of the Florida Fish and Wildlife Conservation Commission retrieves and examines all reported manatee carcasses whenever possible. As shown in Table 8, approximately one-third of all known manatee deaths are due to human causes. Over the past five years, at least 28 percent have been caused by watercraft. In 2002 watercraft-related deaths reached a record high of 98, of which 95 were in Florida. This is the third new record in the last five years.

Manatee deaths due to watercraft have increased steadily since the 1980s, and the rate of increase has exceeded the rate of increase for total mortality, indicating that the problem is becoming worse. According to analyses cited by the Fish and Wildlife Service, between 1976 and 2001 watercraft-related deaths increased annually at a rate of 7.3 percent compared with an annual increase of about 6 percent for total manatee mortality. In the last 10 years the average annual increase in watercraft-related manatee deaths has risen about 10 percent per year compared with about 7.5 percent per year for total mortality. Thus, the proportion of total mortality due to watercraft is increasing.

Manatees also are subject to periodic die-offs due to exposure to brevetoxins produced by red tides. As noted in Chapter VI, at least 33 manatees are thought to have died during a red tide event in the spring of 2002 in southwestern Florida.

The loss of essential habitat, particularly sea grass beds on which manatees feed and warm-water refuges, also poses major threats to Florida manatees. Over the past 50 years coastal development has significantly altered Florida's coastal ecosystems. Increased turbidity and other forms of pollution have eliminated most of Florida's sea grass beds (although regrowth has occurred in some areas) and reduced the number of natural, quiet secluded areas used by manatees to rest, give birth, and nurse their young in safety.

As for warm-water power plants, those built before the 1980s are permitted to discharge heated cooling water directly into coastal waters. Such discharges are prohibited at plants built since 1980. Most of those older plants, however, are reaching the end of their planned operational lives and, unless they are repowered (i.e., their existing electric generating units are replaced with new, more efficient equipment), they could be shut down in the near future. If outfalls from those plants are eliminated and not replaced, many manatees that have learned to use them may be unable to find alternative refuges and die. Those that do find other refuges may find that development and habitat alteration have limited food resources in those areas, making them unable to support a large influx of displaced animals. Even natural warm-water springs face an uncertain future. Increased pumping of groundwater for domestic, agricultural, and industrial uses has lowered watertables and caused significant reductions at some major natural warm-water refuges. If this trend continues, springs now used by manatees may not discharge enough warm water for animals to survive winter periods.

The Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission share lead responsibility for developing and carrying out manatee recovery activities. In the 1980s and early 1990s, with support from the Florida Legislature, directives by the Florida Governor and Cabinet, and a well-conceived manatee recovery plan, cooperation between the two agencies and other concerned parties produced a well-directed conservation strategy. Among other things, that strategy featured a research program focused on manage-

ment-related information needs, the development of a broad network of boat speed regulatory zones and a few small no-entry areas at warm-water refuges, and initiatives to guide the construction of new boating facilities in key manatee habitats (e.g., through the review of related permit applications and the incorporation of facility siting plans into county manatee protection plans).

Over the past five years, the willingness of involved parties to work cooperatively to resolve issues has dissolved into a bitter discord marked by litigation and polarized views regarding further conservation needs. On the one hand, some parties, noting that minimum abundance estimates for manatees have nearly tripled since the early 1980s, have resisted any new efforts to establish boat

Table 8. Known manatee mortality in the southeastern United States (excluding Puerto Rico) reported through the manatee salvage and necropsy program, 1978–2002

Year	Vessel–Related Deaths No. (%)	Flood Gate and Lock Deaths No. (%)	Other Human–Related Deaths[1] No. (%)	Perinatal Deaths No. (%)	Other Deaths[2] No. (%)	Total Deaths in the Southeastern United States
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)[3]	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
1996	60 (14)	10 (2)	1 (0)	61 (15)	284 (68)[4]	416
1997	55 (22)	8 (3)	9 (4)	61 (25)	113 (46)	246
1998	67 (28)	9 (4)	7 (3)	52 (21)	108 (44)	243
1999	83 (30)	15 (5)	8 (3)	52 (19)	116 (42)	274
2000	79 (28)	7 (3)	9 (3)	58 (21)	126 (45)	279
2001	82 (24)	1 (0)	7 (2)	63 (19)	183 (45)	336
2002[5]	98 (31)	5 (2)	9 (3)	53 (17)	150 (48)	315

[1] Includes deaths due to entanglement and ingestion of marine debris, drowning in shrimp nets, poaching, vandalism, etc.
[2] Includes deaths due to cold stress, other natural causes, and undetermined causes.
[3] Includes 38 deaths attributed to a spring redtide event in southwestern Florida.
[4] Includes 149 deaths attributed to a spring redtide event in southwestern Florida.
[5] Data for 2002 are preliminary.

Source: Florida Fish and Wildlife Conservation Commission.

speed zones or constrain the construction of new watercraft facilities. They maintain that population recovery seems to be progressing under existing measures and the population appears to be large enough to sustain current mortality levels. On the other hand, some parties note that expanded efforts to count manatees may have accounted for much of the increase in minimum abundance estimates, that the number of boating facilities and boats in important manatee habitat areas continues to multiply, that management measures have to date demonstrated little effectiveness in limiting increases in watercraft-related manatee deaths, and that a long-range strategy to prevent the loss of essential manatee habitats, such as warm-water refuges and sea grasses, has not been developed. In the face of Florida's still burgeoning human population, many worry about the long-term safeguards for coastal habitat and species.

The Governor of Florida brought concerned parties together to resolve disparate views at a "manatee summit" on 19 October 2000. The Fish and Wildlife Service revived an inactive manatee recovery team to help update the Florida Manatee Recovery Plan, and this was approved in 2001. However, neither effort was directed at establishing an ongoing process for working through differences.

The Marine Mammal Commission attempted to help resolve outstanding issues by conducting a detailed review of the manatee recovery program at its annual meeting in October 2000 in St. Petersburg, Florida. As discussed in previous annual reports, Commission recommendations resulting from that meeting were provided to the involved agencies. Among other things, it recommended that the Fish and Wildlife Service—

• increase funding to establish an enforcement task force to target boat speed zones of particular concern around the state on a periodic basis,

• proceed with rulemaking to designate new manatee refuges to help control boating activity in key areas and protect warm-water refuges, with a goal of expanding the system of such areas over the long term,

• work with the state and the Army Corps of Engineers to develop criteria for distinguishing between boating facilities that would and would not jeopardize manatees, and

• convene regular meetings of the recovery team to help identify and implement recovery activities.

The Commission also recommended that, as part of state efforts to accelerate the completion of county manatee protection plans, the Florida Fish and Wildlife Conservation Commission work with other federal and state agencies to develop specific criteria on how to protect manatees and manatee habitat for use in preparing and evaluating county manatee protection plans. It also strongly endorsed a proposal to add 100 new officers to the Florida Division of Law Enforcement to help improve enforcement of new boat speed zones. Most of these recommendations were either not adopted or only partially adopted.

In 2002 little was done by the lead agencies to bring parties together, and views of the concerned parties became increasingly polarized during the year. Lawsuits and threats of additional lawsuits dominated the attention of involved agencies and parties. Actions undertaken in 2002 are discussed below.

Watercraft-Related Manatee Deaths

Manatee deaths due to watercraft are the principal cause of human-related mortality and are increasing at a faster rate than total known mortality, suggesting that the problem is becoming worse. Almost all of these deaths are caused either by wounds from propellers or by blunt trauma impacts from fast-moving boats (Fig. 34). To address the problem, managers have relied principally on establishing a broad network of boat speed zones in 13 key counties where manatees occur. Because boaters cannot reliably detect and avoid manatees, managers sought to slow boats down in those parts of waterways where manatees are most likely to occur to provide time for manatees to avoid oncoming boats.

Over the past 12 years, speed zones have been established throughout waterways in those 13 counties as well as other parts of the state. Most of the zones have been developed and implemented by the Florida Fish and Wildlife Conservation Commission and its predecessors in consultation with county officials and local interest groups. Establishment of these zones has relied on negotiations to balance the needs of both manatees and boaters through use of various types of seasonal and year-round speed zones. These include channel-exempt, channel-inclusive, and shoreline speed zones with various speed limits (e.g., idle or slow speeds outside channels but 25 mph in marked

channels), high-speed water sports areas, and, in a few limited cases at warm-water refuges, small no-access areas. Both the Florida Fish and Wildlife Conservation Commission and the Fish and Wildlife Service increased efforts in this regard in 2002 (see below). Other management tools that have been brought to bear include enforcement of those zones, limiting or conditioning permits for the construction of new boat access facilities (e.g., marinas, boat ramps, and docks) in key manatee habitat, and public education and outreach.

Figure 34. Collisions between watercraft and manatees are one of the major causes of Florida manatee deaths, and the vast majority of living manatees bear multiple scars from nonlethal collisions. (Photo by Robert K. Bonde, courtesy of the Sirenia Project, Center for Aquatic Resource Studies, U.S. Geological Survey.)

In 2002 Fish and Wildlife Service enforcement officers organized 12 two- or three-day enforcement operations to improve compliance with manatee-related speed zones in Brevard, Collier, Lee, Sarasota, and Volusia Counties. The initiatives targeted boaters in areas of poor compliance that had high numbers of watercraft-related manatee deaths. Serivce officers issued tickets to 670 violators during these operations. During 2002 the Coast Guard also cited 711 violators for exceeding posted speed limits in various parts of Florida.

Although boat speed zones likely have helped limit the number of watercraft-related manatee deaths to some unknown extent, their effect has not been evident in overall watercraft-related mortality trends, which have continued to increase. This may be due to a number of factors. In part, the continuing increase may reflect increasing numbers of manatees. However, the 10 percent rate of increase in watercraft-related deaths in recent years exceeds what could reasonably be expected to be the potential maximum rate of manatee population growth. It is unclear how fast manatee abundance may have grown in recent years, but for some areas, recent declines in adult survival rates suggest that population growth rates may have slowed and even declined in recent years.

Increasing numbers of boats also may be responsible for the increase in watercraft deaths. Data from the Florida Division of Law Enforcement reported that 829,000 state-registered vessels and about 300,000 out-of-state boats used Florida waterways in 1999. Two years later in 2001, those combined figures had risen nearly 20 percent to 943,600 state-registered vessels and 400,000 out-of-state boats. Given this rate of increase, it is possible that boat speed zones have helped stem the increase in watercraft-related deaths but not enough to prevent the problem from becoming worse. The recent increase in the number of boats has risen faster than it did in the 1980s and early 1990s but could slow with the recent economic downturn of the past few years. It seems highly unlikely, however, that the number of boats will decrease in the foreseeable future, given Florida's steadily increasing human population.

Low rates of boater compliance in established zones also may be a factor. Studies undertaken by the Florida Marine Research Institute have revealed low levels of compliance by boaters in some areas, with operators of relatively small outboards and personal watercraft responsible for most violations of posted speed limits. Obviously, if zones are established and posted but not widely obeyed, they will not be effective. It also is possible that speed limits established for some areas have not provided a level or form of protection commensurate with manatee protection needs. For example, in some areas where high-speed traffic has been allowed adjacent to shoreline or nonchannel speed zones in deference to boating interests, watercraft-related manatee deaths have remained high.

It also is possible that manatees may have limited abilities to evade even slow-moving boats. Although this is possible, it does not appear to have been a factor in recent trends. If this were the case, one would expect an increase in the proportion of animals killed by propeller wounds and a decrease in the proportion killed by blunt trauma impacts because boats in key manatee habitats spend more time traveling slowly in response to new speed zones. However, there has been no obvious change in these proportions since work began to expand the network of boat speed zones in the early 1990s. Of 406 watercraft-related manatee deaths between 1979 and 1991, 39 percent were caused by propeller wounds, 55 percent by blunt impact, and 6 percent by a combination of both or unspecified causes. Of the 585 watercraft-related deaths from 1992 through 2001, 33 percent were caused by propellers, 57 percent by impact, and 10 percent by a combination of both. Thus, there does not appear to have been an increase in deaths that might arguably be linked to boats traveling at slow speeds.

To resolve questions about factors that influence the effectiveness of boat speed regulatory zones, it may be necessary to treat some speed zones as index sites where detailed monitoring and perhaps some management manipulation (e.g., various documented levels of enforcement, signage, and public education) would be undertaken. Assessing the effectiveness of different types of zones seems particularly important. The latter probably would require comparing data on watercraft-related manatee deaths in a particular area during periods of different regulatory regimes. Areas in which past watercraft-related deaths have been relatively frequent (e.g., the Barge Canal and Sykes Creek in Brevard County) may provide the best opportunities in this regard. In the near term, further enforcement, public education, and attention to the adequacy of zones in high-mortality areas seem warranted.

Proposed Incidental Take Rules—The Marine Mammal Protection Act prohibits both the intentional and unintentional taking of marine mammals unless authorized under certain limited exceptions. Under the Act, taking includes harassing, injuring, or killing. One of the Act's exceptions to this provision is section 101(a)(5), which authorizes the Fish and Wildlife Service, upon request, to develop regulations that would allow specific activities to incidentally, but unintentionally, take small numbers of marine mammals. In issuing such regulations, the Service must find, in part, that the total take by the requested activity over the period that the regulations are in effect (i.e., a maximum of five years) would have no more than a negligible impact on the affected species or stock.

In partial response to a settlement agreement for a lawsuit filed by several environmental groups against the Fish and Wildlife Service and the Army Corps of Engineers, the Service published proposed regulations on 14 November 2002 under section 101(a)(5) to help implement measures to limit watercraft-related manatee deaths. The proposed regulations identified procedures that the Service would use to issue letters of authorization to certain government agencies whose programs authorize the operation of watercraft or the construction of watercraft access facilities in three areas of Florida. Specifically, the letters would authorize the incidental but unintentional take of manatees under the Army Corps of Engineers' section 404 Clean Water Act permitting program. Under that program, the Corps issues dredge and fill permits required for the construction of marinas, docks, and certain other watercraft access facilities. The process for issuing letters of authorization also would be available to other state and federal agencies should they choose to request a letter of authorization for their government programs concerning watercraft operations or watercraft facilities that could affect manatees.

Procedurally, the proposed regulations provided that, upon receiving a request from a government agency for incidental take authorization,

Figure 35. Florida manatees occur in at least four discrete stocks: northwestern and southwestern Florida, the Atlantic coast, and the upper St. Johns River. (Figure by Sirenia Project, courtesy of the U.S. Geological Survey.)

the Service would review the agency's described program to determine if it would cause watercraft-related deaths to exceed negligible levels. For depleted species, such as the Florida manatee, generally accepted guidance defines negligible levels of taking as those that (1) do not exceed 10 percent of a population's net productivity, and (2) do not delay the projected time required for the population to reach its optimum sustainable population level by more than 10 percent. The Service indicated its intention to use the latter standard to determine negligible levels of take for manatees. To make this determination, the Service also noted that it planned to use a population model that was still under development.

If it is determined that the agency's program could cause levels of taking that exceed negligible levels, the Service would then identify additional measures to prevent such an occurrence. If it could not make a finding that take levels could be maintained at negligible levels, it could not issue a letter of authorization. For purposes of limiting taking by watercraft, the Service advised that it would rely on the following general types of measures: (1) rules to restrict boat speed and waterway access, (2) enforcement of those rules, (3) boater education and awareness programs, (4) measures in county manatee protection plans and government permit programs to guide the location and development of new watercraft access facilities, and (5) technological measures, such as propeller guards. If specific measures were deemed necessary to prevent taking in excess of negligible levels, the Service would include those in its letter of authorization to the requesting agency.

As indicated above, to issue such regulations the Service must find that the levels at which manatees are taken by watercraft will not exceed negligible levels. Florida manatees have been divided into four separate stocks (Fig. 35). For two of these regional subpopulations, the upper St. Johns region and northwestern Florida, the Service concluded that watercraft-related deaths currently are at negligible levels and that no additional mitigation mea-

sures would be needed to implement the Corps' permit program. For one region, the Atlantic coast region, it concluded that current mortality levels exceed negligible levels but that additional mitigation measures plus existing measures would reduce impacts to negligible levels. For the fourth region, southwestern Florida, the Service concluded that information was not adequate to make a determination at this time. To reach these conclusions, the Service considered information on watercraft-related deaths and compared the status of the four manatee subpopulations with population benchmarks developed to provide measurable criteria for downlisting and delisting manatees under the Endangered Species Act.

At the end of 2002 the Commission was developing comments and recommendations on the Service's proposed rule.

The Service's proposal reflects a novel, albeit perhaps ill-suited, use of section 101(a)(5) authority. This section of the Act was developed to provide a mechanism for authorizing insignificant levels of take by individuals or industry groups engaged in specific activities for a set period of time, rather than for government programs making decisions on thousands of individual projects on an ongoing basis.

In attempting to use this section to address watercraft impacts, the Service's proposal raises a number of significant substantive and procedural issues. First, the Service's conclusions that current levels of watercraft-related manatee deaths are currently below or near negligible levels for three of the four Florida regions are questionable and lack supporting calculations to show that its chosen negligible impact standard (i.e., not delaying recovery time to optimum sustainable levels by more than 10 percent) would be met. Under the other generally accepted standard not considered by the Service (i.e., not exceeding 10 percent of a population's net productivity), the net productivity level for the total Florida manatee population would have had to have been at least 980 for the 98 watercraft-related deaths in 2002 to be considered negligible; and even that level would include no consideration for serious injuries and other forms of nonlethal taking. Such a high net productivity is unrealistic for a population that may number little more than 3,276 and whose females, at best, successfully rear a single calf every two years.

Also, the Service asked for comments on a proposal to use a population model not yet completed to assess negligible impact levels. There was, however, no way to test the model's utility for this purpose. As required by the provisions of section 101(a)(5), the proposal also did not set forth the specific research, monitoring, or mitigation measures that would be needed to assure that impacts do not exceed negligible levels. Instead, the regulations deferred decisions on those measures to a point when opportunity for public review and comment on a requested authorization would not be provided.

Given these points, it appeared that a more appropriate approach for identifying and implementing needed measures to reduce watercraft-related mortality would be through developing county manatee protection plans that meet established standards and criteria of acceptability. The Commission had previously recommended such an approach following its review of the manatee program in 2000. In 1989 such plans had been mandated for some counties as part of the Florida Growth Management Act, but only a few counties prepared them. In view of the controversy surrounding the issuance of permits for watercraft access facilities and the establishment of boat speed regulatory measures, it also appeared highly desirable that a long-term issue resolution process be established to bring all concerned parties together to help develop an optimal strategy for identifying and implementing additional manatee protection measures as may be needed. At the end of 2002 the Commission was in the process of summarizing these and other comments in a letter to be sent to the Service early in 2003.

Manatee Sanctuaries and Refuges

Regulations adopted by the Fish and Wildlife Service in 1979 authorize the agency to designate manatee sanctuaries and manatee refuges for the purpose of manatee protection. Manatee sanctuaries are areas in which all human activities are precluded, and manatee refuges are areas where specified human activities may be regulated. Before 2001 these regulations had been used to establish only seven small manatee sanctuaries (about 50 acres combined) in Kings Bay, a warm-water refuge at the head of the Crystal River on Florida's west coast.

Pursuant to negotiations to settle a lawsuit filed in January 2000 by several environmental groups against the Service and the Army Corps of Engineers alleging violations of federal statutes protecting manatees, the Service agreed to pursue actions to designate additional manatee sanctuaries and refuges. The Service subsequently requested comments and advice on potential new sites and, as noted in previous annual reports, the Commission suggested several possible areas. Based on submitted comments and its own analyses, the Service published a proposed rule on 10 August 2001 to designate 12 new manatee refuges and 4 new sanctuaries.

Designation of the Barge Canal and Sykes Creek Manatee Refuges—On 7 January 2002 the Service published a final rule to designate two of the 16 areas it had proposed as new manatee sanctuaries and refuges. The two areas, located within about a mile of each other on Merritt Island near Cape Canaveral, were designated as manatee refuges for the purpose of strengthening boat speed restrictions. One was located in a portion of Sykes Creek (846 acres) and the other was in a dredged cut called the Barge Canal (683 acres). The Service decided to defer action on the other 14 sites in lieu of steps the State of Florida planned to take to consider additional protection needs for those and other areas under state authority.

The two designated areas are heavily used by manatees as a travel corridor. Sixteen watercraft-related manatee deaths have been recorded in the area as of 2000, making it among the most deadly areas in Florida for manatees. The Barge Canal, about seven miles long and 150 feet wide, is heavily used by recreational boaters transiting between the Intercoastal Waterway, Sykes Creek, and the Banana River. Under state rules, much of the Barge Canal had been regulated as a channel-exempt speed zone, with a 25 mph limit in the channel and a slow speed limit along the banks, with four slow-speed segments along portions of the channel. High-speed boat traffic also has been allowed in Sykes Creek, which connects to the Barge Canal. Because of continuing manatee mortalities in both areas, the state had previously proposed to make both areas a slow-speed zone, but due to rule-making appeals filed to block the action, it was unclear whether or when the rule would go into effect. The Service therefore decided to proceed with designating the two areas as manatee refuges and to require year-round slow speeds in case the state was unable to implement its rule.

Proposed Exemption Process—On 16 April 2002 the Service proposed amending its new regulations for the Barge Canal to establish a process for authorizing exemptions to the slow-speed restrictions. The proposed rule was prompted by a request from a boat manufacturer with facilities along the canal who wanted to be able to continue testing new boat designs at high speeds in the canal. The Service also proposed issuing an exemption to the company if it was determined that no manatees would be taken during testing operations. The rule noted that the Service had concluded that it may be possible to conduct the activity without placing manatees at risk by using observers or technological methods to ensure that no manatees are present in the area when the boats are tested.

The Commission commented on the proposed rule on 28 June 2002, noting that available records indicate that at least two manatees had been struck and killed in the Barge Canal by the company's boats and that granting the exemption would set an ill-advised precedent. Among other things, it noted that high-speed travel areas existed within two miles of the company's facilities, a 15-minute trip each way at slow speeds. It also noted that an exemption to operate vessels at high speed in a confined, heavily traveled corridor where other boats were limited to slow speed could pose a navigation hazard. In addition, the exemptions could complicate efforts to assess the effectiveness of the new slow-speed rules. By carefully monitoring watercraft compliance and documenting enforcement efforts, the new refuges could provide an important opportunity for assessing the potential effectiveness of both boat speed restrictions and enforcement efforts.

The Commission also questioned the Service's conclusion that it may be possible for observers and technological detection methods to assure that no manatees are present in the area during times of testing. It noted that visual detection of manatees would be limited due to poor water clarity in the Barge Canal, and that detection technologies, such as acoustic detection or sonar, had not been proven reliable. As a general matter, the Commission therefore recommended that any applicant asserting that it would be possible to assure that manatees are not present in a given area at a given time be required to demonstrate that ability.

The Commission also noted that, although the proposed exemption process allowed for public review of submitted applications, it did not provide a similar opportunity to review the Service's views on the request or any terms and conditions that it planned to require. The Commission therefore recommended that the exemption process be revised to provide public notice and opportunity to comment on the Service's intent to approve, deny, or condition a requested exemption and the rationale for its proposed action.

As of the end of 2002 the Service had taken no further action on its proposed amendment rule, and it was unclear if it planned to grant the requested exemption to test boats at high speed in the Barge Canal.

Other Manatee Sanctuaries and Refuges—In the spring of 2002 the Florida Fish and Wildlife Conservation Commission initiated a rulemaking process to consider possible measures to protect certain manatee habitats, including areas that the Service had proposed to designate as manatee sanctuaries and refuges. In July 2002, however, the District Court for the District of Columbia found that the Service's decision to defer action on its proposed sanctuaries and refuges violated the terms of a 7 November 2001 settlement agreement reached between the Service and environmental groups on the abovenoted lawsuit.

On 20 September 2002 the Service therefore published emergency rules to designate four of the sanctuaries and three of the refuges that it had previously deferred (Table 9). All seven areas were associated with warm-water refuges on Florida's west coast. With the approach of winter, the Service's notice advised that it had determined that manatees in those areas were at risk of imminent danger without the action. The four sanctuaries, which prohibit all waterborne activity from 1 October through 31 March, included the Blue Waters Manatee Sanctuary (4.1 acres) adjacent to the Homosassa Springs State Wildlife Park, and warm-water outfalls at three power plants in Tampa Bay — the Bartow Electric Generating Plant (181.5 acres), and the Tampa Electric Company's Big Bend plant (76.2 acres) and Gannon plant (2.7 acres). The three refuges included waters immediately adjacent to the three sanctuaries in Tampa Bay and established slow and idle speed zones also effective from 1 October through 31 March.

The emergency rules were to be effective from 1 October 2002 through 20 January 2003. On 8 November 2002 the Service published final rules making all but one of the seven sanctuaries and refuges permanent. Because of a more protective county ordinance at the manatee refuge associated with the Gannon power plant, the Service withdrew that refuge. The final rules also changed the effective period for the other six refuges to 15 November to 31 March and modified most of the area boundaries to make them conform with state and local measures.

Table 9. Manatee sanctuaries and manatee refuges designated in Florida by the Fish and Wildlife Service in 2002

Site	Status	County	Regulation	Proposed Acreage	Final Acerage
Blue Waters	Sanctuary	Citrus	No Entry	4.1	1.6
Bartow Power Plant	Sanctuary	Pinella	No Entry	181.5	29.8
Big Bend Power Plant	Sanctuary	Hillsborough	No Entry	76.2	29.9
Port Sutton Power Plant	Sanctuary	Hillsborough	No Entry	2.7	2.7
Bartow Nav. Channel	Refuge	Pinella	Withdrawn	74.8	–
Big Bend	Refuge	Hillsborough	Idle Speed	230.9	220.8
Port Sutton	Refuge	Hillsborough	Idle Speed	96.9	96.9
Pansy Bayou	Refuge	Sarasota	Slow Speed	116.1	116.1
Little Sarasota Bay	Refuge	Charlotte	Slow/25 Channel	529.4	529.4
Lemon Bay	Refuge	Charlotte	Slow/25 Channel	948.0	948.0
Piece River	Refuge	Charlotte/DeSoto	Various	12,088.1	4,196.1
Shell Island	Refuge	Lee	Slow Speed	80.5	80.5
Haulover Canal	Refuge	Brevard	Slow Speed	682.7	22.1
Cocoa Beach	Refuge	Brevard	Slow Speed	59.1	59.1
Barge Canal	Refuge	Brevard	Slow Speed	682.7	682.7
Sykes Creek	Refuge	Brevard	Slow Speed	845.8	845.8

The Service's 8 November 2002 final rules also designated seven other manatee refuges (Table 9) with year-round requirements for using slow speed, channel-exempt slow speed, and/or shoreline slow speed. Several of the designated areas were smaller than those initially put forth in the Service's 10 August 2001 proposed rules.

Thus, including the Barge Canal and Sykes Creek established in January 2002, the Service designated four new manatee sanctuaries (totaling 64 acres) and 11 new manatee refuges (totaling 7,269 acres) during 2002.

State Regulatory Areas—As part of a settlement agreement on a lawsuit concerning manatee protection filed by several environmental groups against the Florida Fish and Wildlife Conservation Commission, the latter considered rulemaking action during the spring of 2002 to establish new boat speed zones in 16 areas around the state. Most of those areas included waters that had been proposed for designation as manatee refuges and sanctuaries in the 10 August 2001 *Federal Register* notice published by the Fish and Wildlife Service. The Florida conservation commission subsequently held public hearings in the summer of 2002, and in the fall of 2002 it adopted rules to proceed with 10 of the 16 sites under consideration. As of the end of 2002 one site had been posted and work was under way or being planned to post the remaining nine sites.

Assessing Boater Compliance—To assess compliance with established zones, the Florida Marine Research Institute, the Fish and Wildlife Service, Mote Marine Laboratory, and others have supported studies at various speed zones around the state. The studies involve placing observers along regulated waterways to monitor and record data on boat traffic and vessel speed. Such studies are labor-intensive and expensive.

To explore the development of a less expensive, more efficient way to monitor compliance, the Commission and the Fish and Wildlife Service provided funding to the Florida Marine Research Institute in 2001 to contract for the development of a remotely operated photographic system to monitor vessel traffic and vessel speeds on waterways used by manatees. The intent was to develop an easily portable system that could record and transmit photos of vessels and data on vessel speed over a wireless Internet connection to a remote site and threby speed the process of gathering compliance data. In 2002 the contractor developed such a device but, because of difficulty in obtaining a laser range-finding device, data collection capabilities were somewhat limited compared with the initially envisioned system. As of the end of 2002 the Commission and the Institute were working with the contractor to identify options to overcome the technical difficulties. It is hoped that, with further efforts, the device can be perfected in 2003.

Management Strategies for Warm-Water Refuges

Almost all manatees in Florida depend on natural or artificial warm-water refuges to survive winter cold periods (Fig. 36). About 60 percent of the manatees seen during the maximum count of 3,276 animals in January 2001 occurred at power plant outfalls. Because of threats to manatees at both natural warm-water springs and power plant outfalls, the third revised Florida manatee recovery plan assigns its highest priority ranking to tasks necessary to implement a long-term strategy for ensuring a safe, dependable network of warm-water refuges. In 1999 the Service convened a workshop to identify research and management actions needed to develop such a strategy. Shortly after that workshop, a warm-water task force composed of agency and industry representatives was established to help plan and oversee related work.

Figure 36. Natural and artificial warm-water refuges with at least one count of 40 or more Florida manatees (power plants are identified in roman and natural springs in italics). (Figure by Leslie Ward, courtesy of the Florida Marine Research Institute.)

In 2002 to support a warm-water task force adaptive management planning initiative, the Fish and Wildlife Service provided funds to the U.S. Geological Survey and the Florida Fish and Wildlife Conservation Commission to develop a manatee response model and related research. With those funds, researchers increased efforts to survey and photo-identify manatees at East Coast power plants to assess manatee responses to various temperature and climate changes. Task force members also worked to standardize the collection of temperature data at the various plants. Preliminary modeling efforts are scheduled to begin early in 2003.

Because of the possibility that power plants now used by manatees could be retired and closed, the Commission has recommended that consideration be given to constructing nonindustry-dependent warm-water refuges within the current winter range of manatees. Such refuges might minimize the discharge of heated water into waterways to minimize thermal pollution while replacing existing industry-dependent warm-water refuges. As discussed in the previous annual report, the Florida Power & Light Company contracted for studies to (1) consider possible sites for such refuges along the east coast of Florida where it operates several power plants used by manatees and (2) assess the engineering feasibility, land requirements, and construction costs associated with a solar-powered water-heating system that could support manatees through the winter at a site on the east coast.

Results of the former study were completed in 2001 and are reported in the previous annual report. It identified four possible sites based on factors such as proximity to sea grass feeding areas and local boat traffic patterns. The second study, completed in 2002, concluded that existing solar heating technology could provide a requisite amount of warm water to maintain a small embayment at temperatures that would sustain manatees through the winter. To maintain a 100 by 150-ft. embayment six feet deep at a temperature of 68ºF, construction costs for an adequate field of solar energy collectors were estimated at approximately $135,000. This cost would increase to about $750,000 to maintain a temperature of 80ºF. It was estimated that one-half acre would be required for the solar field. Additional costs would be required for maintenance, pumping, and possibly land acquisition (many of the potential sites identified in the initial study were adjacent to publicly owned lands and thus many require no land acquisition).

During 2001 and 2002 Florida Power & Light Company also undertook work to repower its Fort Myers power plant on the west coast of Florida. The plant outfall has been used by more than 300 manatees on several occasions during cold periods in recent winters, and on one occasion was reported to have more than 400 animals. To proceed with repowering work in January 2002, the company had to temporarily shut down the warm-water discharge from the plant's generating units. For the sole purpose of ensuring an adequate warm-water refuge for manatees that have come to depend on the plant's effluent, the company temporarily installed an auxiliary oil-fired water heating unit called a "donkey boiler" for the winter period of reduced plant discharges. Although the heated area was smaller than that produced by the operating plant, manatees continued using the outfall under the temporary arrangement. Work to repower the plant and resume the warm- water discharge was completed before the onset of winter at the end of 2002.

Entrapment in Flood Gates

The second largest source of human-related manatee mortality has been the crushing or drowning of animals that become pinned in closing flood gates and navigation locks. Most of these water control structures are owned or operated by either the South Florida Water Management District or the U.S. Army Corps of Engineers. In 1994 manatee deaths in such structures reached a record high of 16 animals. To prevent such deaths, the two agencies, at the urging of the Florida Bureau of Protected Species Management and the Fish and Wildlife Service, initiated engineering studies to develop mechanisms to be installed on gate and lock doors that, like elevator doors, would automatically stop and reverse closing operations when a manatee became caught in them.

After considerable effort and design work, promising devices were developed in the mid-1990s for both flood gates and navigation locks. The Corps and the District developed a list of more than 20 structures to be retrofitted with the new devices and secured funding to begin installation work. The first flood gate was equipped in 1997 and the first navigation lock was retrofitted in 1998.

Since then the agencies have been installing the devices as time and funding permit. Initial work has focused on those structures that had the highest manatee mortality. Manatee deaths at gates and locks equipped with new devices have dropped to very low levels. When deaths have occurred, adjustments have been made to further reduce the entrapment risks. As of the end of 2002, 12 structures had some type of protection devices in place and work was under way at another flood gate. During 2002, five manatees were killed at water control structures, but none of them occurred at structures that have been retrofitted with the new devices.

Petition to the State of Florida to Reclassify Manatees

Florida manatees are listed as endangered under both the U.S. Endangered Species Act and state law. In light of the January 2001 count of 3,276 manatees, the Coastal Conservation Association of Florida petitioned the Florida Fish and Wildlife Conservation Commission to reevaluate the status of Florida manatees under state law. The Association believed that, under state law, manatees could be delisted or downlisted to a status of "threatened" or "species of special concern." In response to the petition, the Florida conservation commission requested comments on the status of Florida manatees relative to the state's definitions for the various protected species categories.

The terms "endangered," "threatened," and "species of special concern" are defined in Chapter 68 of the Florida Administrative Code and were adopted in 1999 based on definitions used by the World Conservation Union to define "critically endangered," "endangered," and "vulnerable" species. The World Conservation Union's definitions were developed to identify species most urgently in need of protection on a worldwide basis and apply to any species of plant or animal. The definitions are complex and stringent and are ill-suited to species such as marine mammals that are long-lived, wide-ranging, slow-reproducing, and slow to recover. For example, definition of a critically endangered species includes such criteria as having a population size of less than 50 individuals, a population size of fewer than 250 individuals that also is declining at a rate of 25 percent per generation, a distribution of less than 40 square miles, and a projected decrease in population size of at least 80 percent within the next 10 years.

In the early 1990s the World Conservation Union proposed that these definitions be used as listing criteria for species protected under the Convention on International Trade in Endangered Species of Fauna and Flora. At that time, the Commission wrote to the Fish and Wildlife Service, which represents the United States at Convention meetings, commenting that several highly endangered marine mammals would not meet the listing criteria and that the criteria were flawed, at least as they applied to marine mammals.

On 9 August 2002 the Marine Mammal Commission responded to the Florida conservation commission's request for comments on the petition. In its letter the Marine Mammal Commission reiterated its concerns about the World Conservation Union's criteria and enclosed a copy of its 1993 letter to the Service. It noted that the Florida manatee did not appear to qualify under any criteria adopted by the state to define "endangered" or "threatened species," or "species of special concern." It also noted, however, that the definitions of those terms were entirely inappropriate for assigning marine mammals and certain other species, such as sea turtles, to those categories. It noted, for example, that under the state's definitions, North Atlantic right whales, which number about 300 animals—and are rarer than giant pandas and most tigers — also would not qualify as either endangered or threatened. As a general matter, the Commission noted that the criteria did not adequately address species that are long-lived, wide-ranging, slow to reproduce, and slowly recovering from depletion.

The Marine Mammal Commission, therefore, recommended that the Florida conservation commission revise its definitions and criteria for the three protected species categories to take into account life history characteristics that typify marine mammals. Pending such revisions, it recommended that Florida manatees remain listed as endangered species under state law.

As of the end of 2002 the Florida conservation commission was scheduled to consider the petitioned action at its first meeting in 2003.

Chapter IV

MARINE MAMMAL/FISHERIES INTERACTIONS

Fishing operations may disturb, harass, injure, or kill marine mammals either accidentally or deliberately. Conversely, marine mammals may take or damage bait and fish caught on lines, in traps, or in nets; damage or destroy fishing gear; or potentially injure fishermen trying to remove them from fishing gear. Further, marine mammals and fishermen sometimes compete for the same fish and shellfish resources.

The Marine Mammal Protection Act was amended in 1994 to establish a new regime governing the take of marine mammals incidental to commercial fishing operations. 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. Implementation of the 1994 fisheries regime is discussed in this chapter. Also discussed are amendments to the Marine Mammal Protection Act enacted in 1997 pertaining to the eastern tropical Pacific tuna fishery and actions being taken to implement those amendments. Fishery interactions affecting specific species, including Hawaiian monk seals, Steller sea lions, harbor porpoises, bottlenose dolphins, and right whales, are discussed in the individual species' sections in Chapter III.

Implementation of the Incidental-Take Regime for Commercial Fisheries

Since its enactment in 1972 the Marine Mammal Protection Act has contained provisions for authorizing the taking of marine mammals incidental to commercial fishing operations. The 1987 ruling in a lawsuit challenging an incidental-take permit issued to Japanese salmon fishermen operating in U.S. waters (*Kokechik Fishermen's Association* v. *Secretary of Commerce*), however, threw into question whether, under then-existing provisions, such permits could continue to be issued to many other fisheries known to take marine mammals. In response, Congress passed a five-year interim exemption to govern taking incidental to commercial fishing operations. During that time a new long-term incidental-take regime was to be developed. Efforts to design the new regime, including development of recommended guidelines by the Commission, are discussed in past annual reports.

These efforts led to the amendment of the Marine Mammal Protection Act in 1994 to establish a new regime to govern the taking of marine mammals incidental to commercial fishing operations. Three new sections (sections 117, 118, and 120) 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. In part, the assessments are intended to identify strategic stocks for which take reduction plans must be prepared. Strategic stocks are those that (1) have a level of direct human-caused mortality exceeding the calculated potential biological removal level, (2) are designated as depleted under the Marine Mammal Protection Act, (3) are listed as endangered or threatened under the Endangered Species Act, or (4) are likely to be listed as endangered or threatened in the foreseeable future.

Section 118 sets forth the requirements of the 1994 incidental-take regime. It directs the National

Marine Fisheries Service to publish a list of commercial fisheries classified into three categories according to the frequency with which they kill or seriously injure marine mammals. Certain requirements (e.g., a registration requirement and a requirement to carry observers) are applicable, depending on a fishery's classification. The amendments focus resources on the most pressing problems— those involving strategic stocks. Such take reduction plans are to be developed for each strategic stock subject to frequent or occasional mortality or serious injury. The Service is to convene a take reduction team with members representing a range of interests to recommend measures to be included in a take reduction plan adopted by the Service to reduce incidental take of marine mammals in commercial fisheries.

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 to lethally take 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 task force to examine problems involving pinnipeds and aquaculture projects in the Gulf of Maine.

The new regime includes a mechanism for authorizing a limited incidental take of marine mammals listed as endangered or threatened under the Endangered Species Act, something the original statute and the interim exemption did not provide. Such authorizations may be issued under section 101(a)(5)(E) of the Marine Mammal Protection Act, provided the National Marine Fisheries Service (or the Fish and Wildlife Service for manatees and southern sea otters) determines that (1) the incidental mortality and serious injury will have a negligible impact on the species or stock, (2) a recovery plan has been or is being developed under the Endangered Species Act, and (3) if required, a monitoring program for relevant fisheries has been established under section 118.

Actions involving the preparation of stock assessments and take reduction plans are discussed below and, as they relate to specific marine mammal stocks, in Chapter III. Implementation of the other requirements of section 118 and provisions applicable to endangered and threatened species, to deterring marine mammals from damaging fishing gear or catch, and to authorizing the lethal removal of pinnipeds adversely affecting the recovery of certain salmonid stocks are also discussed.

Stock Assessments

Section 117 of the Marine Mammal Protection Act requires the Secretaries of Commerce and the Interior to prepare and periodically update stock assessment reports for each marine mammal stock that occurs in U.S. waters. This provision also requires that three regional scientific review groups be established to assist in the development of these reports. These groups were established in 1994 for Alaska; the Pacific coast, including Hawaii; and the Atlantic coast, including the Gulf of Mexico. They include experts in marine mammal biology, commercial fishing technology and practices, and, in the case of Alaska, Native subsistence uses. Among other things, scientific review groups are 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) needed research with respect to possible modifications in fishing gear and practices to reduce the incidental mortality and serious injury of marine mammals, and (4) the potential impacts of habitat destruction on marine mammals and, for strategic stocks, conservation measures to reduce such impacts.

Based on the advice of the scientific review groups and public comment on draft stock assessments, the Secretaries are to publish a final assessment report for each stock. Among other things, each assessment is to provide an estimate of 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 it to reach or remain at its optimum sustainable population level. The potential biological removal level is calculated by multiplying three variables: the stock's minimum population estimate, one-half of its theoretical or estimated maximum net productivity rate at a small population size, and a recovery factor of between 0.1 and 1.0, depending on the status of the population.

National Marine Fisheries Service

The National Marine Fisheries Service published its original stock assessment reports in 1995. Assessments are to be reviewed at least annually for strategic stocks and at least once every three years for other stocks. Revisions made to stock assessments by the National Marine Fisheries Service in past years are discussed in previous annual reports.

The Service published a notice of availability of the final stock assessments for 2001 in the *Federal Register* on 8 March 2002. The reports for the Alaska, Atlantic, and Pacific stocks may be accessed on the National Marine Fisheries Service's website at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/sars.html#Overview.

The Service announced the availability of draft revised stock assessment reports for 2002 in a *Federal Register* notice published on 19 April 2002. The Service proposed revisions to 23 of the 60 assessment reports for stocks occurring in the Atlantic and Gulf of Mexico area. The proposed revisions applied to 14 strategic and 9 nonstrategic stocks and, for the most part, pertained to abundance and mortality estimates. The report pertaining to the western North Atlantic coastal stock of bottlenose dolphins was substantially revised to reflect new information on stock structure. Although the Service identified it as a single stock, that stock is divided into seven "management units." Unit-specific abundance and mortality data were provided, as were separate calculations of potential biological removal levels for each unit. The Service proposed a change in the status of one stock, the western North Atlantic pygmy sperm whale stock. The stock would be changed from nonstrategic to strategic in light of new information indicating that fishery-related mortality exceeds the stock's potential biological removal level.

Revisions to 13 of the 56 marine mammal stocks occurring in U.S. waters along the Pacific coast and Hawaii were proposed for 2002. Based on recent genetic analyses, the Service proposed splitting the two stocks of harbor porpoise that it had previously identified as occurring along the California coast into four distinct stocks. One of the new stocks, that occurring in Monterey Bay, is considered to be a strategic stock, with fishery-related mortality exceeding its potential biological removal level by a factor of nearly eight. The eastern North Pacific transient stock of killer whales, previously listed as a Pacific stock, was reclassified as an Alaskan stock. A proposed revision to the Hawaiian monk seal stock assessment would separate mortalities and serious injuries that occur in derelict fishing gear from those attributed to active fishing.
.

Of the 33 marine mammal stocks that occur in Alaska waters, revisions to the assessment reports for 15 were proposed for 2002. Decisions were based primarily on new estimates of abundance or human-related mortality. The draft reports for ringed, ribbon, spotted, and bearded seals included new, higher estimates of the numbers taken by subsistence hunters. The draft report for the eastern North Pacific stock of gray whales included new information concerning the unusually high number of whales found stranded during 1999 and 2000 and presented preliminary data from 2001 that suggest that stranding rates have returned to "normal."

The Commission, in consultation with its Committee of Scientific Advisors, reviewed the draft stock assessments and provided comments to the Service by letter of 24 July 2002. The Commission questioned the practice of combining or grouping stocks for the purpose of estimating abundance, potential biological removal levels, or mortality estimates, noting that this was inconsistent with the statutory requirements concerning stock assessments. Combining data for species groups has the potential to underestimate the risk to those species with lower abundance, slower growth rates, or higher interaction rates. The Commission noted, for example, that combining the analyses for long-finned and short-finned pilot whales, or those for *Mesoplodon* beaked whales, may result in underestimating the risks to some of those species.

The Commission also questioned the Service's decision to include data on fishery- and other human-related mortalities and serious injuries only when incidents could be confirmed. In the Commission's view, requiring confirmation runs counter to the precautionary principle built into the Marine Mammal Protection Act and would tend to result in underestimates. Similarly, the Commission took issue with conclusions in some assessment reports, particularly those for the Alaska region, that certain effects were not occurring because they had not been observed. The Commission cautioned that such conclusions of no-effect

should be based, in part, on monitoring effort being made to detect such effects.

The Commission's comments also noted inconsistencies in the way observer data concerning mortalities and serious injuries were treated in the assessments. In some instances, data from fisheries with low observer coverage were used to estimate overall mortality rates, but for other fisheries the data were deemed to be too unreliable a basis for extrapolating take levels. Also of concern to the Commission was the questionable reliability of observer-based estimates of take in those fisheries where observer coverage was low. The Commission noted, for example, that coverage in the Atlantic squid, mackerel, and butterfish trawl fishery is less than 1 percent and the resulting estimates of take for common dolphins shows great interannual variability (from 0 to 940). The Commission believed that such lack of precision and accuracy does not inspire confidence in the existing monitoring program for this fishery or in the Service's assessment of the potential effects of the fishery on dolphins. The Commission therefore encouraged the Service to consider the adoption of standards for setting observer coverage levels.

The Commission also commented specifically on the draft assessments for 34 stocks.

At the end of 2002 final 2002 stock assessment reports for the marine mammal stocks under the jurisdiction of the National Marine Fisheries Service had not been completed but were expected to be available early in 2003.

Fish and Wildlife Service

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

As discussed in previous annual reports, the Fish and Wildlife Service issued draft revised stock assessments for southern sea otters in California, northern sea otters in Washington, and the Florida and Antillean stocks of West Indian manatees in April 1997. The final reports for those stocks were never published, and they have not been updated since that time.

The Service published a notice of availability of draft revised stock assessment reports for Pacific walruses, polar bears, and sea otters occurring in Alaska on 28 March 2002. The key change proposed by the Service was the splitting of Alaska sea otters, which had originally been identified as a single stock, into three separate stocks. The southwestern Alaska stock, which has experienced a dramatic decline over the past decade and is a candidate for listing under the Endangered Species Act, was identified as a strategic stock. The other two stocks, south-central Alaska and southeastern Alaska, were considered to be nonstrategic.

The Commission provided comments to the Fish and Wildlife Service on the draft revisions by letter of 26 June 2002. The Commission noted that some of the information used to estimate population sizes of the sea otter stocks was dated and therefore of questionable reliability. In view of the significant decline of sea otters in southwestern Alaska, the Commission believed that obtaining updated population estimates for all three stocks was a high priority. The Commission also provided specific comments on the individual assessments.

The Service published a notice of availability of the final assessment reports for the marine mammal stocks that occur in Alaska in the *Federal Register* on 9 October 2002. Those assessments retained the separation of Alaska sea otters into three stocks. With respect to the Commission's concern about the need for more recent sea otter abundance estimates, the Service indicated that it had requested the U.S. Geological Survey's Division of Biological Resources to conduct new aerial surveys of the southeastern Alaska population. The Service noted, however, that although that survey is currently under way, it will take two to three years to complete. The final reports for the Alaska stocks prepared by the Fish and Wildlife Service are available online at http://www.r7.fws.gov/mmm/sar.

The Incidental-Take Regime

Section 118 of the Marine Mammal Protection Act sets forth the regime governing the take of marine mammals incidental to most commercial fishing operations. It requires classification of all U.S. fisheries according to the frequency with which marine mammals are taken, registration by fishermen participating in fisheries that frequently or occasionally take marine mammals, monitoring

and reporting of incidental taking, and reduction of incidental mortality and serious injury of marine mammals in commercial fisheries to insignificant levels approaching zero within seven years. The section also requires the preparation of a take reduction plan for each strategic stock subject to frequent or occasional mortality or serious injury in fishing operations. Each plan is to include recommended regulatory or voluntary measures to reduce incidental mortality and serious injury and recommend dates for achieving specific objectives. The immediate goal of the 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.

Implementing Regulations

As discussed in previous annual reports, the National Marine Fisheries Service published regulations implementing section 118 in 1995. Among other things, the regulations include procedures for vessel owners to register for an authorization certificate, observer and reporting requirements, and criteria for classifying fisheries. Minor changes to the regulations were published in 1999.

Although the original proposed rule published by the Service in 1994 included a proposed definition to be used to determine when the zero mortality and serious injury rate goal of the Act had been achieved, this element of the regulations has never been finalized. As such, this issue remains unresolved. This is an important omission because section 118(b) of the Act requires that commercial fisheries reduce incidental mortality and serious injury of marine mammals to insignificant levels approaching a zero mortality and serious injury rate by April 2001. More specifically, take reduction plans developed under section 118 are to be designed to achieve the zero mortality and serious injury rate goal for the covered fisheries within five years of a plan's implementation. Toward this end, the amendments require that the National Marine Fisheries Service review the progress of commercial fisheries in meeting this zero mortality rate goal and report its findings to Congress. The report was to have been submitted by 30 April 1998. However, the Service has yet to complete the report.

This lack of action prompted the Center for Biological Diversity and other organizations to file suit against the National Marine Fisheries Service on 13 April 2002 in U.S. district court alleging violations of the Marine Mammal Protection Act. The plaintiffs are seeking to have the court compel the Service to complete and transmit its report to Congress on the progress being made to achieve the zero mortality rate goal. The plaintiffs also claimed that the Service was violating the Act by failing to convene a take reduction team for each strategic stock that interacts with a fishery with frequent or occasional mortality or serious injury of marine mammals (i.e., category I and II fisheries) and to develop and implement take reduction plans for those stocks. As of the end of 2002, the lawsuit was still pending. The Commission understands, however, that filing the complaint with the court has prompted the Service to revisit the need to publish regulations defining the term "zero mortality and serious injury rate goal." Service staff has informed the Commission that they expect to conclude the rulemaking in 2003.

Several provisions of the incidental-take regime for commercial fisheries are aimed at reducing marine mammal mortalities and serious injuries to certain levels. As such, there needs to be some mechanism for differentiating between serious and nonserious injuries. Regulations promulgated by the Service in 1995 define serious injury as any injury that will likely result in the mortality of a marine mammal. However, it is not always apparent at the time a marine mammal is released from fishing gear whether its injuries are life-threatening. To address this issue, the Service convened a workshop in April 1997 to consider ways to determine what injuries are to be considered serious. Representatives of the Marine Mammal Commission participated in the workshop.

The workshop report, published in 1998, identified the different ways in which marine mammals may be injured by various types of fishing gear and assessed the likelihood that different types of marine mammals would survive such injuries. (A link to the report is provided on the Service's website at http://www.nmfs.noaa.gov/prot_res/PR2/Fisheries_Interactions/fisheriesinteractions.html.). The workshop report included general guidelines for determining when injuries should be consid-

ered serious. For large whales, participants generally agreed that any entanglement that resulted in the animal trailing gear such that its mobility or ability to feed was impeded should be considered a serious injury. For small cetaceans, animals that ingest hooks, are trailing gear when released, or swim away abnormally after being released should be considered seriously injured. For pinnipeds, animals should be considered seriously injured if they are trailing gear or are hooked in the mouth. The Service has drawn on the report to develop internal guidelines for determining what constitutes a serious injury but has yet to publish draft guidelines for public review and comment.

Take of Endangered and Threatened Species

The incidental-take regime enacted in 1994 includes a provision for authorizing the incidental taking of species listed as endangered or threatened, provided certain findings are made. On 30 October 2000 the Service published in the *Federal Register* a notice of issuance of a three-year permit to authorize the incidental take of fin whales (California/Oregon/Washington stock), humpback whales (California/Oregon/Washington/Mexico stock), Steller sea lions (eastern stock), and sperm whales (California/Oregon/Washington stock) in the California/Oregon drift gillnet fishery for thresher shark and swordfish. These are the only marine mammal stocks listed under the Endangered Species Act for which taking incidental to commercial fishing is currently authorized. That is, no authorizations are in place for fisheries in the Alaska region, the northeast region, or the southeast region (including the Gulf of Mexico). It is expected that the Service will review these authorizations during 2003.

List of Fisheries

A key feature of the incidental-take regime is the annual publication of a list of fisheries placing each U.S. fishery into one of three categories based on the frequency with which marine mammals are killed or seriously injured. Vessel owners participating in category I or category II fisheries must register and are subject to certain other requirements. Those participating in category III fisheries need not register for an incidental-take authorization, but are required to report any marine mammal mortality or injury that occurs incidental to their operations.

Under regulations published by the National Marine Fisheries Service, a category I fishery is one in which annual mortality and serious injury of animals from any marine mammal stock are equal to or greater than 50 percent of the stock's potential biological removal level. A category II fishery is one in which annual mortality and serious injury are between 1 and 50 percent of the stock's potential biological removal level, provided that the total number of mortalities and serious injuries from all fisheries combined is greater than 10 percent of the stock's potential biological removal level. All other fisheries (i.e., those that, combined with other fisheries, do not take more than 10 percent of a stock's potential biological removal level or that individually take less than 1 percent of any stock's potential biological removal level) are placed in category III. In the absence of reliable information concerning the frequency with which marine mammals are killed or seriously injured incidental to a fishery, the National Marine Fisheries Service assesses the proper placement of the fishery by evaluating factors such as fishing techniques and gear used, available deterrence methods, target species, seasons and areas fished, stranding data, the species and distribution of marine mammals in the area, and comparisons with similar fisheries.

The Service published a *Federal Register* notice on 17 January 2002 indicating that the final list of fisheries for 2001, published on 15 August 2001, would remain in effect throughout 2002. The list includes 6 category I fisheries, 33 category II fisheries, and 140 category III fisheries. Although proposed changes to the list of fisheries for 2003 had yet to be issued as of the end of 2002, the Service staff expects that they will publish them early in 2003.

Take Reduction Plans

Section 118 of the Marine Mammal Protection Act requires the National Marine Fisheries Service to develop a take reduction plan for each strategic stock that interacts with a category I or category II fishery (i.e., a fishery that frequently or occasionally kills or seriously injures marine mammals). That section directs the Service to establish take reduction teams to assume the lead in developing plans. The teams are to include mem-

bers representing federal agencies, affected coastal states, appropriate fishery management councils, interstate fishery commissions, academic and scientific organizations, environmental groups, the commercial and recreational fishermen that incidentally take the species or stock, and any affected Alaska Native or Native American tribal organizations. Representatives of the Commission have participated as members of most of the take reduction teams.

Where human-caused mortality and serious injury of a stock are believed to be equal to or greater than the stock's potential biological removal level, a take reduction team is to prepare and submit to the Service a draft take reduction plan within six months of the team's establishment. For other strategic stocks, draft take reduction plans are to be submitted within 11 months of the team's establishment. Within 60 days of receiving a draft take reduction plan, the Service is to publish the plan in the *Federal Register*, along with any proposed changes and proposed regulations to implement the plan, for public review and comment. After a public comment period of no more than 90 days, the Service has 60 days in which to publish a final take reduction plan and implementing regulations. After publication of the final plan, take reduction teams are to continue to meet to monitor the plan's implementation.

To date, the National Marine Fisheries Service has established six take reduction teams— the Gulf of Maine Harbor Porpoise Take Reduction Team, the Pacific Offshore Cetacean Take Reduction Team, the Atlantic Offshore Cetacean Take Reduction Team, the Atlantic Large Whale Take Reduction Team, the Mid-Atlantic Harbor Porpoise Take Reduction Team, and the Bottlenose Dolphin Take Reduction Team. Because of significant changes in the fisheries covered by the Atlantic Offshore Cetacean Take Reduction Plan, that team was disbanded in 2001. The Service intends to evaluate the need for a new take reduction team to address the taking of marine mammals in these offshore fisheries as new mortality and serious injury estimates become available.

Activities of the Mid-Atlantic and Gulf of Maine Harbor Porpoise Take Reduction Teams are discussed in the harbor porpoise section of Chapter III. Activities of the bottlenose dolphin team are discussed in the bottlenose dolphin section of Chapter III. Actions taken by the Service and the Atlantic Large Whale Take Reduction Team regarding the take reduction plan for endangered whales taken in gillnet and lobster pot fisheries along the Atlantic coast are discussed in the North Atlantic right whale section of Chapter III.

The final team, the Pacific Offshore Cetacean Take Reduction Team was constituted in 1996 to address the incidental take of several species of beaked whales, short-finned pilot whales, pygmy sperm whales, sperm whales, and humpback whales in the category I drift gillnet fishery targeting thresher sharks and swordfish in waters off California and Oregon. As discussed in previous Commission reports, the recommendations of this team that nets be set a minimum of 11 m (36 ft) below the water surface and that low-intensity acoustic deterrent devices (pingers) be used on nets have been incorporated into a final take reduction plan and implemented by regulation. Those measures have reduced incidental mortalities and serious injuries to below the potential biological removal levels of the affected marine mammal stocks.

Intentional Taking

Unlike the interim exemption that governed incidental taking from 1988 to 1995, the regime established under section 118 prohibits intentional lethal taking of marine mammals in commercial fishing operations. The only exception is in situations where lethal taking is "imminently necessary in self-defense or to save the life of another person in immediate danger."

Although intentional lethal take is not allowed, fishermen and others may take marine mammals by nonlethal means to deter them from damaging gear, catch, or other property under certain circumstances. Section 101(a)(4) of the Marine Mammal Protection Act directs the National Marine Fisheries Service and the Fish and Wildlife Service to publish a list of guidelines to govern measures for safely deterring marine mammals. In the case of marine mammals listed as endangered or threatened, the Services are to recommend specific measures that can be used to deter the animals nonlethally. The use of certain deterrence measures that have a significant adverse effect on marine mammals may be prohibited.

The National Marine Fisheries Service published proposed deterrence regulations in 1995, offering guidance on passive, preventive, and reactive measures that could be taken to deter marine

mammals. The Service proposed 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. The Service also proposed to prohibit the use of any firearm or other device to propel an object that could injure a marine mammal, the use of any explosive device to deter cetaceans, the use of explosives more powerful than seal bombs to deter seals or sea lions, the translocation of any marine mal, or the use of tainted food or bait or any other substance intended for consumption by the marine mammal. Deterrence of marine mammals listed as endangered or threatened under the Endangered Species Act would not be authorized under the proposed regulations. Rather, measures to deter listed species safely would be subject to a separate rulemaking. Commission comments on the proposed regulations are summarized in the 1995 annual report.

As of the end of 2002 final deterrence regulations had yet to be published by the National Marine Fisheries Service. The Fish and Wildlife Service had yet to publish any guidelines or proposed regulations with respect to deterrence of those species of marine mammals under its jurisdiction.

Pinniped/Fisheries Interactions

Since passage of the Marine Mammal Protection Act, a number of seal and sea lion populations in U.S. waters have increased substantially. At the same time, reports of seal and sea lion interactions with commercial fisheries, aquaculture projects, and protected stocks of salmon have also increased. Such interactions typically involve depredation of catch, damage to gear, and, in the case of wild salmon stocks, predation of dwindling numbers of salmon as they attempt to negotiate migratory barriers, such as locks, dams, and waterfalls. Pinniped/fishery interactions have been a particular source of concern in California, Oregon, and Washington and in the Gulf of Maine.

In response to these concerns, Congress added section 120 to the Marine Mammal Protection Act in 1994. To address predation on depleted salmon stocks, section 120 calls for establishing pinniped/fishery interaction task forces to identify research and management needs and to make recommendations concerning requests for lethal taking authority. Where nonlethal management alternatives prove ineffective, lethal removal of individual seals or sea lions contributing to the problem may be authorized. To address other concerns, section 120 also directs that various analyses and reports be completed to help assess the need for, and to identify, possible responsive measures. The reports and recommendations made by the Service as part of those reports are discussed in past annual reports.

To date, only the State of Washington has requested lethal removal authority for pinnipeds under section 120. That authorization was issued by the National Marine Fisheries Service to enable the state to address the taking of winter-run steelhead salmon by California sea lions at the Chittenden, or Ballard, Locks in Seattle. From the early 1980s to 2001 the number of steelhead returning to spawn in streams emptying into Lake Washington declined from nearly 3,000 to just 42 per year.

The original authorization was issued to the Washington Department of Fish and Wildlife in 1994 and granted authority for the lethal removal of individual sea lions provided that (1) the animals had been observed taking steelhead at the site, (2) nonlethal means of deterrence had failed, and (3) the identified animals were present during the time of the steelhead run. That authorization expired in 1997, but was extended for an additional four-year period. Under those authorizations, sea lions have been relocated, nonlethal deterrence measures have been taken (e.g., an acoustic array was installed around the locks to deter sea lions from approaching the area where salmon are most vulnerable to depredation), and three sea lions were placed in captivity. No taking by lethal means has been necessary.

On 19 October 2001 the Service published a notice in the *Federal Register* indicating that the State of Washington was seeking to extend its letter of authorization for an additional five-year period. No other changes were proposed to the authorization. In its request to the Service, the State of Washington cited the continuation of severely depressed returns of steelhead and the continuing need to be able to remove any sea lion that meets the criteria of the authorization. The State noted that it had

no specific plans for lethal removals but requested that the authorization be extended so that, as a last resort, it could respond in a timely manner to sea lion predation that could not be controlled by nonlethal means. A notice that the Service had extended the pinniped removal authority through 30 June 2006, as proposed, was published in the *Federal Register* on 5 February 2002.

The Tuna-Dolphin Issue

For reasons not fully understood, schools of large yellowfin tuna (those greater than 25 kg [55 lbs]) tend to associate with dolphin schools in the eastern tropical Pacific Ocean. This area covers more than 18.1 million km^2 (5 million mi^2), 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 dolphin schools to catch the tuna swimming below. Despite efforts by fishermen to release the dolphins unharmed, some animals become trapped in the nets and are killed or injured. Estimated dolphin mortality in the early years of the fishery was in the hundreds of thousands per year. 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. More recently, efforts have focused on identifying the possible effects of chasing and encircling large numbers of dolphins in the tuna fishery each year that may not be reflected in the reported mortality figures, but that may be impeding the recovery of depleted dolphin stocks.

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. This is reflected in Figure 37, which shows the number of dolphin sets being made by the U.S. and foreign fleets. Along with these shifts in the fishery came changes in the associated dolphin mortality. As reflected by mortality data presented in Table 10, progress made by the United States to reduce dolphin mortality under the Marine Mammal Protection Act was offset by increased mortality from growing 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. Imports of yellowfin tuna caught in the eastern tropical Pacific were banned from countries that failed to adopt a tuna-dolphin program comparable with that of the United States or whose fleet exceeded the incidental-take rate of the U.S. fleet by a certain amount. In addition, imports of yellowfin tuna from intermediary nations that imported tuna from nations subject to a primary embargo were made subject to a secondary embargo. Additional requirements also were placed on U.S. tuna fishermen.

The 1988 amendments and the resulting threat of tuna embargoes brought about a substantial reduction in dolphin mortality by foreign fleets. Between 1989 and 1992 reported mortality by the foreign fleet dropped by more than 80 percent. Another factor contributing to the drop in dolphin mortality was the La Jolla Agreement, an agreement entered into voluntarily by the tuna-fishing

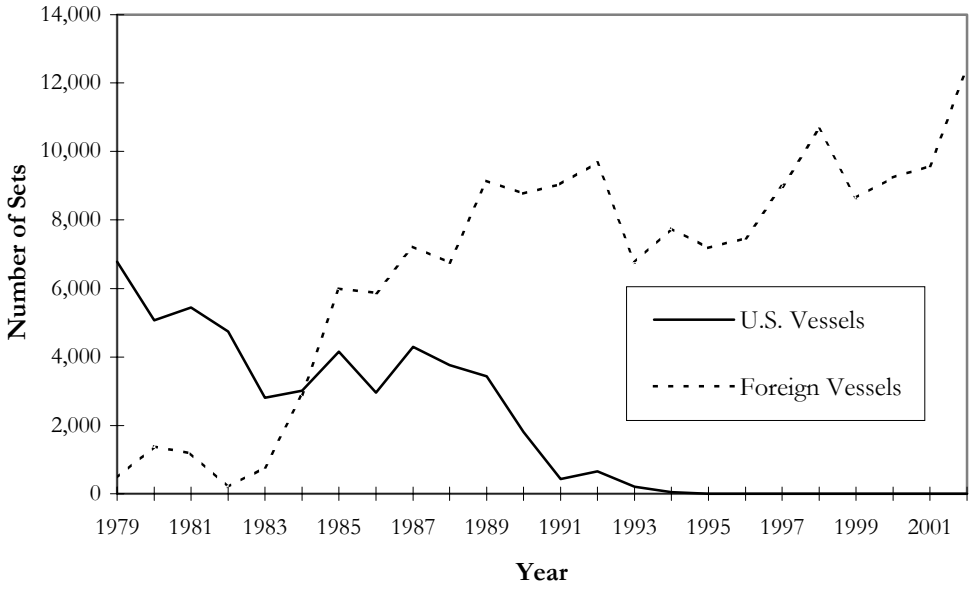

Figure 37. Sets on dolphins by U.S. and foreign vessels, 1979–2002.

Table 10. Estimated incidental kill[1] of dolphins in the tuna purse seine fishery in the eastern tropical Pacific Ocean, 1972–2002

Year	U.S. Vessels	Non-U.S. Vessels
1972	368,6000	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	105	4,095
1995	0	3,274
1996	0	2,547
1997	0	3,005
1998	24	1,853
1999	0	1,348
2000	0	1,636
2001	0	2,129[2]
2002	0	1,514[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.

nations in 1992. The specific provisions of the La Jolla Agreement are discussed in past annual reports and included vessel-specific mortality limits. When in 1993 an individual vessel's performance in reducing dolphin mortality was tied directly to its ability to continue to make dolphin sets throughout the year, reported dolphin mortality dropped even more precipitously. Although part of the decline that occurred during that four-year period was attributable to fewer sets being made on dolphins, the primary factor in reducing incidental dolphin mortality was a marked reduction in the average number of dolphins killed per set.

Even though the international tuna fleet had been quite successful in reducing incidental dolphin mortality from unsustainably high levels in the 1980s, under the comparability requirements applicable under the 1988 and 1992 Marine Mammal Protection Act amendments, yellowfin tuna caught in the eastern tropical Pacific was excluded from the U.S. market if it was from countries whose vessels continued to set on dolphins. This prompted six parties to the La Jolla Agreement—Colombia, Costa Rica, Ecuador, Mexico, Panama, and Venezuela—to issue a statement in 1995 urging the United States to lift the embargoes then in effect. They contended that catching tuna in compliance with the International Dolphin Conservation Program, established under the La Jolla Agreement, was environmentally sound and that the increased use of fishing methods that did not involve setting on dolphins would harm biodiversity by increasing the discard of juvenile tuna and the bycatch of nontarget species other than dolphins. The six nations stated that the situation was endangering their continued participation in the program established under the La Jolla Agreement. In response, Congress in mid-1995 began to consider the need for changes to the Marine Mammal Protection Act's tuna-dolphin provisions, particularly those concerning the tuna embargoes.

Concerned that an opportunity to consolidate the gains in dolphin conservation made under the La Jolla Agreement was slipping away, five environmental groups initiated discussions with representatives of Mexico in September 1995 to explore the possibility of a multilateral agreement among tuna-fishing nations to formalize and strengthen the International Dolphin Conservation Program and lift U.S. tuna embargoes. These discussions led to a compromise supported by the tuna fishing nations, some environmental groups, and the United States.

This compromise ultimately formed the basis for the Declaration of Panama, an agreement signed by representatives of the United States and 11 other nations on 4 October 1995. These nations declared their intention, contingent on the enactment of changes in U.S. law, to formalize the La Jolla Agreement as a binding international agreement and to incorporate additional dolphin protection measures. The envisioned changes to U.S. law included allowing access to the U.S. market for all tuna, whether caught by setting on dolphins or not, provided that it was caught in compliance with the agreement. The Declaration of Panama also called

on the United States to redefine 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 dolphin mortality was observed, rather than applying that term only to tuna caught on trips during which no dolphin sets were made. Among other things, the new international agreement was to establish annual stock-specific quotas on dolphin mortality based on minimum population estimates and to limit overall mortality to no more than 5,000 a year.

The international agreement envisioned by the parties to the Declaration of Panama, the Agreement on the International Dolphin Conservation Program, was concluded in May 1998 and entered into force on 15 February 1999.

Reported Mortality and Fishing Effort

Under the Agreement on the International Dolphin Conservation Program, each vessel of greater than 400 short tons of carrying capacity is required to carry an observer on each fishing trip made in the eastern tropical Pacific Ocean. At least 50 percent of the observers placed on a nation's vessels are to be from the Inter-American Tropical Tuna Commission's observer program, with the remainder coming from a parallel national program, should the nation decide to establish one. Among other things, the observers are to report the number of dolphins killed and seriously injured in purse seine sets. Data from these reports are reflected in the estimates of dolphin mortality provided in Table 10. Estimated dolphin mortality, particularly for the early years of the fishery, are based on significantly lower levels of observer coverage. The United States achieved 100 percent observer coverage beginning in 1989. Full observer coverage on the foreign fleets was not achieved until 1995.

Since 1993 dolphin mortality incidental to the eastern tropical Pacific tuna fishery has remained at a level believed by most to be biologically insignificant. Nevertheless, as discussed below, those dolphin stocks that were depleted over the years by the tuna fishery have failed to show signs of recovery as one would expect in light of the reported mortality levels.

Although still a preliminary estimate, it appears that reported dolphin mortality in 2002 will be the second lowest since the fishery began, despite a marked increase in the number of sets on dolphins. The increase in dolphin sets during 2002 follows a recent trend in the fishery (Fig. 37). In 1999, 8,648 dolphins sets were made. This number increased to more than 9,235 in 2000 and 9,577 in 2001. A preliminary estimate of fishing effort for 2002 made by the Inter-American Tropical Tuna Commission indicates that about 12,430 dolphin sets were made during the year.

The International Dolphin Conservation Program Act

Efforts to amend U.S. law as called for by the Declaration of Panama culminated in enactment of the International Dolphin Conservation Program Act on 15 August 1997. The new law made several changes to the U.S. tuna-dolphin program. Amendments to section 304 of the Marine Mammal Protection Act directed the Secretary of Commerce, in consultation with the Marine Mammal Commission and the Inter-American Tropical Tuna Commission, to conduct a study of the effects of chase and encirclement on dolphins and dolphin stocks taken in the course of purse seine fishing for yellowfin tuna in the eastern tropical Pacific. The study was to consist of abundance surveys and stress studies designed to determine whether chase and encirclement are having a "significant adverse impact on any depleted dolphin stock in the eastern tropical Pacific Ocean." Specifically, the amendments required the National Marine Fisheries Service to survey the abundance of depleted dolphin stocks during calendar years 1998, 1999, and 2000. The stress studies were to include (1) a review of relevant stress-related research and a three-year series of necropsy samples from dolphins killed in dolphin sets, (2) a one-year review of relevant historical demographic and biological data related to dolphins and dolphin stocks, and (3) an experiment involving the repeated chasing and capturing of dolphins by means of intentional encirclement.

The Service was directed to make an initial finding by March 1999, based on the preliminary results of the research program and any other relevant information, as to whether the intentional encirclement of dolphins was having a significant adverse effect on any depleted dolphin stock. A final finding was to be made between 1 July 2001 and 31 December 2002 and a report of that finding submitted to Congress. If the Service deter-

mined that there was no significant adverse effect, the definition of dolphin-safe tuna would be changed to include all tuna harvested in sets in which no dolphin mortality was observed.

The amendments also directed the National Marine Fisheries Service to engage in other research to further the goals of the International Dolphin Conservation Program. The Service, in consultation with the Marine Mammal Commission and with the cooperation of the nations participating in the International Dolphin Conservation Program and the Inter-American Tropical Tuna Commission, is to conduct such research, which may include projects to (1) devise cost-effective fishing methods and gear designed to reduce or eliminate incidental mortality and serious injury of dolphins, (2) develop cost-effective methods for catching mature yellowfin tuna that do not require setting on dolphins, (3) carry out assessments of dolphin stocks taken in the eastern tropical Pacific tuna fishery, and (4) determine the extent to which the incidental taking of nontarget species, including juvenile tuna, occurs in the eastern tropical Pacific tuna fishery and assess the impact of such taking.

Although still subject to the dolphin-safe labeling requirements, all tuna caught in the eastern tropical Pacific after the effective date of the amendments may be imported into the United States, provided it was caught in accordance with the requirements of the International Dolphin Conservation Program. The amendments further required that the total dolphin mortality limits and the per-stock limits for nations importing tuna to the United States not exceed the 1997 levels and be consistent with the objective of progressively reducing dolphin mortality to a level approaching zero. The amendments lifted the zero quota and stock-specific restrictions that have prevented U.S. fishermen from setting on dolphins. U.S. fishermen are now able to apply for a permit allowing them to take dolphins in accordance with the provisions of the International Dolphin Conservation Program. Unlike the multiyear, general permits issued to the American Tunaboat Association in the past, individual vessels are required to obtain annual permits.

The amendments took effect on 3 March 1999, the date that the Secretary of State certified to Congress that a binding international agreement establishing the International Dolphin Conservation Program had been adopted and was in force. The parties to that agreement, other than the United States, are Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, and Venezuela. In addition, Bolivia, Colombia, the European Union, and Vanuatu are applying the agreement provisionally.

Implementation of the 1997 Amendments

As noted earlier, the International Dolphin Conservation Program Act requires the National Marine Fisheries Service to consult with the Marine Mammal Commission regarding implementation of mandated research into the effects of chase and encirclement on depleted dolphin stocks. Other research in furtherance of the goals of the International Dolphin Conservation Program required under the Act is also to be conducted in consultation with the Commission. In addition, the Service is required to consult with the Commission in developing regulations to implement the new provisions governing the taking of marine mammals in the eastern tropical Pacific tuna fishery.

Initial Finding—Under the terms of the International Dolphin Conservation Program Act, the National Marine Fisheries Service was to make an initial finding by the end of March 1999 as to whether the intentional encirclement of dolphins is having a significant adverse effect on any depleted dolphin stock in the eastern tropical Pacific. The Service made its initial finding on 29 April 1999 that, although the northeastern offshore stock of spotted dolphins and the eastern stock of spinner dolphins did not appear to be increasing at the expected rates, there was insufficient evidence to conclude that chase and encirclement are having a significant adverse impact on those stocks. The rationale for the finding and a summary of the data on which it was based are discussed in past Commission annual reports. However, before that finding became effective and the labeling requirements under the Act were changed, environmental groups successfully challenged the finding in U.S. district court. The court invalidated the initial finding, based largely on the Service's failure to collect and consider at least preliminary data from all of the studies mandated under the International Dolphin Conservation Program Act before making the determination. That ruling was subsequently upheld by the Ninth Circuit Court of Appeals, which further directed that the Service, in making the find-

ings under the Act, must determine whether or not chase and encirclement are having significant adverse effects on depleted dolphin stocks. That is, the court ruled that it was insufficient for the Service to find by default that there is no significant adverse impact simply because there is inconclusive evidence.

Decision Framework—Shortly after enactment of the International Dolphin Conservation Program Act, the Commission wrote to the National Marine Fisheries Service recommending that it establish a framework for carrying out the required consultations. Among other things, the Commission urged the Service to develop and circulate the criteria it would use to make the initial and final findings as to whether chase and encirclement of dolphins were having a significant adverse effect on any depleted dolphin stock. The Commission noted that these determinations were likely to be controversial and believed that the Service could best insulate itself from possible claims that it was not being objective by developing the criteria before collection and analysis of the data from the mandated studies.

As discussed in previous annual reports, the Service agreed and, beginning in December 1998, convened a series of meetings to develop decision-making criteria. Representatives of the Marine Mammal Commission and the Inter-American Tropical Tuna Commission participated in two of those meetings. The participants at those meetings reached general agreement that appropriate criteria should be based on addressing two general questions. First, based on data concerning the abundance and trends of depleted dolphin stocks, have the populations failed to grow at expected rates? Second, if there has been such a failure, is it attributable to fishery-related causes? The Service published a report providing a detailed discussion of the framework developed at the 1998 meeting. That framework was used in making the initial finding in 1999. A complete summary of the consultations regarding the decision framework can be found in the Southwest Fisheries Science Center Administrative Report LJ-00-16, published in January 2001, which is available from the National Marine Fisheries Service.

Although the Service had informed the Commission that it planned to conduct further consultations regarding the decision framework and the underlying research projects in 2001, no such consultations took place. Instead, the Director of the Service's Office of Science and Technology wrote to the Commission on 20 April 2001 to explain that the Service had recently held a workshop, involving both agency scientists and top-level policy officials, to review the development of the decision process. One of the principal outcomes of that workshop was the recognition of "... a clear distinction between scientific advice and the policy elements of the decision." Although the Service recognized its obligation to consult with the Commission about the research mandated by the International Dolphin Conservation Program Act, it apparently saw no need for ongoing consultation with respect to the development of the policy aspects of the decision criteria. Rather, the Service indicated its intention to complete the development of a "draft decision process" internally and seek the advice of the Commission and others only after the draft was complete.

The Service published a notice in the *Federal Register* on 15 February 2002 announcing the availability of its proposed organizational decision process and seeking comments. The draft process identified four basic questions that the Service would have to address to determine whether chase and encirclement were having significant adverse effects—

• the "ecosystem question"—during the period in which the eastern tropical Pacific tuna fishery has operated, has the carrying capacity for dolphins declined substantially or has the ecological structure of that ecosystem changed substantially in any way that could impede depleted dolphin stocks from growing at expected rates?

• the "direct mortality question"— for any depleted dolphin stock, does the estimated fishery-related mortality (including direct mortality and, where appropriate, quantifiable levels of indirect mortality) exceed the mortality standard considered appropriate by the Secretary?

• the "indirect effects question"— for each depleted dolphin stock, is the estimated number of dolphins affected by the tuna fishery, considering data on sets per year, mortality attributable to the fishery, indicators of stress in blood, skin, and other tissues, the separation of mothers and calves during chase and encirclement, and any other relevant information, at a level that is cause for concern?

• the "abundance question"—for each depleted dolphin stock, is the estimate of the observed

population growth rate sufficient so as not to risk recovery or appreciable delay in recovery time of the stock to its optimum sustainable population level?

The draft decision process, however, did not attempt to quantify the levels that would prompt the Service to find that there has been a significant adverse impact on dolphin stocks from any of these sources.

The *Federal Register* notice also indicated that the Service intended to appoint two expert panels to provide assessments concerning the questions set forth in the proposed decision process. In addition, the Service invited the submission of information to be factored into the final finding and proposed criteria to be used to determine the weight to be given different sources of information. Among other things, the Service would consider the relevance and timeliness of the information and whether it had been independently peer-reviewed and made available to the Service for verification. The Service also indicated that information from outside sources needed to be submitted by 1 May 2002 to allow time for review before using it in the decisionmaking process.

The Commission submitted comments on the proposed organized decision process by letter of 19 April 2002. That letter traced the history of consultations between the Commission and the Service regarding the need to develop objective, statistically based criteria for making the required findings and noted the Service's earlier commitment to develop such criteria. The Commission expressed concern about the Service's backing away from that commitment under the new proposal. In this regard, the Commission noted that the proposed organized decision process contained no criteria that would indicate when possible adverse impacts of the tuna fishery would be considered "significant." The Commission further noted that, although the Service has no statutory obligation to develop such explicit decisionmaking criteria, it continued to believe that doing so would provide the best way to ensure that the Secretary's finding is well reasoned and well supported, understandable to the public, and likely to withstand judicial scrutiny if challenged. Although noting the difficulties in finalizing such criteria in time to be used for the final determination, the Commission encouraged the Service to draw on the work that had already been done to the extent possible.

The Commission also expressed appreciation for the Service's concerns about the need to separate the science and policy aspects of the decisionmaking process. The Commission noted, however, that this did not mean that the policy criteria for determining significance could not be established ahead of time and incorporated into the decision framework that the Service had been working on. The Commission offered to assist the Service in any way it could in formulating and applying such criteria.

The Commission also provided comments on the Service's proposal as to how it would evaluate scientific information submitted by outside sources. It noted that the applicable statutory provision clearly envisioned that the final determination regarding the effects of chase and encirclement would take into account all relevant information, whether developed by the Service or others. Nevertheless, there was a need to recognize that, whereas the information developed by the Service had been subject to considerable scrutiny, this was not necessarily the case with information provided by others. The Commission therefore concurred with the Service's view that the weight accorded information considered in making the determination should reflect the quality of the methods used to collect it and the extent to which it has been peer-reviewed. The Commission believed that it was imperative that, before any information is factored into the final determination, the Service be given an opportunity to review it for purposes of verification. Toward this end, the Commission supported the process for reviewing information proposed by the Service and the proposed 1 May cutoff date, which, the Commission noted, should enable the Service to complete the review and verification process before relying on such information in making the final determination.

The Service published the final organized decision process in the *Federal Register* on 23 August 2002, addressing the comments submitted by the Commission and others. Although some revisions were made in response to comments, the substance remained unchanged. Among other things, the description of the "indirect effects question" was revised to clarify that the Service would be determining whether such effects were occurring "at a magnitude and degree that would risk recovery or appreciably delay recovery" of depleted dolphin stocks. Another noteworthy change was the

redesignation of the "abundance question" as the "growth rate question" to clarify that it is the rate at which dolphin stocks are recovering, rather than their absolute abundance, that is the focus of the inquiry.

As for the Commission's concerns, the Service thought that the organized decision process provided a sufficiently sound basis for weighing the information that would be factored into the final determination without the need for preestablished, quantified criteria. The Service noted that the science report it would issue before making the determination would indicate the confidence intervals and probabilities associated with the research findings, and the final determination made by the Secretary would explain how those data were used to make the finding. In the Service's view, the decision process would provide a sound basis for the Secretary to weigh the complex information that would be factored into the determination and result in a finding that was "informed, transparent, and defensible."

Science Report—Before finalizing a report summarizing the findings of the research conducted under the International Dolphin Conservation Program Act, the Service sought extensive input from outside reviewers. First, the research results underwent a year-long peer review process conducted by the Center for Independent Experts (CIE) at the University of Miami to ensure the quality of the information to be used to make the final finding. Second, the Service convened two expert panels—the Ecosystem Panel and the Indirect Effects Panel—to provide views on those issues where the data were particularly complex or uncertain. Panel members were chosen by a committee that included representatives of the Service, the Marine Mammal Commission, the Inter-American Tropical Tuna Commission, and nongovernmental marine mammal scientists. The recommendations provided by individual panel members, as well as other information concerning the science report and final determination on the effects of chase and encirclement on depleted dolphins can be found online at http://www.nmfs.noaa.gov/prot_res/PR2/Tuna_ Dolphin/tunadolphin.html.

Following completion of the reviews, the National Marine Fisheries Service on 18 September 2002 provided the Commission and the Inter-American Tropical Tuna Commission with prepublication copies of its "Report of the Scientific Research Program under the International Dolphin Conservation Program Act" for review and comment. The report discussed the various elements of the research program and the findings with respect to the abundance of depleted dolphin stocks, environment and ecosystem issues, fishery effects, and stock assessments.

The Commission, in consultation with its Committee of Scientific Advisors, provided comments on the report by letter of 25 October 2002. It noted at the outset that its comments were being offered in the context of the appellate court ruling in *Brower* v. *Evans*, which specified that the Marine Mammal Protection Act requires that the Secretary of Commerce "affirmatively find whether or not there is a significant adverse impact before the dolphin-safe labeling standard can be relaxed." Against that backdrop, the Commission commented specifically on the various sections of the report.

With respect to population trends, the Commission noted that, although changes in fishing practices have resulted in a marked reduction of observed dolphin mortality in tuna nets, the three depleted dolphin populations that occur in the eastern tropical Pacific do not appear to have experienced the growth expected in light of those reduced mortality rates. Generally accepted population theory on density dependence suggests that, at their reduced abundance levels, these populations should exhibit a growth rate approaching 4 percent per year. However, the information provided in the report indicated clearly that northeastern offshore spotted dolphins and eastern spinner dolphins have failed to recover at such rates. Because of inadequate information concerning the historic population size of the coastal spotted dolphin stock, no conclusions could be drawn about its trends. The Commission believed that, based on these trends, the concern reflected in the International Dolphin Conservation Program Act appeared to be well founded. That is, even in the absence of biologically significant levels of observed fishery-related mortality, the practice of chasing and encircling dolphins to catch tuna may be having significant effects on the ability of these populations to recover from their depleted status.

The Commission next discussed the factors other than the tuna fishery that might be impeding the recovery of depleted dolphin stocks in the eastern tropical Pacific. The primary alternative hy-

pothesis is that the eastern tropical Pacific environment/ecosystem has changed in a manner that has lowered the environmental carrying capacity for dolphins, thereby impeding or preventing the populations from returning to prefishery abundances. The Commission noted that such effects, if they have occurred, may be highly complex and difficult to assess, with respect to both the direction and magnitude of any such changes. Although comments from the members of the ecosystem expert panel convened by the Service suggested that some changes may have occurred in the eastern tropical Pacific since the inception of the tuna purse seine fishery, the Commission believed that the available information was clearly insufficient to support a conclusion that any such changes would explain the failure of dolphin stocks to recover. Furthermore, the Commission hypothesized that, because dolphins are long-lived and have life history strategies that promote population stability even when there is environmental variability, environmental changes, if they occurred, may have had no significant effect on the dolphins. The Commission agreed that, based on the available information, the possibility that significant environmental/ecosystem changes have affected recovery of the eastern tropical Pacific dolphin stocks cannot be ruled out conclusively. The Commission advised, however, that any environmental change sufficient to cause a three- to fivefold shift in the carrying capacity would likely have been of sufficient magnitude to be detectable. This being the case, the Commission did not believe that the available data supported a conclusion that environmental/ecosystem changes have prevented dolphin stocks from recovering.

As to the possibility that fishery-related effects beyond the reported incidental mortality may be occurring, the Commission concurred with the draft report that mortality resulting from the separation of mothers and their calves, mortality due to predation that may be facilitated by the chase/capture/release process, and mortality that results from heightened levels of stress associated with chase and capture but that may not be manifested until hours or even days after release, may all be occurring. The Commission noted in particular that, based on the research conducted by the Service, it appeared that mortality associated with the separation of mothers and calves during chase and encirclement was a potentially large source of unobserved mortality. The Commission also agreed with the Service's suggestion that stress associated with chase and capture may be contributing to the apparent lack of recovery by causing reproductive failure within the dolphin populations. In addition, the Commission raised a concern not considered in the report that the recovery of dolphin populations may be impeded if the tuna-dolphin bond, which is central to this whole issue, has positive benefits to dolphins that are diminished or denied either immediately through removal of tuna or over longer periods as a result of fishery-induced reductions in the abundance or biomass of large tuna. The Commission noted that a number of such potential benefits are possible, although almost nothing is known about their existence or significance.

The Commission next considered the information provided in the report that indicated that, when one considers the relatively large number of times that dolphin schools are chased and captured during a year (on average each dolphin is chased between five and ten times per year and encircled about one to three times per year), the level of additional mortality or reduced fecundity required to impede recovery is relatively small (on the order of a few animals per set). The Commission noted that potentially significant effects may be small, and therefore difficult to detect, and that the situation is further complicated by the fact that multiple factors, each potentially small in itself, may be cumulatively affecting the dolphin stocks. For that reason, the Commission believed that there was a need to evaluate the effects of tuna fishing practices in light of the combined effects of these multiple factors.

In commenting on the adequacy of the available scientific information for characterizing fishery effects other than observed mortality, the Commission agreed with the Service that there was not a sufficient foundation on which to quantify any increase in dolphin mortality that might occur during chase operations, reproductive failure resulting from stress, facilitated predation, postrelease capture myopathy, or disruption of the tuna-dolphin bond. Despite these shortcomings, the Commission concluded that the information assembled under the Service's research program was sufficient to demonstrate a significant occurrence of mother-calf separation and to provide evidence of stress-induced injuries that may have lethal or sublethal (e.g., reproductive) consequences of population-

level significance. However, due to the limitations of the research conducted under the International Dolphin Conservation Program Act, including inadequate sample sizes for some studies (in part because fishing nations failed to provide adequate opportunities for sample collection), the Commission did not believe that the full nature of the hypothesized stress effects, and their implications for population recovery, could be fully described.

Based on its review of the scientific report, the Commission concluded that (1) generally accepted, density-dependence population theory supports the view that depleted dolphin stocks in the eastern tropical Pacific are not exhibiting the recovery one would expect in light of the considerable reduction in observed mortality incidental to the tuna fishery; (2) although environmental/ecosystem changes may have occurred in the eastern tropical Pacific and may have affected dolphin recovery, large-scale changes that would explain the lack of growth of depleted dolphin stocks were not detected by the Service's research program and, consequently, the nature and extent of any such ecosystem effects remain hypothetical; (3) unobserved fishery-related effects need not be large (when viewed on a per-set basis) to prevent or significantly impede dolphin population recovery; and (4) the practice of chasing and encircling dolphins to catch tuna may have a number of unobserved and indirect effects that have not yet been adequately characterized or quantified but that, in combination, could be impeding population recovery. For these reasons, the Commission believed that there was an insufficient basis for making a determination that the practice of chasing and encircling dolphins with purse seine nets in the eastern tropical Pacific tuna fishery is not having a significant adverse impact on depleted dolphin stocks. The Commission further indicated that the results of the Service's research program, although not conclusive, provided evidence that the practice of chasing and encircling dolphins is having adverse effects on the recovery of depleted dolphin stocks and that the magnitude of those effects, at both the individual and population levels, may be significant.

The science report formed the basis for the Secretary of Commerce's final determination on the effects of chase and encirclement. The report was made available to the public in conjunction with the issuance of the finding.

Final Finding—The National Oceanic and Atmospheric Administration's Assistant Administrator for Fisheries (the head of the National Marine Fisheries Service), on behalf of the Secretary of Commerce, issued the final finding required under the International Dolphin Conservation Program Act on 31 December 2002. The Assistant Administrator found that "... [b]ased on the information reviewed, ... the intentional deployment on or encirclement of dolphin[s] with purse seine nets is not having a significant adverse effect on any depleted dolphin stock in the [eastern tropical Pacific]." The rationale for the finding was not provided at that time. Rather, the announcement said that a *Federal Register* notice would be published containing more information on the finding. The announcement also noted that the final science report would be transmitted to Congress within 90 days. The announcement specified that the finding was to become effective immediately, meaning that suppliers could begin labeling tuna caught by encircling dolphins as being "dolphin-safe," provided that no dolphins were killed or seriously injured during the sets in which the tuna were caught.

Within hours of the release of the final finding, environmental organizations filed suit in the U.S. District Court for the Northern District of California challenging the finding, claiming that it was not supported by the research findings and other information and therefore that it was arbitrary and not in accordance with the applicable law (*Earth Island Institute* v. *Evans*). No further action on this matter occurred during 2002.

Other Issues—Section 303 of the Marine Mammal Protection Act, as amended by the International Dolphin Conservation Program Act in 1997, requires the National Marine Fisheries Service, in consultation with the Department of State, the Marine Mammal Commission, and the U.S. commissioners to the Inter-American Tropical Tuna Commission, to issue regulations to implement the International Dolphin Conservation Program. The Service published an interim final rule implementing the provisions of the International Dolphin Conservation Program Act on 3 January 2000.

As discussed in the previous annual report, environmental groups filed suit in the U.S. Court of International Trade (*Defenders of Wildlife* v. *Hogarth*) challenging several aspects of the regulations shortly after they became effective. The plaintiffs contended that certain provisions of the in-

terim final rule were inconsistent with the underlying statutory provisions. Among other things, the plaintiffs alleged that the regulations (1) did not accurately track the statutory provisions concerning stock-specific dolphin mortality limits, (2) provided unauthorized exceptions to the requirement that each nation's fleet not exceed its assigned annual dolphin mortality limit, (3) did not require affirmative findings to be made annually, (4) allowed backdown of purse seine nets to be completed up to 30 minutes after sundown, rather than no later than 30 minutes before sundown, (5) provided impermissible exceptions concerning tracking requirements and segregation of dolphin-safe and non-dolphin-safe tuna, and (6) failed to provide incentives for vessel captains to reduce dolphin mortality. The plaintiffs also alleged that the Service had violated the National Environmental Policy Act by not preparing an environmental impact statement and by omitting or misinterpreting crucial information in the environmental assessment the agency did prepare.

The court issued its decision on 7 December 2001, ruling in favor of the National Marine Fisheries Service on all claims. With respect to the provision pertaining to sundown sets, the court found that, although the regulation at issue conflicts with the wording of the statutory provision, it does not conflict with the intent of Congress, which is paramount in matters of interpretation. Citing numerous references to the completion of sets no later than 30 minutes after sundown, both in the preexisting provisions of the Act and in the international agreement, the court was not convinced that the use of the word "before" was a true expression of congressional intent. The court also found that the Service's environmental assessment was adequate to meet the requirements of the National Environmental Policy Act. In making this ruling, the court noted that, although the Act demands that accurate information be used in preparing the assessment, there was no requirement that the Service use the "best available scientific evidence," as plaintiffs had contended. Further in this regard, the court determined that the Service was not required to include in the assessment the information set forth in the 1999 report to Congress on the initial finding of the effects of chase and encirclement.

The plaintiffs appealed the trade court's ruling on 5 February 2002, seeking review of two issues—whether the regulatory provision concerning the cutoff time for completing sundown sets is consistent with the statutory requirement and whether the environmental assessment prepared in conjunction with the rulemaking was sufficient to meet the requirements of the National Environmental Policy Act. Although the appeal of the case has been briefed and argued, the appellate court had not issued its ruling as of the end of 2002.

As discussed above, the International Dolphin Conservation Program Act requires the National Marine Fisheries Service to engage in research apart from that directed at making the findings on the effects of chase and encirclement. The Service is also to conduct research to further the goals of the International Dolphin Conservation Program. Section 304 (b)(2) of the Marine Mammal Protection Act specifies that such research may include projects to (1) devise cost-effective fishing methods and gear designed to reduce or eliminate incidental mortality and serious injury of dolphins, (2) develop cost-effective methods for catching mature yellowfin tuna that do not require setting on dolphins, (3) carry out assessments of dolphin stocks taken in the eastern tropical Pacific tuna fishery, and (4) determine the extent to which the incidental taking of nontarget species, including juvenile tuna, occurs in the eastern tropical Pacific tuna fishery and assess the impact of such taking.

Since enactment of that provision in 1997 the Commission has, on several occasions, sought information from the Service regarding plans for conducting such research. Most recently, this issue was discussed at the Commission's 2002 annual meeting. At that meeting, Service representatives confirmed that, because of the focus on the studies that formed the basis for the Secretarial findings on chase and encirclement, the agency had yet to initiate any such research. Those representatives indicated that, now that that research had ended, it could consider allocating resources to developing improved fishing techniques and practices. They noted that the Department of Commerce had requested $3 million for tuna-dolphin research in its Fiscal Year 2003 budget submission. Although the Service scientists indicated a desire to conduct follow-up studies related to the chase and encirclement research (e.g., additional monitoring of dolphin abundance), depending on the amount ultimately allocated, some funding may be directed at this other line of research.

Affirmative Findings and Embargoes— The regulations implementing the International Dolphin Conservation Program Act set forth procedures and criteria for making affirmative findings for tuna-harvesting nations. Only countries with such a finding are permitted to export yellowfin tuna and yellowfin tuna products into the United States. During 2001 affirmative findings were made for Mexico and Ecuador, giving them access to the U.S. market through 31 March 2002. On 19 April 2002 the National Marine Fisheries Service published a notice in the *Federal Register* that it had renewed the affirmative finding for Ecuador, allowing tuna imports to continue through 31 March 2003. A similar renewal for Mexico was published on 25 June 2002.

On 22 May 2002 the Service published a notice in the *Federal Register* announcing an embargo of tuna imports from Peru. Inasmuch as Peru was harvesting tuna in the eastern tropical Pacific Ocean using purse seine vessels with greater than 400 short tons of carrying capacity, no such imports could be allowed until an affirmative finding is made under the International Dolphin Conservation Program Act. Peru joins Belize, Bolivia, Colombia, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Spain, Vanuatu, and Venezuela as being subject to a prohibition on importing tuna to the United States. Although an affirmative finding has not been made for Costa Rica, tuna harvested by its vessels is not embargoed because it does not have any purse seine vessels with greater than 400 short tons of carrying capacity that fish in the eastern tropical Pacific Ocean.

Tuna embargoes are also to be imposed against nations that import yellowfin tuna from harvesting countries embargoed from importing tuna directly to the United States. Such embargoes prevent nations from gaining access to the U.S. market for their tuna by shipping through a secondary nation. Currently, no intermediary nation embargoes are in place.

Chapter V

INTERNATIONAL ASPECTS OF MARINE MAMMAL PROTECTION AND CONSERVATION

The Departments of Commerce, the Interior, and State, in consultation with the Marine Mammal Commission, are instructed by section 108 of the Marine Mammal Protection Act to take such actions as may be appropriate or necessary to protect and conserve marine mammals under existing international agreements, and to negotiate additional agreements as needed to achieve the purposes of the Act. Furthermore, section 202 of the Act requires that the Marine Mammal Commission recommend to the Secretary of State and to other federal officials appropriate policies regarding international arrangements for protecting and conserving marine mammals. During 2002 the Commission continued to provide advice to the U.S. delegations to the International Whaling Commission, the Arctic Council, and the Convention on International Trade in Endangered Species of Wild Fauna and Flora. In addition, the Commission provided advice to the Department of the Interior on implementation of the United States–Russia Bilateral Polar Bear Agreement. These activities are discussed below.

International Whaling Commission

The International Whaling Commission (IWC) was established under the International Convention for the Regulation of Whaling, which was signed by the United States in 1946. The goal of the IWC is to manage commercial and aboriginal subsistence whaling to conserve whale stocks. Nevertheless, commercial whaling before the 1970s reduced many whale stocks to levels approaching biological extinction. This and other concerns led to passage of the Marine Mammal Protection Act of 1972. The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, as part of its responsibilities under the Act, advises the Departments of Commerce and State on measures necessary to ensure that commercial and aboriginal subsistence whaling do not cause any whale stock to be reduced or maintained below its optimum sustainable level. Activities related to the 2002 meetings of the IWC are described below.

Preparations for the 2002 Meeting

The National Oceanic and Atmospheric Administration (NOAA) acts as the lead agency representing the United States at IWC meetings. To prepare for the annual meeting in 2002, NOAA convened interagency committee meetings, which included congressional representatives, to help develop and review U.S. positions on major issues scheduled for discussion. A representative of the Marine Mammal Commission participated in these meetings.

The principal issues facing the IWC and its Scientific Committee at their 2002 meetings included the following—

- an application by Iceland to rejoin the IWC with a reservation exempting it from the moratorium on commercial whaling;
- further development of a Revised Management Scheme for commercial whaling;

• a joint U.S.–Russia quota request for bowhead whales for the period 2003 through 2007 on behalf of Alaska Eskimo whalers and Russian Natives;
• a joint U.S–-Russia quota request for gray whales for the period 2003 to 2007 on behalf of the Makah Tribe of Washington and Russian Natives;
• research whaling by Japan, which takes minke whales in the Southern Ocean Sanctuary and minke, Bryde's, and sperm whales in the North Pacific Ocean;
• a proposal from Japan to expand its North Pacific research whaling program to include 50 sei whales and 50 minke whales by coastal whalers;
• a request by Japan seeking authorization for coastal, community-based whalers to catch up to 50 minke whales per year;
• the effects of climate change and environmental contaminants on cetaceans;
• the need to conserve highly endangered whale populations;
• proposals to create whale sanctuaries in the South Atlantic and South Pacific Oceans; and
• a proposal to abolish the Indian Ocean Sanctuary.

The 2002 Meetings of the IWC

The 54th annual meeting of the IWC was held 20–24 May 2002 in Shimonoseki, Japan. Immediately before the meeting, six nations—Benin, Gabon, Mongolia, Palau, Portugal, and San Marino—became parties to the whaling convention and voting members of the Commission. Key actions by the IWC at the meeting included—
• rejecting Iceland's attempt to rejoin with a reservation to the moratorium on commercial whaling;
• rejecting a proposal to provide Japan with 50 minke whales for "small-type coastal whaling";
• renewing all aboriginal subsistence whaling quotas with the exception of the U.S.–Russia request for bowhead whales; and
• declining to establish whale sanctuaries in the South Pacific and South Atlantic Oceans; (the proposal to abolish the Indian Ocean Sanctuary was withdrawn and not subject to a vote).

Also, the IWC made little progress on the Revised Management Scheme but scheduled a special meeting on 14–17 October 2002 to continue work on various aspects of the scheme.

Iceland's Application to Rejoin the IWC— For the second consecutive year, the IWC rejected Iceland's attempt to rejoin the organization with a reservation to the moratorium on commercial whaling (i.e., paragraph 10(e) of the IWC Schedule). Iceland was unwilling to join without that reservation and, after the vote, the Icelandic delegation delivered a statement of protest in the plenary session and refused to attend as an observer. In the statement, Iceland's representative reiterated its challenge to the Commission's competency to decide whether to admit Iceland. Iceland also claimed that the Commission had acted contrary to its rules of procedure and that the chair had acted contrary to the underlying provisions of the whaling convention. Iceland singled out the United States, charging that it had failed to carry out its duties as depositary government under the convention by refusing to accept Iceland's submission for membership subject to a reservation without approval by the IWC members. In Iceland's view, the United States should have acknowledged Iceland as a contracting party in 2002 upon its revised request to rejoin the IWC. The United States disputes each of these claims.

Aboriginal Subsistence Whaling—Three of four requests for aboriginal subsistence whaling quotas were renewed at the 2002 meeting. By consensus, IWC members approved an annual take of up to 140 eastern North Pacific gray whales for subsistence purposes by the Makah Tribe of Washington and Russian Natives, with a total allowable catch of 620 whales for the years 2003 through 2007. Bequian subsistence whalers in St. Vincent and The Grenadines may take a total of four humpback whales for the years 2003 through 2007, subject to certain additional catch limits for 2006 and 2007. Greenland Natives may annually take up to 19 fin whales and 187 minke whales for the years 2003 through 2007. As discussed below, Japan and other countries blocked the U.S.–Russian request to renew the existing five-year quota for a subsistence take of bowhead whales from the Bering–Chukchi–Beaufort Seas stock by Alaska and Russian Natives.

The IWC Scientific Committee reported that it had made progress in developing a strike limit algorithm and an associated aboriginal subsistence whaling procedure covering the Bering–Chukchi–Beaufort Seas bowhead whale stock. The Committee recommended a bowhead whale strike limit algorithm that is derived by averaging the results from two highly regarded procedures employing

different philosophies as representing the best scientific tool it has and the best advice it can give for meeting IWC management objectives. It also recommended that future resources be focused on developing a new algorithm covering the gray whale harvest and addressing data shortcomings associated with the Greenland whale hunt.

Although supporting the new bowhead whale algorithm in principle, the United States stated that the current aboriginal management scheme has been effective and that agreement on a new scheme should not occur unless it is a clear improvement over the current system, and until a total aboriginal management package is developed. The IWC endorsed and adopted the new bowhead whale algorithm in principle.

In outlining the most recent census results and abundance estimates involving the Bering–Chukchi–Beaufort Seas stock of bowhead whales and the eastern North Pacific stock of gray whales, the Scientific Committee found no reason to change the management advice it had provided in 2001 or its conclusion that aboriginal subsistence needs and quotas proposed for these stocks fall well below allowable catch limits. The Scientific Committee reported again that annual takes of up to 102 Bering –Chukchi–Beaufort bowhead whales and up to 463 eastern North Pacific gray whales are consistent with the requirements of the schedule and are sustainable. Moreover, the Committee noted that a 50 percent carryover from the last year of one block to the first year of the next can be permitted without impacting the overall block limit.

Japan's Small-Type Coastal Whaling and the Bowhead Quota—On the second day of the meeting, the IWC rejected Japan's request for a quota for 50 minke whales for its small-type coastal whaling operations. Japan has requested, but has not obtained, a minke whale quota for its coastal whaling operations every year since 1988. The majority of IWC members regard coastal whaling as a commercial operation and thus inconsistent with the IWC moratorium on commercial whaling. In addition, necessary information on minke whale stock structure was lacking. In response to this development, Japan and other countries blocked every attempt to reach consensus on the bowhead whale quota in an effort to force the United States to accept Japan's coastal whaling proposal. The United States did not accept such an arrangement. Japan's actions forced the IWC to vote on the U.S.–Russian bowhead whale quota proposal with the proposal failing by one vote to gain the required three-quarters majority.

The Revised Management Scheme—Following the 2001 IWC annual meeting, an expert drafting group met intersessionally in Cambridge, England, in October 2001 and in Auckland, New Zealand, in February 2002 to continue work to develop a Revised Management Scheme under which commercial whaling might be resumed. Although the expert drafting group made some progress on observer requirements and the design of a compliance review committee, many fundamental and difficult issues remained. In general, Japan and Norway continued to reject a strong monitoring and observation program. One product of those expert drafting group meetings was a marked-up version of the text that highlighted major disputes, including (1) whether the scheme should include DNA tracking of whale meat or other procedures to verify that whale products in the marketplace come from authorized harvests; and (2) whether costs of the scheme should be borne by the whaling nations or by the IWC as a whole.

At the 2002 annual meeting, the Revised Management Scheme working group supported two recommendations of the expert drafting group: (1) a statement of principle indicating that the Revised Management Scheme is intended to ensure compliance with the convention and (2) a procedural mechanism whereby subsequent details of a Revised Management Scheme may be developed. With the exception of Japan, the working group also agreed upon the duties of a compliance review committee. Otherwise, there was no progress in resolving the outstanding issues pertaining to supervision and control. The chair of the working group proposed an intersessional meeting of commissioners to continue working on the scheme.

In the plenary session, Japan and Sweden proposed to amend the schedule with competing versions of the Revised Management Scheme. Neither proposal gained the necessary three-quarters majority for adoption. Japan's proposal, which included a proposal to remove the commercial whaling moratorium, modified some essential expert drafting group recommendations and omitted others. Further, it did not provide for certain fundamental aspects related to supervision and control, such as a transparent DNA registry that would de-

ter commercial whaling abuses that have occurred in the past. In contrast, the Revised Management Scheme amendment proposed by Sweden and several other countries contained elements necessary for an adequate monitoring program. However, the United States did not support Sweden's proposal at that time because the measure lacked the broad support that would be needed to ensure effective implementation and not prompt IWC parties to file formal objections.

In recognition of the lack of progress on the Revised Management Scheme and in recognition of the continuing areas of disagreement, the IWC agreed to convene an intersessional meeting of commissioners on 14–17 October 2002 in Cambridge, England, to continue working on the scheme.

Whale Sanctuaries—At its 2001 annual meeting, the IWC had recommended guidelines for the Scientific Committee to use during its 2002 review of the Indian Ocean Sanctuary, which prohibits all whaling in the ocean basin. The Commission reviewed those guidelines at the 2002 annual meeting. Several delegations requested more time to complete their review. Japan nevertheless proposed to eliminate the Indian Ocean Sanctuary but later withdrew its proposal.

Australia and New Zealand presented a proposal, unsuccessfully considered at previous IWC meetings, to establish a South Pacific sanctuary. Whaling countries strongly opposed the proposal. Caribbean countries expressed concerns that range states had not been adequately consulted. After further discussion on the merits of the sanctuary, the proposal failed to receive the three-quarters majority needed for adoption.

As at the 2001 annual meeting, Brazil and Argentina had proposed the establishment of a South Atlantic sanctuary. In response to criticism in 2001 that Brazil had not consulted other countries that border the South Atlantic Ocean, Brazil reported that it had consulted with the range states of Gabon, Togo, Congo, Uruguay, and Namibia. Countries opposed to the concept of sanctuaries raised concerns over the merits of the proposed sanctuary. The proposal failed to receive the three-quarters majority needed for adoption.

Status of Whale Stocks—Prior to the 2002 IWC meeting, its Scientific Committee met to review the status of whale stocks. The Committee completed a comprehensive assessment of North Atlantic humpback whale stocks and agreed that knowledge of humpback whales in this area had been greatly increased. The Committee concluded that humpback whale populations are increasing in a number of areas, including the Gulf of Maine, Iceland, and the West Indies. The rate of increase of the West Indies breeding population is estimated to have been 3 percent per year between 1979 and 1992, with the 1992 population estimated to number 10,752 animals. The Committee noted, however, that questions related to delineation of population structure require additional work.

The Committee again expressed concern over the status of the North Atlantic right whale and reiterated its past recommendation that every effort be made to reduce sources of anthropogenic mortality. For North Pacific right whales, the Committee strongly recommended that every effort be made to gather information about their status and to take whatever measures are necessary to assist in their recovery.

The Scientific Committee noted that the western Pacific gray whale population numbers fewer than 100 whales and is one of the world's most endangered populations of large whales. It reiterated that every effort should be made to reduce sources of anthropogenic mortality and disturbance to zero to save this population from extinction. The Committee recommended that the ongoing U.S.–Russian research and monitoring program be continued and expanded, that no seismic work be conducted in or near the summer feeding ground (additional seismic surveys are planned there in 2002 and 2003) off the northeastern coast of Sakhalin Island, and that the IWC facilitate a workshop to assess the current status of the population and develop a long-term research and monitoring program. South Korea offered to host a special IWC workshop on the status of western gray whales in October 2002. The workshop subsequently was held and a report of its findings will be made available at the 2003 IWC meeting.

The Scientific Committee continued its assessment of the status of Southern Hemisphere minke whales to determine if the most recent survey results indicate a major decline from earlier years. Additional work on this issue will continue for the next three to five years.

An international group of 16 scientists presented a paper to the Scientific Committee detailing their concerns about the proposed expansion

of Japan's lethal scientific research program in the North Pacific. In the group's opinion, the program lacks meaningful quantifiable measures by which to judge performance. Therefore, the proposal would not be acceptable to major national or international funding agencies. They also questioned its classification as "scientific whaling," which is allowed under the whaling convention. The review of Japan's proposal was inconclusive.

Humane Killing and Associated Issues— Japan opened discussion of this agenda item by noting that it no longer intended to submit detailed data on whale killing methods to the IWC. It stated that it would continue its research on killing methods and efforts to reduce time to death for whales, but that in the future it would report research results to academic societies for publication as it deems appropriate.

Denmark reported on improvements in hunting methods in the Greenland hunt, which included testing of a penthrite grenade and secondary killing methods. Denmark also presented data on the number of struck and lost whales. Russia reported on improvements in its whale-killing methods and noted that the time to death and number of projectiles being used decreased from last year. Russia also noted the assistance of the Alaska Eskimo Whaling Commission in helping Chukotka Natives improve their hunting methods. Norway reported on the minke whale hunt during 2001 and noted that the use of penthrite grenades resulted in instantaneous death 78 percent of the time. Japan reported briefly on its whaling in the Antarctic under a scientific research permit and reported that the time to death and instantaneous death rate achieved by three new gunners were worse than those achieved by experienced gunners.

Several delegations requested information on Japan's whaling under a special scientific research permit in the North Pacific. Japan reported that it is using a new Norwegian penthrite grenade. The United States reported on its use of a new penthrite grenade (developed with Norwegian assistance) in the bowhead whale hunt carried out by Alaska Eskimos and noted that difficult and unpredictable ice conditions affect hunting efficiency. Several delegations pressed all reporting countries to provide more detailed information on their hunts, including additional information on time to death. The United Kingdom, supported by many other countries, expressed concern about the high increase in bycatch of whales in Japanese fisheries since changes in Japan's domestic legislation began allowing the commercial use of bycatch animals. The United Kingdom also submitted a list of questions to the government of Japan concerning the killing of small cetaceans.

The Commission decided to hold a workshop on whale-killing methods in Germany before the 2003 IWC annual meeting.

Whale-Watching Activities—Several members (i.e., Australia, New Zealand, Germany, the United States, and the United Kingdom) supported the continued development of responsible whale-watching and noted its economic benefits. New Zealand noted that whale-watching is under the competence of the IWC because the industry pertains to the use of whales. Brazil and Argentina supported whale-watching as a nonlethal, sustainable industry that can provide economic benefits for coastal areas and general education as a tourist industry. Spain commented that it is working on a national plan for whale-watching.

The IWC endorsed a Scientific Committee recommendation that a workshop be held on the development of scientifically based whale- and dolphin-watching management. Although the workshop will not be officially sponsored or funded by the IWC, it is scheduled to take place before the 2003 IWC annual meeting.

Japan, Norway, Antigua and Barbuda, and Russia argued that the IWC does not have competence to regulate whale-watching. Japan and Norway specifically noted that the economic potential of the whale-watching industry is unknown and that commercial whaling would be more profitable. Furthermore, the two countries believe that the proposed whale-watching science workshop is outside the competence of the IWC. Antigua and Barbuda noted that whale-watching should not be a priority of the IWC.

Other Matters—During the meeting, the United Kingdom reported on the availability of whale meat from Greenland and Russia in a local market in Nagasaki and held up samples it had obtained from a nongovernmental organization. Japan asked the United Kingdom to turn the samples over to them. The United Kingdom refused and asked the United States to conduct an independent analysis to determine the species represented by the samples. Near the end of the meeting, the Japanese reported that they had conducted

an investigation into the U.K. allegations and had concluded that it was just a case of mislabeling. The United Kingdom and the United States agreed that the samples should be examined further.

The Commission will hold its 2003 annual meeting in Berlin, Germany.

Special IWC Meeting

The IWC held a special one-day meeting on 14 October 2002 to consider Iceland's membership in the IWC, renewal of the bowhead aboriginal subsistence whaling quota, and a resolution from Japan on coastal whaling. By the end of this meeting, Iceland was admitted with a reservation to the moratorium on commercial whaling, the bowhead quota had been adopted by consensus, and Japan's resolution was defeated. A commissioners-only meeting to continue work on the Revised Management Scheme was held on 15–17 October. Some progress was made on catch verification, cost allocations, and establishment of a new compliance review committee. Subworking groups are to be established to continue work on the first two issues. The Commission also discussed the relationship between completing the Revised Management Scheme and lifting the commercial whaling moratorium, limiting whale harvests to within 200 miles of land and prohibiting trade as temporary confidence-building measures, and developing a code of conduct on scientific research whaling and animal welfare issues.

Icelandic Membership—For the third time in two years, the Commission voted on Iceland's proposal to rejoin the IWC with a reservation to the moratorium on commercial whaling. On 10 October 2002 Iceland deposited another formal request to rejoin the IWC with such a reservation. Previous attempts by Iceland to rejoin the IWC with a reservation were rejected at the IWC's 2001 and 2002 annual meetings. Iceland's application was accompanied by the identical reservation to paragraph 10(e) of the IWC Schedule (i.e., the commercial moratorium). Iceland's request was also accompanied with a statement that read—

> [N]otwithstanding this (the reservation), the Government of Iceland will not authorize whaling for commercial purposes by Icelandic vessels before 2006 and, thereafter, will not authorize such whaling while progress is being made in negotiations within the International Whaling Commission on the revised management scheme. This does not apply, however, in case of the so-called moratorium on whaling for commercial purposes, contained in paragraph 10 (e) of the schedule, not being lifted within reasonable time after the completion of the revised management scheme. Under no circumstances will whaling for commercial purposes be authorized in Iceland without a sound scientific basis and an effective management and enforcement scheme.

The Commissioners voted four times on Iceland's proposal. After procedural votes and challenges, the Commission recognized Iceland as a member with a reservation to paragraph 10(e) of the Schedule. Subsequently, Australia, Mexico, Italy, the United Kingdom, Sweden, and France indicated that they would deposit objections to Iceland's reservation. The United States made a statement indicating its expectation that Iceland will be a constructive participant in the work of the IWC, especially with regard to the Revised Management Scheme. The United States also noted its hope that Iceland will not authorize whaling unless and until the IWC lifts the moratorium on commercial whaling.

Bowhead Whale Subsistence Quota—As discussed above, at the May 2002 IWC annual meeting, Japan had blocked renewal of the aboriginal subsistence whaling quota for bowhead whales used by U.S. and Russian Natives. Between June and October, Japan reversed its position and agreed not to block renewal of a quota. At the special meeting, Japan announced that it continued to have concerns with the status of the bowhead whale stocks but would not block consensus adoption of the quota. At this point Antigua and Barbuda, Dominica, St. Lucia, Palau, and Guinea expressed concerns about the bowhead whale stock, in effect blocking adoption by consensus. Nevertheless, the Commission eventually adopted a quota of 280 whales to be landed from 2003 through 2007. No more than 67 whales are to be struck in any year, with no more than 15 unused strikes from previous years to be carried over into a subsequent year. The United States and Russia agreed to language that assured Commission members that the advice of the Scientific Committee concerning this stock will be followed once the results of the in-

depth assessment on the bowhead whale stocks are available in 2004.

Japanese Coastal Whaling—After the bowhead whale quota was adopted, the Commission addressed Japanese coastal whaling. On 11 October, Japan circulated to all parties a proposed resolution to authorize its coastal whaling. The text of the resolution (1) referenced the establishment of an appropriate catch quota for minke whales consistent with paragraph 10(e) of the Schedule of Regulations and would require that any quota be based on scientific advice from the Scientific Committee; (2) noted Japan's intention to prepare an action plan that would apply pending adoption of the Revised Management Scheme and establish conditions for catches and distribution of whale products; and (3) called for consideration of an amendment to the Schedule to establish an appropriate catch quota at the 2003 annual meeting.

Several countries opposed the proposed resolution, questioning, in particular, how Japan could operate its coastal whaling program consistent with the commercial whaling moratorium. These countries also opposed creating a new category of whaling apart from commercial whaling, aboriginal subsistence whaling, and scientific research whaling. The United States supported the resolution because Japan committed to satisfying the two long-standing concerns about Japanese coastal whaling that the United States has voiced at previous IWC meetings, namely that any coastal whaling program be (1) consistent with the moratorium on commercial whaling and (2) based on advice from the Scientific Committee. U.S. support for the resolution does not commit the United States to support a Schedule amendment giving Japan a quota for coastal whaling at the 2003 IWC annual meeting. The burden remains on Japan to produce an action plan detailing how its coastal whaling program would be consistent with the moratorium on commercial whaling and in accordance with the advice of the IWC Scientific Committee. The United States reserved its right to assess any Japanese proposal for coastal whaling based on the criteria noted above and on other factors it believes are appropriate. The proposed resolution failed by a vote of 16 in favor, 19 opposed, and 2 abstentions.

The Arctic Council

Human activities in the Arctic, such as coastal and offshore oil and gas development, may have adverse effects on marine mammals and their habitats. In addition, human activities outside the Arctic may be adversely affecting the Arctic food web, including marine mammals and people who rely on fish and wildlife for subsistence. Recent studies indicate that a variety of persistent organic compounds and other pollutants originating from human activities in the middle latitudes are being carried by air and water currents to the Arctic, where they accumulate in the tissues of species throughout the food chain, including humans.

In September 1989 representatives of the eight Arctic countries—Canada, Denmark (for Greenland), Finland, Iceland, Norway, the Soviet Union, Sweden, and the United States—met in Rovaniemi, Finland, to discuss cooperative measures to protect the Arctic environment. The principal impetus for this meeting was the Chernobyl nuclear accident and pollution from Russian mining activities near the Finnish border, both of which created a desire to help the Soviet Union address a number of environmental concerns. From this beginning, the Arctic Council was eventually established in 1996 and is today one of the highest-level venues where Arctic nations discuss the Arctic environment, including their concerns about the habitat and conservation of Arctic marine mammals. The Council is notable for being one of the first international forums that strives to accommodate the traditional subsistence and cultural needs and practices of indigenous people through their active participation as permanent members. Previous Marine Mammal Commission annual reports give a more detailed account of the history and development of the Arctic Council.

The Arctic Council has developed five principal working groups to deal with these issues. The Arctic Monitoring and Assessment Program (AMAP) evaluates and monitors the health (human and wildlife) and ecological risks associated with contamination from radioactive waste, heavy metals, persistent organic pollutants, and other pollutants. The Conservation of Arctic Flora and

Fauna (CAFF) program aims to ensure adequate habitat protection and seeks to strengthen wildlife protection through a regional network of protected areas and effective conservation practices. This program provides a forum for scientists, indigenous people, and conservation managers to exchange data and information on issues of mutual interest and concern regarding the biology, ecology, and utilization of fish, wildlife, forests, and other living resources in the Arctic. The Emergency Prevention, Preparedness, and Response (EPPR) working group developed an environmental disaster "risk assessment" for the Arctic, reviews emergency notification systems, and recommends cleanup and response measures. The Protection of the Arctic Marine Environment (PAME) program conducts an ongoing evaluation of the legal instruments associated with protection of the Arctic ecosystem, including the development of regional guidelines for offshore oil and gas operations in the Arctic. Finally, the Sustainable Development Working Group (SDWG) was established to protect and enhance the economies, culture, and health of the inhabitants of the Arctic. The group is responsible for facilitating preparation of development-related proposals for consideration by the Council, recommending to the Council projects that appear to merit consideration, and overseeing implementation of projects approved by the Council.

The Department of State has overall lead responsibility for developing and overseeing implementation of U.S. policy regarding the Arctic. The National Oceanic and Atmospheric Administration has lead responsibility for U.S. participation in the AMAP working group. The Alaska Office of the U.S. Fish and Wildlife Service has lead responsibility for U.S. participation in the CAFF working group. To help meet these responsibilities, U.S. positions regarding policy-related matters are developed through an interagency Arctic Policy Group chaired by the Department of State. This group includes representatives of the Arctic Research Commission, the Environmental Protection Agency, the National Science Foundation, and the Departments of Commerce, Defense, Energy, the Interior, and Transportation, and the Marine Mammal Commission. Representatives of the State of Alaska, Alaska Native organizations, industry, and public interest groups are consulted to assist in developing policies regarding issues that affect them.

Federal agency interest in and contributions to the work of the Arctic Council are increasing, due in part to growing recognition of both the global and regional importance of the issues. The Marine Mammal Commission will continue to take part in domestic discussions of Arctic Council issues, to send representatives to working group and other meetings bearing on marine mammals under the aegis of the Arctic Council, and to make recommendations as appropriate concerning the organization and content of the work of the Arctic Council.

Recent Arctic Council Activities

Chairmanship of the Council for 2000–2002 was held by Finland. In 2002 two meetings of the senior Arctic officials were held, one in May in Oulu, Finland, and one in October in Saariselka, Finland, prior to the Arctic Council meeting in the same location. The Marine Mammal Commission worked with the Department of State, other federal agencies, Alaska Native organizations, and the Alaska Governor's office to develop U.S. positions for these meetings. The United States maintains the view that it is inappropriate for the Arctic Council to be involved in issues relating to the take of marine mammals and other living resources and trade in products made from them. This policy was developed as a direct order from President Clinton in 1997 in reaction to an attempt by Canada to address takings of marine mammals in the Council. President Bush reconfirmed the position in August 2001.

In 1997 the AMAP working group delivered a report entitled *Arctic Pollution Issues* to the ministers of the Arctic Environmental Protection Strategy. The report was a nontechnical description of what is currently known about a wide range of pollutants and their effects on the environment and on human health in the Arctic. In September 1998 the working group delivered a comprehensive scientific report entitled *The AMAP Assessment Report* to the Council. Since then the working group has been attempting to address more recent topics not covered in the initial assessments (e.g., the use of the antifouling paint additive, tributyltin, and brominated flame retardants). It met in April 2002 in the Faroe Islands and in October 2002 in Rovaniemi, Finland, where it held the Second AMAP Symposium to update information on heavy metals, persistent organic pollutants, radionuclides,

human health, and changing pathways. A nontechnical summary, *Arctic Pollution 2002*, was delivered at the symposium, and more-technical findings presented at the meeting are being published.

In 2000 the Arctic Council negotiated and adopted a framework for the Sustainable Development Program. Two issues were contentious. First, several countries, led by Denmark, favored an extensive, prescriptive document to define the program, outline specific activities to be undertaken, and emphasize certain philosophical points of view, particularly regarding the use of marine mammals. The United States favored a brief document summarizing the general intent of the program without specific details or opinions. In the end, the U.S. approach was taken.

In 2001 the CAFF Working Group produced *Arctic Flora and Fauna: Status and Conservation,* and in 2002 the group produced *Arctic Flora and Fauna: Recommendations for Conservation*. Both books serve as references for nonspecialists and are the product of 10 years of CAFF-sponsored projects. The books are intended to inform a wide audience about Arctic conservation issues and serve as a basis for measuring conservation progress. In August 2002 the CAFF working group met in Abisko, Sweden, to discuss the Circumpolar Protected Areas Network and the topic of marine protected areas. This group plans further work to examine ecologically important marine areas. In addition, the group is continuing efforts to develop a monitoring network for nine species or species groups, one of which is ringed seals.

Arctic Climate Impact Assessment

The Marine Mammal Commission is concerned about the possible effects of climate change on the Arctic environment, including Alaska Native communities. In 2000 the Commission and representatives of those communities convened a workshop on the nature and causes of observed changes in sea ice and the condition of marine mammals in the Arctic. The workshop also discussed how such changes may affect Native communities. The final report from the workshop provides a series of recommendations for addressing issues associated with environmental change in the Arctic (see Huntington et al. 2000, Appendix B).

The Arctic Council has directed the AMAP and CAFF working groups to assess the effects of climate change on Arctic ecosystems. The working groups, in cooperation with the International Arctic Science Committee, developed a proposal for an Arctic climate impact assessment, which the Arctic Council approved at its October 2000 meeting. The assessment will address climate change, ozone depletion, and ultraviolet radiation and their impacts on the Arctic environment, human health, and human activities. The assessment will be presented to the Council in 2004. A representative of the Commission is participating in the preparation of the assessment.

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) is the primary international framework for ensuring that international trade in animals and plants is not detrimental to their survival. The Convention entered into force in 1975. Currently 160 countries have signed and ratified the agreement. Within the United States, the Fish and Wildlife Service is the lead agency for implementing the Convention. The National Marine Fisheries Service, the Marine Mammal Commission, the U.S. Customs Service, the Animal and Plant Health Inspection Service, the International Trade Administration, the U.S. Trade Representative, and other agencies provide technical expertise and participate in CITES meetings, including conferences and technical meetings. U.S. positions and policies are coordinated through regular meetings of a CITES interagency coordination committee, on which the Marine Mammal Commission participates.

Under CITES, species are grouped into three appendices depending on their conservation status, and trade in them is correspondingly regulated. 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 or their products in trade 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 and 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 in the range of the species.

CITES countries may propose adding or deleting species from the appendices or transferring species from one appendix to another before any meeting of the Conference of the Parties. Before the 2002 meeting, Japan submitted proposals to transfer most Northern Hemisphere stocks of minke whales from Appendix I to Appendix II and the western North Pacific stock of Bryde's whales from Appendix I to Appendix II. Adoption of those proposals would have allowed limited international trade in these species.

At all recent CITES meetings, the United States has strongly opposed the downlisting of any species or population of whales subject to the IWC moratorium on commercial whaling. The United States, as well as several other CITES parties, considers it inappropriate to consider downlisting any whale species or population until the IWC has completed its Revised Management Scheme.

Actions Taken at the 2002 Conference of the Parties

The 12th meeting of the Conference of the Parties to CITES took place in Santiago, Chile, 3–15 November 2002. Parties dealt with several marine mammal topics and charted new territory in marine conservation when they listed three commercially traded marine taxa—whale sharks, basking sharks, and seahorses (32 species)—in Appendix II. After extensive and highly charged debates on whales, the parties rejected Japan's proposals to reopen commercial trade in minke and Bryde's whale products and voted to limit trade in the Black Sea population of bottlenose dolphins. Details of the marine mammal issues are provided below.

Whale Proposals—Before the November meeting, Japan submitted two proposals to downlist Northern Hemisphere stocks of minke whales and western North Pacific stock of Bryde's whales from Appendix I to Appendix II. Japan's proposal would have effectively allowed the reopening of international commercial trade in whale products. After arriving at the meeting the Japanese delegation realized that it had made a significant drafting error in each proposal. The initial proposals would have allowed trade only in whale products taken within territorial waters of CITES nations. In committee action, Japan subsequently proposed to amend its initial proposals to include trade in products from animals harvested on the high seas. The United States believed the proposed amendments were inadmissible under CITES rules because they would have widened the scope of the proposals. The committee chair and many nations agreed with the United States' interpretation, and Japan was required to rely on its original proposals. Norway, Iceland, and several countries from the Caribbean and Africa supported Japan. The United States opposed the proposals on the basis of the relationship between CITES and the IWC (see below) and because the stocks do not meet CITES downlisting criteria that require that effective management regimes be in place. For commercial whaling, the United States believes that the IWC's long-debated Revised Management Scheme is the mechanism to provide effective management of whaling. Australia, the European Union, and several Latin American countries shared the U.S. position.

Japan's proposal to downlist Northern Hemisphere stocks of minke whales failed in committee by a vote of 41 in favor, 54 opposed. Japan's proposal to downlist the western North Pacific stock of Bryde's whales failed by a margin of 43 in favor, 63 opposed. These votes marked an erosion of support for Japan's whaling proposals since the 2000 CITES meeting when similar proposals achieved a simple majority but not the necessary two-thirds vote of the parties.

In a final effort to gain support for its whale trade proposals, Japan raised its minke whale downlisting proposal for reconsideration in the closing plenary session and amended it to include only one stock, the Okhotsk–West Pacific stock. Japan also attempted to revise the minke whale proposal with an amendment that would have expanded the scope of the initial proposal. The plenary chair ruled against allowing the amendment that had earlier been rejected. The proposal was again defeated by a vote of 53 in support, 66 opposed. Japan did not attempt to reopen the Bryde's whale proposal. The plenary adopted the committee decision to reject the Bryde's whale proposal.

Black Sea Bottlenose Dolphin—The Republic of Georgia submitted a proposal to transfer

the Black Sea bottlenose dolphin from Appendix II to Appendix I. This subspecies, which is isolated from other populations of bottlenose dolphins, is found only in the Black Sea. Its population has declined greatly due to its overexploitation, diminished food resources, pollution, and other factors affecting the Black Sea ecosystem. The size of the current population is unknown. No estimates exist of sustainable levels of take. The United States agrees with Georgia that any take for purposes of exhibit or export is potentially detrimental to the population.

The Republic of Georgia's proposal to transfer the Black Sea bottlenose dolphin from Appendix II to Appendix I received a simple majority in committee (40 in favor, 31 opposed, and 39 abstentions) but failed to get the necessary two-thirds majority for adoption. Georgia reopened discussion during the plenary by amending its proposal to retain the Black Sea bottlenose dolphin on Appendix II but with a zero export quota for commercial purposes. The parties approved the amended proposal with 86 in favor, 26 against, and 10 abstentions.

CITES' Relationship to the IWC

In recent years CITES parties have debated the relationship between CITES and other international conventions and organizations such as the IWC and the United Nations Food and Agricultural Organization (FAO). In 1982 the IWC imposed a moratorium on the commercial take of large whales pending development of a Revised Management Scheme that would ensure adequate protection for affected whale stocks. The IWC requested that the CITES parties assist the IWC by including in CITES Appendix I those whale species subject to the moratorium. Many CITES parties, including the United States, supported the IWC request and continue to oppose any proposals to revise appendix designations for whales before the IWC has adopted a Revised Management Scheme for commercial whaling. Whaling nations and their supporters believe that there is a need for independent action under CITES using the Convention's own criteria when listing species on the appendices, without taking into consideration the views or actions of the IWC. The issue has become more important now that Japan takes whales under a scientific research program and Norway has initiated the first international trade in whale products in more than a decade by shipping minke whale products from its commercial harvest to Iceland.

The Convention stipulates that when a proposal for a marine species is received for consideration by CITES parties, the CITES Secretariat must consult "intergovernmental bodies having a function in relation to those species" for their comments. In anticipation of such a request, the IWC at its May 1999 annual meeting in Grenada overwhelmingly adopted a resolution directing its Secretariat to advise CITES parties that the IWC had not yet completed work on its Revised Management Scheme and that catch limits of zero for commercial whaling remain in force. A representative of the IWC attended the 2002 CITES meeting and reaffirmed the IWC position that it is the international organization with primary competence to manage whaling and that until the IWC adopts a Revised Management Scheme, the IWC lacks an effective whale harvest regulatory program. Japan and Mexico had submitted conflicting proposed resolutions addressing the relationship of CITES and the IWC. After limited debate, both parties withdrew their proposals.

The United States and Japan independently submitted proposals asking the parties to formalize CITES' relationship with FAO to coordinate both organizations' activities on CITES marine and fish issues. The two countries, which usually disagree on issues of this type, developed terms of reference for a memorandum of understanding calling for FAO and CITES to, among other things, establish provisions for FAO scientific review of CITES proposals to list exploited marine species (including whales).

Polar Bear Agreements

Alaska is home to two discrete stocks of polar bears: the western or Chukchi/Bering Seas stock, shared with Russia, and the southern Beaufort Sea stock, shared with Canada. In addition, there are several other stocks that occur throughout the Arctic in Canada, Greenland, Norway, and Russia. Polar bears can traverse vast territories, often crossing national boundaries and into international waters. As such, efforts to conserve polar bears require international cooperation, at least for those stocks that cross international boundaries. Recognizing this, and because of concern over the dramatic increase in the number of polar bears

being taken by hunters in the 1950s and 1960s, the United States and other countries where polar bears occur negotiated the international Agreement on 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. Among other things, the Agreement limits the purposes for which polar bears may be taken, prohibits certain methods of taking, and requires the parties to protect habitat components that are important to polar bears, such as denning and feeding sites and migratory corridors.

Prior to reauthorization of the Marine Mammal Protection Act in 1994, the Marine Mammal Commission and others questioned whether the Act or other domestic statutes provided sufficient legal authority for the United States to implement fully all provisions of the Agreement on the Conservation of Polar Bears, particularly those related to habitat protection. This prompted the Commission to contract for an examination of the Agreement, the Marine Mammal Protection Act, and other domestic legislation to identify possible inconsistencies and how they might be reconciled. The report of that study was provided to the Fish and Wildlife Service in January 1994. (It was subsequently updated to reflect amendments to the Marine Mammal Protection Act enacted later that year; see Baur 1995, Appendix B).

In response to these concerns, Congress amended section 113 of the Marine Mammal Protection Act in 1994 to require 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 of the Agreement, particularly with respect to habitat protection. A report based on the review was to be submitted to Congress by 1 April 1995. The amendments also required the Secretary to initiate a multilateral review of the effectiveness of the Agreement and to work with the four other parties to establish a process by which future reviews of the Agreement would be conducted. A third new provision added to the Act in 1994 called on the Secretary of the Interior, acting through the Secretary of State, and in consultation with the Marine Mammal Commission and the State of Alaska, to consult with Russian officials on the development and implementation of enhanced cooperative research and management programs for the shared polar bear stock.

In 1995 the Fish and Wildlife Service convened a meeting of representatives of interested governmental agencies and nongovernmental organizations to review U.S. implementation of the Agreement. The Service subsequently prepared a draft report assessing U.S. compliance with each of the agreement's provisions and with a resolution adopted by the parties to the Agreement concerning the taking of female bears, cubs, and denning bears. A full discussion of the draft report and the Commission's comments thereon can be found in past annual reports. Among the key issues under review was whether the United States was in full compliance with the habitat protection provisions of the Agreement and whether the issuance of incidental-take authorizations under the Marine Mammal Protection Act was consistent with the terms of the Agreement. Although the Service has done considerable work on the report, it has yet to be finalized and transmitted to Congress. The Service expects to complete the report and provide it to Congress during 2003.

As for the directive to consult with the other parties on the effectiveness of the Agreement, the Fish and Wildlife Service wrote to those countries in 1997 seeking assistance in conducting the review. The Service received final reviews from Canada, Norway, and Greenland, but, as of the end of 2002, was waiting for a final response from the Russian Federation. A preliminary response from Russia suggested that there may be some interest in opening up the 1973 agreement for modification. Once all final responses are in hand, the Service intends to prepare a report on international compliance with the Agreement and the other parties' views on further steps that are needed.

Efforts to pursue greater cooperation between the United States and Russia with respect to the Chukchi/Bering Seas polar bear stock culminated in the signing of the Agreement between the government of the United States of America and the government of the Russian Federation on the Conservation and Management of the Alaska-Chukotka Polar Bear Population in October 2000. That agreement, and steps taken toward its implementation, are discussed below.

United States–Russia Bilateral Polar Bear Agreement

The western or Chukchi/Bering Seas polar bear stock, which ranges between Alaska and Russia, has traditionally been used for subsistence by Native people in both the United States and Russia, although hunting has been banned in Russia since 1956. With the breakup of the Soviet Union, however, came renewed interest by Natives residing in Russia in resuming subsistence hunting of polar bears. This led to a growing concern that subsistence hunting in Russia, combined with the existing levels of taking by Alaska Natives under the Marine Mammal Protection Act, might adversely affect the shared stock, and prompted the Fish and Wildlife Service's Alaska Regional Director and a representative of the Russian Ministry of Ecology and Natural Resources to sign a protocol in 1992 indicating the parties' intentions to conclude a bilateral agreement on the conservation and use of polar bears from that stock. The number of bears reported as being taken by Alaska Natives under the Fish and Wildlife Service's marking and tagging program are provided in Table 11. No comparable data of take levels in Russia are available. Although taking polar bears in Russia is not currently authorized, anecdotal information suggests that some hunting is occurring, perhaps at a significant level.

Table 11. Numbers of polar bears tagged during Alaska Native harvest, 1989–2002

Harvest Year	Total Tagged	Bering and Chukchi Seas Population	Beaufort Sea Population
1989–1990	99	—	—
1990–1991	76	—	—
1991–1992	59	—	—
1992–1993	66	—	—
1993–1994	121	—	—
1994–1995	92	—	—
1995–1996	40	—	—
1996–1997	69	—	—
1997–1998	50	27	22
1998–1999	95	79	15
1999–2000	47	25	22
2000–2001	67	38	29
2001–2002	70	55	15

Source: U.S. Fish and Wildlife Service.

Beginning in 1994, representatives of Native organizations and government agencies from the United States and Russia held technical discussions concerning joint conservation of the shared stock of polar bears occupying the Chukchi, Bering, and eastern Siberian Seas. These discussions led to adoption of the Protocol on U.S./Russia Technical Consultation for the Conservation of Polar Bears of the Chukchi/Bering Sea Regions in September 1994. Further scientific and technical discussions on a proposed government-to-government agreement were held with Russian officials during 1995 and 1998, culminating in the adoption in early 1998 of an ad referendum text of a bilateral agreement for submission to the two governments for approval. Participants in those negotiating sessions again included federal officials, including a representative of the Marine Mammal Commission, and representatives of the State of Alaska, the affected Native communities, and conservation organizations.

After reviewing the text, the Russian Federation and, to a lesser extent, the U.S. Department of State suggested revisions, and a final negotiating session was held in Anchorage, Alaska, in March 2000. As with past negotiating efforts, the U.S. delegation included a representative of the Commission. Those negotiations resulted in a new text that was circulated for approval within the respective governments and was provided to the other three nations party to the Agreement on the Conservation of Polar Bears for their review. After incorporating technical changes to reconcile the English and Russian texts, the Agreement between the government of the United States of America and the government of the Russian Federation on the Conservation and Management of the Alaska-Chukotka Polar Bear Population was signed in Washington, D.C., on 16 October 2000.

The Agreement specifies that subsistence taking by Native residents of Alaska and Chukotka are to be the only allowable consumptive uses of the affected stock of polar bears. Under the Agreement, a joint commission composed of four members—a governmental official and a representative of its Native people from each jurisdiction— is to establish annual taking limits that may not exceed the sustainable harvest level determined for the stock. The allowable take will be divided equally

between the two parties, but, subject to approval by the joint commission, either party may transfer a portion of its allowable take to the other party. Once in place, the joint commission will establish a scientific working group to assist in setting annual sustainable harvest levels and identifying scientific research to be carried out by the parties. Other provisions of the Agreement prohibit the taking of denning bears, females with cubs, or cubs less than one year old, and the use of aircraft and large motorized vessels for hunting polar bears. Also, the Agreement directs the parties to undertake all efforts necessary to conserve polar bear habitats, particularly denning areas and those areas where polar bears concentrate to feed or migrate. Implementation of these provisions is expected to help ensure that the United States is in full compliance with the provisions of the multilateral 1973 polar bear treaty. The full text of the agreement and related information can be found at the website maintained by the Fish and Wildlife Service's Alaska Region (http://www.r7.fws.gov/mmm/pbsigning/agreement.html).

Before the Agreement can take effect, it must be approved by the Senate. This being the case, President Bush transmitted the agreement to the Senate on 15 July 2002, seeking its advice and consent. As of the end of 2002, Senate action had yet to be taken. In addition, domestic legislation to implement certain provisions of the Agreement will be needed. The Department of the Interior, in consultation with the Marine Mammal Commission and the State Department, developed draft implementing legislation, which was submitted for interagency review in April 2002. At year's end, the Interior proposal was still undergoing review and clearance prior to submission to Congress. It is expected that proposed implementing legislation will be transmitted to Congress early in 2003.

Although the Agreement has yet to enter into force, the parties met in Moscow on 6–7 June 2002 to discuss steps that had been taken or that were needed to implement the Agreement, including actions related to the establishment and organization of the bilateral polar bear commission. As with other meetings concerning the agreement, a Commission representative participated on the U.S. delegation, which included both government officials and Alaska Native representatives.

The parties discussed additional steps needed to bring the agreement into effect. The U.S. representatives provided a description of the legislative process being followed to ratify and implement the Agreement. The Russian delegation explained that no further action was needed on its part to ratify the agreement, but that implementing acts would be needed. The Russian delegation also indicated that it intended to wait for the United States to ratify the agreement before beginning work on its laws. In response, the United States delegation encouraged the Russians to begin drafting those laws sooner, to avoid delays in implementation once action by the U.S. Congress has been taken.

The U.S. delegation provided their Russian counterparts with a discussion document outlining the issues that it believes need to be considered in establishing and operating the joint commission that will oversee implementation of the Agreement. The Russian representatives indicated that they would review that document and provide comments to the Fish and Wildlife Service, which they did in November. These have been incorporated into a revised draft that will be circulated by the Service for further review. Although the parties continue to work toward addressing issues related to the joint commission, they have recognized that, ultimately, it will be up to the commission itself to adopt the procedures that will govern its operation.

At this Moscow meeting, the Fish and Wildlife Service described the harvest management program in place in Alaska and provided an overview of ongoing population assessment work. It also noted that it had held a joint workshop with Chukotka and Alaska Natives on harvest monitoring techniques that had led to the development of a draft management plan by the Association of Traditional Marine Mammal Hunters in Russia. Drawing on that experience, the parties agreed to continue close cooperation on these and related efforts. A specific point of concern raised by the U.S. delegation was the need for closer cooperation in conducting population surveys and other research, including access of U.S. research vessels to Russian waters. Although the meeting participants reached no resolution of this matter, they agreed to work together to address the issue, perhaps by designing a cooperative study specifically focused on polar bears that could be submitted jointly to the authorizing agencies.

The parties also discussed the role of Alaska and Chukotka Natives in implementing the Agree-

ment. The United States representatives explained that the situation is clear on the U.S. side, with the Nanuuq Commission representing polar bear hunters in Alaska. They noted, however, that, although the Association of Traditional Marine Mammal Hunters has been identified as the group representing Natives in Chukotka, the relationship between the hunters and the Russian government needed to be clarified. Both parties expect that the roles of the Native organizations will be further defined in a Native-to-Native agreement that is currently under development and through the adoption of allocation and enforcement mechanisms by the joint commission.

Chapter VI

MARINE MAMMAL MORTALITY EVENTS

Unusual mortality events involving marine mammals appear to have increased in frequency and scale over the past several decades. The apparent increase may be due to actual increases in mortality, more extensive observation, better reporting, or some combination of these. Events have been documented around the world for a wide range of species. More than 17,000 harbor seals died in the North Sea in 1988; more than 1,000 striped dolphins died in the Mediterranean Sea in 1990–1991; as many as 200 Mediterranean monk seals died along the northwestern coast of Africa in 1997; more than 1,600 New Zealand (Hooker's) sea lions died on the Auckland Islands, south of New Zealand, in January–February 1998; and more than 10,000 Caspian seals died along the Kazakhstan coast in April and May 2000. Similar events have occurred in the United States over the past 25 years involving Hawaiian monk seals in the Northwestern Hawaiian Islands; harbor seals, humpback whales, white-sided dolphins, and harbor porpoises in New England; harbor seals, California sea lions, and gray whales on the Pacific coast; bottlenose dolphins along the east and Gulf of Mexico coasts; and manatees in Florida. These events can have devastating impacts on marine mammal populations, particularly those that are already threatened or endangered.

Mortality events may be triggered by a variety of factors, both natural and human-related. The distinction between human-related and natural factors is becoming more difficult to discern because human activities may indirectly affect the occurrence of otherwise natural factors, causing mortality events. For example, the frequency, severity, and location of toxic algal blooms may be changing as a consequence of global warming and marine pollution. In 1996 manatees along the southwestern coast of Florida died after exposure to brevetoxin, a biotoxin produced by *Karenia brevis*, an organism that causes red tides and formerly known as *Gymnodinium breve*. In 1998 the death of California sea lions off the central California coast was linked to domoic acid, a neurotoxin produced by the alga *Pseudonitzchia australis*. The unusually high mortality of bottlenose dolphins along the coast of northwestern Florida in 1999 and 2000 also appears to have been caused by one or more blooms of toxic algae, suspected to have been *K. brevis*. In 2002 several die-offs, one involving multiple species of marine mammals and seabirds, were attributed to toxic algal blooms (see below).

Other mortality events may be caused by disease. Morbilliviruses (which cause distemper in dogs, measles in humans, and rinderpest in hoofed mammals) are thought to be responsible for several recent events involving Mediterranean monk seals, harbor seals, bottlenose dolphins, and striped dolphins. Cetaceans and pinnipeds succumbing to these viruses may have been exposed to them only recently, thus having no acquired immunity to them, or more virulent forms of the viruses may be evolving. In 2002 as many as 21,000 harbor seals in northern Europe perished from phocine distemper virus (see below), only 14 years after a similar massive die-off in the same region.

High levels of environmental contaminants also may contribute to mortality events. In general, the effects of contaminants are poorly understood, but they may adversely affect reproduction, hormonal function, or immune system function. Populations of animals that are affected by contaminants may be more susceptible to disease or less able to recover after a mortality event. Human-related activities and events, such as oil spills and possibly operation of some powerful sonars

(see Chapter VII), also may cause mortality events. Thus, mortality events may be caused by single or multiple factors.

Unusual Mortality Events in 2002

Harbor Seals in Northern Europe

From May to December 2002 about 21,000 harbor seals in northern Europe perished from phocine distemper virus. Dead harbor seals were first observed in late May on islands in the Kattegat Channel between Denmark and Sweden. From there the observations spread to southern portions of Sweden and Norway, Germany, the Netherlands, Belgium, northern France, England, and Ireland. The number of deaths peaked locally at different times, but the overall peak occurred in September. Transmission of the disease may have been facilitated by the fact that major reproductive events occur in late spring and summer months, bringing seals together to mate, give birth, and nurse their young.

Samples taken from dead animals throughout the range of the die-off consistently indicated that the animals succumbed to phocine distemper virus. Affected animals exhibited signs of respiratory and immunological distress that probably impeded their ability to forage and increased their susceptibility to secondary infections. Many of the seals were thought to have died from starvation. By December 2002, when the event was considered over, approximately 40 to 50 percent of the seals in the affected areas had been lost. A small number of grey seals also perished, but they generally appeared resistant to the virus.

A similar die-off in 1988 involved 17,000 to 18,000 seals in the same area and also was attributed to the same virus. Although survivors of the earlier epidemic might have had or developed immunity, it is not clear that disease resistance persisted to 2002. In addition, the majority of the seals in these regions in 2002 had been born after the 1988 event and may have had no immunity to the disease. Contaminants were also thought to have contributed to the earlier decline by affecting immune system function. The role of contaminants in the 2002 decline is not clear although marine pollution in this region reportedly has been reduced since 1988.

Multispecies Mortality Event in California

From February to August 2002 hundreds of marine animals stranded along the central and southern coasts of California, and a smaller number were observed along the Baja coast of Mexico. The first observations of the event involved common dolphins, but subsequent observations indicated that California sea lions, sea otters, harbor seals, bottlenose dolphins, and a number of species of marine birds (e.g., brown pelicans, grebes, loons) also were involved. In addition, a gray whale, a Dall's porpoise, and a humpback whale also stranded during the same period. It is not clear that all these strandings resulted from the same cause or causes or that observations in Mexico were related to those along the central and southern California coast. The peak number of strandings occurred in May. By July the number of affected animals was notably reduced.

Live stranded animals exhibited signs of lethargy and disorientation, experienced seizures, or were comatose. Necropsy results indicated unusual adhesions in the thoracic and abdominal cavities. Analyses of urine and stomach samples indicated that the animals may have been exposed to domoic acid. Degeneration of neurons in the hippocampal region of the brain is one of the diagnostic indicators of domoic acid poisoning. However, such degeneration is difficult to detect because the hippocampus is small and difficult to find and preserve in some species. In addition, degeneration may not be observed in animals where acute poisoning rapidly led to death. Domoic acid, produced by the diatom *Pseudonitzchia australis,* is passed up the food chain through both fish and shellfish and can become concentrated to the point that it threatens marine mammals and marine birds. Similar, albeit smaller, mortality events linked to domoic acid poisoning were reported in California in 1998 and 2000.

Domoic acid may also pose a threat to human health. It was first linked to human illness in 1987 when a number of people on Prince Edward Island, Canada, became ill and several died after eating tainted blue mussels. In California in 2002, state officials advised the public against eating sport-caught shellfish, crabs, sardines, and anchovies because of the potential for poisoning. No related human illnesses were reported.

Pilot Whales

For reasons that are unclear, mass strandings of several species of marine mammals frequently occur on Cape Cod, Massachusetts. In the 1990s nearly 20 stranding events occurred in this area. On 29 July 2002 fifty-seven pilot whales stranded alive on Cape Cod. Staff and volunteers of the Cape Cod Stranding Network and New England Aquarium responded and organized health assessments and marking of each animal (Fig. 38). Forty-six animals were refloated and swam away, three were euthanized, and eight died naturally. Full necropsies were conducted on the 11 animals that died. On 30 July 2002 the remaining 46 whales stranded again. Attempts to refloat and herd the animals into deeper water using acoustic deterrents and boats were unsuccessful. Twelve animals died naturally and 34 were euthanized. Basic data, such as sex, length, tag information, and skin and teeth samples, were taken from these animals and their carcasses were sunk offshore.

This event was one of the largest in recent history. Previous pilot whale strandings in the Cape Cod area include 10 whales in July 2000 and 31 animals in December 1991. It is not known why animals mass strand, but hypotheses include navigational error, local bathymetric and geographic conditions (i.e., mass strandings sometimes recur in the same area), anomalies in the earth's electromagnetic field, and disease (i.e., a pod following one sick leader). Blood samples taken from 17 live animals during this event may help in understanding the cause of mass strandings.

Manatees in Southwestern Florida

From mid-March to mid-May 2002 about 50 manatee carcasses were found along the shores of southwestern Florida, with most of the carcasses in Sarasota, Charlotte, Lee, and Collier Counties. The evidence for cause of death varied for each animal. The majority were thought or suspected to have resulted from exposure to brevetoxin produced by the dinoflagellate *Karenia brevis*. A number of bottlenose dolphins stranded in the same area in late February although it is not known if the dolphin and manatee strandings were related.

Most of the manatees involved appeared to have been in good condition at the time of death. They often had food in their gastrointestinal tracts and showed no outward signs of poor condition, disease, or injury. Prior to death, some animals exhibited signs of paralysis with seizures. Necropsies revealed some degree of congestion in their kidneys, lungs, liver, and meninges. Brevetoxin was detected in liver, kidney, lung, urine, stomach, and fat samples collected from 33 animals, with high-

Figure 38. Stranded pilot whales on Cape Cod, Massachusetts, in July 2002 and participants in the stranding response. (Photo by E. Touhey, courtesy of the Cape Cod Stranding Network.)

est amounts generally found in the stomach contents. Coincidentally, high levels of brevetoxin were observed on foraging substrates (e.g., blades of sea grass).

A particularly large manatee die-off involving at least 149 manatees occurred under similar conditions in 1996 and was attributed to brevetoxin. Historically, such events appear to be related to high winter productivity of *K. brevis* over the shelf and shelf break areas west of the Florida peninsula, when currents drive the toxic alga shoreward. During these same periods, manatees shift from winter refuges to coastal estuaries and may be more exposed to red tides. Red tides resulting from *K. brevis* blooms have been documented in this region since the mid-1800s. Whether and to what extent their patterns of occurrence (e.g., frequency, concentration, location, duration, timing) have changed since then is unknown.

Beaked Whales in the Canary Islands and Gulf of California

On 24–25 September 2002, 15 beaked whales stranded on the coasts of Feurteventura and Lanzarote Islands in the Canary Islands. Nine died (seven *Ziphius cavirostris*, one *Mesoplodon europaeus*, and one *M. densirostris*) and six were returned to the sea. Two additional sightings of whales floating at the surface suggest that a larger number of animals may have been involved. Several of the stranded animals had crustaceans and cephalopods in their stomachs, indicating that they had eaten recently. External examination of the animals did not reveal the cause of stranding. Similar beaked whale strandings have occurred in recent years in association with military exercises, and it has been suggested that military sonars may be a causative factor.

The September 2002 stranding event coincided with a Spanish invitational naval exercise that involved participants from nine nations and included one U.S. Navy ship. The purpose of the exercise and the nature and extent of sonars used have not been fully described,. Preliminary investigations purportedly indicated that exposure to high sound levels may have contributed to the strandings, but the nature of the evidence has not been described and more extensive follow-up investigations have not been completed. The Environmental Department of the government of the Canary Islands is leading the investigation of the strandings, and the Society for the Study of Cetaceans in the Canary Archipelago provided assistance with the initial field response. The government of the Canary Islands asked the Spanish Navy to halt the exercises, and it did so. Since 1985 this is the seventh stranding event in the Canary Islands involving beaked whales, some of which have coincided with naval exercises.

At the Commission's annual meeting in San Diego in October 2002, scientists from Scripps Institution of Oceanography and the National Marine Fisheries Service reported on two beaked whales (a female and male *Z. cavirostris*) stranded alive on the shore of Isla San Jose in the Gulf of California. The animals were initially sighted alive on 24 September 2002 by fishermen and were discovered dead the following day by marine mammal scientists from the U.S. National Marine Fisheries Service. The scientists contacted a nearby vessel to seek assistance in removing and preserving the heads of the whales for later investigation of cause of death, but the request was denied. The vessel was the R/V *Maurice Ewing*, which was being operated by scientists from the Lamont-Doherty Earth Observatory of Columbia University and supported by the National Science Foundation. Researchers aboard the vessel were using air guns to conduct geophysical research. The proximity of their research to the stranded whales suggests that the air gun noise may have caused the whales to strand.

These two mortality events are discussed more fully in Chapter VII.

Working Group on Marine Mammal Unusual Mortality Events

As noted in previous Commission reports, the deaths of more than 700 bottlenose dolphins along the U.S. mid-Atlantic coast in 1987–1988 led to the Marine Mammal Health and Stranding Response Act of 1992 (Title IV of the Marine Mammal Protection Act). Among other things, the Act directed the Secretary of Commerce to (1) establish an expert 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 responses to such events; (3) establish a fund to

compensate people for certain costs incurred in responding to unusual mortality events; (4) develop objective criteria for determining when sick and injured marine mammals have recovered and can be returned to the wild; (5) continue development of the National Marine Mammal Tissue Bank; and (6) establish and maintain a central database for tracking and accessing data concerning marine mammal strandings.

Responsibility for these activities has been delegated to the National Marine Fisheries Service. The Service, in consultation with the Marine Mammal Commission and the Fish and Wildlife Service, established the Working Group on Marine Mammal Unusual Mortality Events composed of marine mammal experts from around the country. The working group consists of 12 voting members, each appointed for a three-year term, plus one representative each from the National Marine Fisheries Service, the Fish and Wildlife Service, the Environmental Protection Agency, and the Marine Mammal Commission. In addition, Canada and Mexico are each represented by a nonvoting member. The group held its first meeting in April 1993 and has met annually since then. Service staff members have been designated to consult the group whenever increases in stranding rates or other factors suggest that an unusual mortality event may be occurring.

The working group has developed criteria to help decide when unusual mortality events are occurring. The criteria are (1) a marked increase in the number of strandings compared with historic records; (2) strandings of animals at an unusual time of year; (3) an increase in the number of strandings in a localized area (possibly suggesting a localized problem), over a growing area, or throughout the geographic range of a species or population; (4) a difference in the species, age, or sex composition of the stranded animals compared with that which usually occurs in the area or time of year; (5) the appearance of similar or unusual pathologic findings or differences in the general condition of stranded animals compared with what is usually seen; (6) abnormal behavior in living animals in an area where mortality is occurring; and (7) the stranding of critically endangered species. The working group helped prepare a National Contingency Plan for Response to Unusual Marine Mammal Mortality Events, published by the National Marine Fisheries Service in September 1996, and the Contingency Plan for Catastrophic Manatee Rescue and Mortality Events, published by the Fish and Wildlife Service in 1998.

The working group met in Silver Spring, Maryland, on 11–13 March 2002 for its annual meeting. At its meeting the group was provided an update of several mortality events prior to 2001 and reviewed events in 2001 (i.e., bottlenose dolphins in the Indian River Lagoon of Florida, Hawaiian monk seals, and harp seals). A contingency plan for the Hawaiian monk seal was described, and plans were developed for revising the national contingency plan. Other topics discussed included recommendations for monitoring after an event was deemed over, the significance of repeat events (e.g., related to annual toxic blooms), protocols for assessing the role of biotoxins in an event, archiving tissue samples for future analyses, release guidelines for animals captured and rehabilitated during an event, and progress in the establishment and use of a national database on strandings, including unusual mortality events.

Prescott Grant Program

In December 2000 Congress passed the Marine Mammal Rescue Assistance Act of 2000, which amends Title IV of the Marine Mammal Protection Act. It instructs the Secretaries of Commerce and the Interior to conduct, subject to the availability of appropriations, a grant program to be known as the John H. Prescott Marine Mammal Rescue Assistance Grant Program. The initial authorization was for 2001, 2002, and 2003. The purpose of the program is to provide financial assistance for marine mammal stranding network participants to carry out several critical activities including (1) recovery or treatment of stranded marine mammals, (2) collection of data from living and dead stranded marine mammals, and (3) operational costs directly related to the aforementioned activities. Awards may be granted for up to three years with a cumulative total of $100,000 per eligible participant.

The National Marine Fisheries Service and the Fish and Wildlife Service administer the grant program. A total of $5 million was authorized for each of fiscal years 2001 through 2003, to remain available until expended. Of this annual amount, $4 million was to be available to the Secretary of Commerce and $1 million to the Secretary of the

Interior. The Secretaries are to ensure that the funds are distributed equitably among the stranding networks, taking into account episodic mortality events in the preceding year, average annual stranding and mortality events, and the size of marine mammal populations inhabiting a geographic area within a region. Preference is to be given to facilities with established records for rescuing and rehabilitating sick and stranded marine mammals. As of the end of 2002, Congress had not yet acted on the agencies' FY 2003 appropriation.

On 7 June 2001 the National Marine Fisheries Service issued a draft implementation plan for the program. On 29 June 2001 the Commission wrote to the Service commending it for efforts to prepare the plan and recommending that (1) state and local governments be allowed to apply for support related to pinniped strandings, as well as cetacean strandings, (2) the Service make allowances for applications from inexperienced applicants to allow for new ideas and broader participation in stranding programs, and (3) the Service implement the program jointly with the Fish and Wildlife Service under a single integrated set of priorities, criteria, and procedures so that plans for manatees, sea otters, and other species are coordinated.

On 14 January 2002 the National Marine Fisheries Service published in the *Federal Register* a solicitation for applications under the Prescott grant program. Technical and merit review panels were established and met in June 2002 to review the 88 proposals that were received. Of the $7.9 million available to the Service ($4 million each for 2001 and 2002 less administrative expenses), about $5.6 million was committed to fund 66 of 88 proposals. Of the remaining $2.3 million, $1.3 million was carried over to the next funding cycle, $600,000 was set aside for emergency funding (of which $200,000 was spent in 2002 and $400,000 was carried over), and the remainder was used for administrative costs. At the end of 2002, negotiations were continuing on about a dozen proposals.

The Department of the Interior's budget request for fiscal years 2001 and 2002 did not include a request for Prescott funds, and no funds were appropriated to the Fish and Wildlife Service in those years. At the end of 2002 the Service had not yet developed a program for dispersing Prescott Grant funds for marine mammal species under the Service's management (i.e., manatee, sea otter, walrus, and polar bear).

Chapter VII

EFFECTS OF SOUND ON MARINE MAMMALS

Sound is a common element of the marine environment. It originates from a variety of natural sources such as wind, rain, waves, storms, lightning strikes, volcanic eruptions, ice breakup and movements, surf, coastal erosion, and transport of sand, rocks, and boulders. Perhaps because light transmission is relatively limited in water, sound is an important source of information that organisms use both passively (listening) and actively (production of sound) to sense their environment and to communicate, forage, socialize, and reproduce.

Sound also is introduced into the marine environment by human activities, including commercial shipping; recreational and other noncommercial boating; seismic testing related to geophysical studies and oil and gas exploration; sonar systems used for military purposes and by fishing vessels; and coastal development, including construction, dredging, blasting, and demolition. The potential effects of anthropogenic sound on marine mammals and other species was not recognized when the Marine Mammal Protection Act was enacted in 1972. Over the past three decades this issue has become highly controversial. The controversy stems from concern that under certain conditions human-generated sounds may adversely affect the survival and productivity of marine organisms, including marine mammals. Possible effects include deaths due to physical trauma, as might occur as a result of a blast injury or from exposure to high-intensity sounds; permanent or temporary hearing loss; short-term or long-term changes in behavior or physiological condition resulting in stress; and masking of natural sounds used to communicate, find food, or otherwise sense the surrounding environment.

Actual effects on individual marine mammals and their populations depend on a number of factors. These may include the intensity, frequency, and duration of the sound; the location of the sound source relative to the potentially affected animals and key features of their habitat; whether the sound source is moving or stationary; the species, age, sex, reproductive status, activity, and hearing ability of the animals; the extent to which the animals use similar sounds to communicate, locate and capture prey, sense their environment, etc.; and the frequency with which animals are exposed to the sounds. For example, exposure to high-intensity sounds with rapid onset, such as those produced by underwater volcanic explosions, can injure and kill animals close to the sound source but may cause nothing more than a temporary startle response to animals located farther away. Similarly, some animals exposed frequently to a particular sound may grow accustomed to it and show little response, but others may become sensitized to the sound and respond more intensely over time. Also, some animals may respond differently to particular sounds if they are in deep offshore waters versus shallow coastal waters, in murky versus clear water, or in enclosed versus open waters.

After enactment of the Marine Mammal Protection Act, studies done in Alaska and Canada in the late 1970s and early 1980s found that the distribution and behavior patterns of ringed seals, bowhead whales, and beluga whales sometimes were affected by sounds produced by ships, recreational and other noncommercial boating, aircraft, air guns, and other equipment used in offshore oil and gas exploration and development. Subsequent studies done in California and elsewhere found that gray

whales and other marine mammals also can be affected in a variety of ways by sounds of human origin. The findings of these and other studies have been reviewed in various works and reports, including a series of reviews by the National Research Council.

A considerable amount of research has been conducted on the nature of sound in the marine environment and its potential effects. Key areas of ongoing or needed research include characterization of sounds produced by known sources; transmission of sound through the marine environment; ambient sound levels and changes in those levels over space and time; hearing and sound production of marine animals; behavioral and physiological responses to anthropogenic and natural sounds; the abundance and distribution of marine mammals and other species that may be affected, particularly those species thought to be vulnerable to the effects of introduced sounds (e.g., beaked whales); and research methods and the development and application of new technologies. The Navy, which clearly has a need to understand and use sound in the oceans to fulfill its various missions, spent approximately $11.5 million on research related to the effects of sound on marine mammals in 2002. Similarly, the Minerals Management Service spent approximately $3.5 million on research in 2002 to investigate the effects of seismic noise on bowhead whales in the Beaufort Sea and sperm whales in the Gulf of Mexico and the effects of sound generated by oil and gas industry activities on polar bears and ringed seals in the Arctic.

Although much has been learned, available information generally is insufficient to reliably and fully assess how a number of sound sources affect marine mammals or other marine organisms (e.g., fish, fish eggs and larvae, sea turtles, diving birds, etc.). Commercial shipping, for example, appears to be the largest contributor of human sound in the world's oceans, but its effects are largely unknown. It is not known whether marine mammals and other marine organisms have become used to and are not being affected adversely by ship-generated sounds, whether some species or age/sex groups avoid shipping routes or otherwise alter their behavior or habitat-use patterns, whether alterations in behavior or habitat-use patterns affect survival or productivity, or whether repeated exposure to shipping noise causes stress and has adverse effects on growth, reproduction, disease resistance, etc.

Uncertainty about the effects of various sound sources confounds management efforts to provide suitable levels of protection for marine mammals and marine ecosystems while avoiding unnecessary constraints on those activities that generate the sound. A wrong conclusion that a sound does not have a significant effects on marine mammals could lead to important, adverse consequences. A wrong conclusion that a sound does have a significant effect could lead to unnecessary restrictions on sound-generating activities. Research is essential to reduce the probability of these potential errors. Without such research, an absence of evidence regarding effects simply means that managers are unable to determine whether or not possible effects are significant. The National Academy of Science/National Research Council 2000 report on sound recommended research in a variety of areas to reduce uncertainties and the probability of related management errors.

Much of the controversy regarding sound effects has centered around certain military activities and geophysical seismic research. Those activities and their potential effects have been described in environmental analyses required under several pertinent congressional acts. The National Environmental Policy Act requires disclosure of possible environmental effects of major federal activities. The Marine Mammal Protection Act requires authorization to take marine mammals incidentally. And the Endangered Species Act requires that federal actions do not jeopardize species listed as endangered or threatened and do not destroy or adversely modify habitat designated as critical for listed species. The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, works with other agencies and organizations to (1) identify and determine how best to resolve uncertainties regarding the effects of human-generated sounds, (2) ensure that such sounds are not having more than negligible effects on small numbers of marine mammals, and (3) avoid unnecessary restrictions on sound-producing activities.

The remainder of this chapter describes notable events in 2002 related to military activities and seismic research. The focus on these topics is not intended to imply that these are the only or most significant sound-related issues of concern.

Effects of Sonar and Seismic Surveying on Beaked Whales

Islands of the Bahamas

As noted in the Commission's previous annual report, at least 17 cetaceans, including 14 beaked whales (9 *Ziphius cavirostris*, 3 *Mesoplodon densirostris*, and 2 unidentified beaked whales), 2 minke whales, and 1 spotted dolphin, stranded on island beaches in the northern Bahamas (Abaco, Grand Bahama, and Eleuthera) on 15 and 16 March 2000. Most of the animals were alive when they stranded. Eight of the beaked whales and the spotted dolphin died. Six of the beaked whales were pushed off the beaches and swam away, and both minke whales returned to deeper water without assistance. These animals may or may not have survived.

The strandings coincided with U.S. Navy activities in the waters around the Bahama Islands. The Bahamian government requested an investigation and asked the National Marine Fisheries Service to assist. Both the Navy and the Service provided funding and personnel for the investigation. An antisubmarine warfare training exercise had been under way near the areas at the time that the strandings occurred. Those exercises involved standard, midfrequency range tactical sonars. The investigation attempted to determine if the strandings may have been the product of unusual oceanographic conditions or concentrations of beaked whales particularly sensitive to the transmissions from the tactical sonars.

On 19 May 2000 the Commission wrote to the Navy to inquire as to whether all appropriate steps were being taken to determine the cause of the strandings and, if Navy activities were implicated, whether reasonable steps were being planned to avoid such occurrences in the future. The Commission pointed out that efforts to stop the development and use of high-energy sound sources for national defense and other purposes were likely to intensify if such uncertainties were not resolved satisfactorily. The Commission recommended that the Navy and the National Marine Fisheries Service hold a workshop to review what was being done to determine the cause of the strandings, to identify what else might reasonably be done, and to identify reasonable steps to avoid such situations in the future if naval activities were implicated. Because of concern that the strandings may have resulted from activities conducted as part of the Navy's Littoral Warfare Advanced Development (LWAD) program, the Commission also pointed out that it would be inadvisable to proceed with further at-sea tests associated with the LWAD program before the investigation of the strandings was completed and the results made public. Subsequent review of the Bahamas strandings indicated that LWAD was not involved.

On 5 June 2000 representatives of the Navy, the National Marine Fisheries Service, and the Commission met to review the preliminary results of the stranding investigation. The results of that review were summarized in a letter sent from the Navy to the Service on 9 June 2000. Among other things, the Navy indicated that it was conducting a complete reconstruction of the sound field in the area where antisubmarine training exercises had been conducted and that preliminary results of that assessment suggested that oceanographic conditions may have allowed the sonar transmissions to travel farther than normal without significant attenuation. The Navy also indicated its concurrence that the necropsies supported the hypothesis that the whales had sustained pressure-related or auditory trauma before stranding.

On 20 December 2001 the Navy and the National Marine Fisheries Service issued a "Joint Interim Report [on the] Bahamas Marine Mammal Stranding Event of 14–16 March 2000." The report noted that most, but not all, parts of the investigation had been completed and stated that—

> Based on the way in which the strandings coincided with ongoing naval activity involving tactical mid-frequency range sonar use in terms of both time and geography, the nature of the physiological effects experienced by the dead animals, and the absence of any other acoustic sources, the investigation team concludes that tactical mid-range frequency sonars aboard U.S. Navy ships that were in use during the sonar exercise in question were the most plausible source of this acoustic or impulse trauma.

The interim report also indicated that a combination of factors appears to have led to the deaths. Those include presence of a strong surface duct that allowed sonar transmissions to propagate over greater distances than normal, un-

derwater bathymetry in the area where the testing occurred, intensive use of multiple active sonars over an extended period of time, a constricted channel with limited egress, and the presence of beaked whales, which appear to be particularly sensitive to sounds produced by the sonars. The report recommended that future research focus on identifying such problematic conditions so that they can be avoided and briefly described a range of studies meriting consideration. It indicated that "[t]o the maximum extent practical, the Navy will adopt measures in its future peacetime training, including those involving the use of tactical mid-range sonars, to avoid the taking of marine mammals."

The Marine Mammal Commission believes that the conclusions are well supported and that the recommended research and proposed mitigation measures are appropriate.

Canary Islands

On 24–25 September 2002 a total of 15 beaked whales stranded on the coasts of Feurteventura and Lanzarote Islands in the Canary Islands. Nine died (seven *Ziphius cavirostris*, one *Mesoplodon europaeus*, and one *M. densirostris*) and six were returned to the sea. Two additional sightings of whales floating at the surface suggest that a larger number of animals may have been involved. Several of the stranded animals had crustaceans and cephalopods in their stomachs, indicating that they had eaten recently. External examination of the animals did not reveal the cause of stranding.

The strandings coincided with a Spanish invitational naval exercise, NEOTAPAN. The exercise involved participants from nine nations and included one U.S. Navy ship. The nature and extent of sonar used during the exercise have not been fully described. Preliminary investigations purportedly indicated that exposure to high sound levels may have contributed to the strandings, but the nature of the evidence has not been described and more extensive follow-up investigations had not been completed by the end of 2002. The Environmental Department of the government of the Canary Islands is leading the investigation of the strandings. The Society for the Study of Cetaceans in the Canary Archipelago assisted with the initial field response. The government of the Canary Islands asked the Spanish Navy to halt the exercises, and the Spanish Navy agreed to do so. Since 1985 this is the seventh stranding event in the Canary Islands involving beaked whales, several of which appear to have coincided with naval exercises.

Gulf of California

At about the same time that beaked whales stranded on the Canary Islands, two beaked whales (a female and male *Z. cavirostris*) stranded on the shore of Isla San Jose in the Gulf of California. The animals were initially sighted alive on 24 September 2002 by fishermen and were discovered dead the following day by vacationing marine mammal scientists from the U.S. National Marine Fisheries Service. The scientists radioed the research vessel *Maurice Ewing* to request that it contact a local scientist who could respond to the stranding. The vessel did so. Later, the vacationing scientists attempted to contact the vessel again to request assistance in salvaging and preserving the whales' heads for subsequent investigation of cause of death. They could not tell if their request had been successfully received because radio contact was poor. The *Maurice Ewing* was being operated by scientists from the Lamont-Doherty Earth Observatory of Columbia University under a grant from the National Science Foundation. Researchers aboard were using high-intensity (from 220 dB to 263 dB) air guns to study the continental rift zone in the Gulf of California. The timing of their research to the stranded whales suggests that the air gun noise may have caused the whales to strand. The research was temporarily halted at the end of September but resumed about a week later.

At the Marine Mammal Commission's annual meeting in October 2002 two of the Service scientists described their observations of the dead whales and the events surrounding their discovery. They recommended reviews of this incident and the Canary Islands incident, as well as a larger overview to assess the likelihood of additional incidents and their significance. They recommended research to identify where deep-diving whales and seismic research may overlap, to determine the extent to which such events are detectable, to determine whether sub-lethal acoustic levels could be used for geophysical research, to review past events for clues that might indicate how such events could be prevented, to assess the frequency and significance of such events on a global scale, and to evaluate species-specific vulnerability to

seismic surveys. They suggested that mitigation methods would likely not be sufficient if they relied on visual observation or passive acoustic technology to detect deep-diving whales. Finally, they suggested that season/area closures and sublethal sound intensity levels for geophysical research may be the only effective mitigation measures.

On 18 October 2002 the Center for Biological Diversity filed suit against the National Science Foundation to suspend the seismic research that it alleged had led to the deaths of the two beaked whales. The suit claimed that the National Science Foundation had violated the National Environmental Policy Act by failing to conduct the required environmental assessment and, if required, environmental impact statement. The suit also claimed that the National Science Foundation had violated the Marine Mammal Protection Act by failing to seek incidental take authorization before its decision to financially support the research. The Department of Justice, representing the National Science Foundation, contended that neither statute applied to the research activities because they were being conducted within the Mexican Exclusive Economic Zone, and therefore beyond the jurisdictional reach of either Act.

The matter came before the U.S. District Court for the Northern District of California on an expedited basis when the plaintiff filed a motion for a temporary restraining order to halt the research. In its 28 October 2002 ruling granting the requested temporary restraining order, the court found that the plaintiff had met its burden of showing both a likelihood of success on the merits of its claims and the possibility of irreparable harm if the research were allowed to continue. In the court's preliminary view, both the Marine Mammal Protection Act and the National Environmental Policy Act applied to the seismic surveys because the waters of the Gulf of California beyond Mexico's territorial sea are part of the high seas, rather than subject to Mexican sovereignty. Moreover, the court found that the federal defendant had failed to identify any foreign policy implications that would weigh against requiring compliance with the National Environmental Policy Act in this instance.

As of the end of 2002 it was unclear whether the National Science Foundation would pursue further consideration of the merits of the case by the district court. Interagency discussions involving the Marine Mammal Commission and other interested agencies were under way to develop a unified position on the jurisdictional reach of the Marine Mammal Protection Act's taking prohibition before deciding on a course of action.

Littoral Warfare Advanced Development Program

The Navy's Office of Naval Research sponsors the Littoral Warfare Advanced Development (LWAD) program to develop and test techniques and technologies, including several operational and new experimental active sonars, that may be useful for detecting and tracking submarines in shallow coastal waters. One week after the cetacean strandings in the Bahama Islands on 15–16 March 2000, the Marine Mammal Commission received a copy of a letter to the Navy from the Natural Resources Defense Council and the Humane Society of the United States expressing concern that the strandings may have resulted from tests related to the LWAD program.

In follow-up inquiries with the Navy, the Commission learned about the purpose of the program and that further testing was scheduled off New Jersey between 22 May and 7 June 2000. Before both the test in the Bahama Islands and the planned New Jersey tests, the Office of Naval Research had prepared environmental assessments and initiated informal Endangered Species Act consultations with the regional offices of the National Marine Fisheries Service to assure that the tests would not adversely affect any species listed as endangered or threatened under the Act or associated critical habitat. The Service's Northeast Region had questioned the Navy's determination that the tests off New Jersey would not adversely affect any listed species. The Service also pointed out that a small-take authorization under the Marine Mammal Protection Act would be required if the tests were likely to incidentally take marine mammals. Subsequently, the Navy cancelled those parts of the May–June 2000 LWAD tests involving high-energy sound sources and invited Service scientists to use the time at sea to conduct marine mammal surveys. By letter of 23 August 2000 the Service again advised the Navy that formal consultations under the Endangered Species Act and small-take authorizations pursuant to section

101(a)(5) of the Marine Mammal Protection Act are required if species protected under either of these Acts are likely to be affected by testing or related activities.

In September 2001 the Natural Resources Defense Council, Defenders of Wildlife, the Humane Society of the United States, and Santa Monica Baykeeper filed suit in the U.S. District Court, Central District of California, to enjoin any active sonar tests or operations pursuant to the LWAD program until the Navy conducted environmental assessments required by the National Environmental Policy Act, obtained incidental take authorizations required by the Marine Mammal Protection Act, and undertook consultations required by the Magnuson-Stevens Fishery Conservation and Management Act and the Endangered Species Act. The suit alleged (1) that the Navy had violated the National Environmental Policy Act by failing to evaluate the LWAD program as a whole, rather than just evaluating individual actions taken under the program; (2) that one particular test (Sea Test 02-2) was by itself a major federal action that may significantly affect the human environment and the Navy's failure to complete an environmental assessment is a violation of the National Environmental Policy Act; (3) that sea tests have the potential to take an unknown number of marine mammals and the Navy violated the Marine Mammal Protection Act by failing to apply for a small take or incidental harassment authorization; (4) that the LWAD program is likely to have adverse effects on species listed under the Endangered Species Act or their critical habitat and that the Navy's failure to consult with the National Marine Fisheries Service on the program as a whole was a violation of that Act; and (5) that the LWAD program and each of the tests conducted thereunder were likely to have adverse effects on fish habitat designated for protection under the Magnuson-Stevens Fishery Conservation and Management Act and the Navy's failure to consult with the National Marine Fisheries Service was a violation of that Act. Plaintiffs sought summary judgment on their first and fourth claims. The Navy sought summary judgment on all claims, arguing that the plaintiffs lacked standing with regard to the LWAD program as a whole and must limit their claims to individual sea tests. In the alternative, the Navy sought summary judgment arguing that (1) the LWAD program is not a reviewable agency action and the National Environmental Policy Act does not apply outside U.S. territory, and (2) programmatic consultation under the Endangered Species Act was not required because LWAD in its entirety has not issued a programmatic planning document, such consultation would be impractical, and for the issues of this case the Endangered Species Act does not apply outside U.S. jurisdiction.

On 17 September 2002 the court ruled that the plaintiffs do have standing with respect to LWAD because they had demonstrated that they have observed and enjoyed wildlife in many of the specific areas where LWAD operations have been conducted. The court rejected the Navy's argument that the National Environmental Policy Act is not applicable outside territorial seas. However, the court then found that the LWAD program, as distinct from its component parts, is not subject to review under the National Environmental Policy Act because the program as a whole is not clearly defined and resources to carry out the program are not firmly committed at any particular time, nor is there necessarily a clear picture of what future actions will be taken or what possible environmental consequences might occur, and the individual tests conducted on the program are not necessarily connected or cumulative. The court also ruled that LWAD is not subject to programmatic review under the Endangered Species Act. This effectively grants the Navy the discretion to determine whether the program as a whole or its component parts are the appropriate subject of consultation.

The case was dismissed in December 2002.

SURTASS LFA Sonar

During the Cold War both the United States and the former Soviet Union developed and used passive listening systems to detect and track the movements of submarines. Both countries also built quieter submarines that cannot be detected and tracked with passive listening systems and developed alternative systems for detecting and tracking those submarines, including low-frequency active sonar. In the last decade, additional nations have employed the technology.

In July 1996 the Department of the Navy published a *Federal Register* notice announcing its intent to prepare an environmental impact statement on planned operational deployment of a low-frequency active sonar designed to enhance its an-

tisubmarine warfare capability. In July 1999 the Department made available for public comment its Draft Overseas Environmental Impact Statement and Environmental Impact Statement for [its] Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) Sonar. In August 1999 the Navy submitted to the National Marine Fisheries Service a request for authorization, in accordance with section 101(a)(5)(A) of the Marine Mammal Protection Act, to take small numbers of marine mammals incidental to the planned operational deployment of the SURTASS LFA sonar. In October 1999 the Service published in the *Federal Register* an advance notice of proposed rulemaking concerning the Navy's request. These actions and the Commission's responses to them are described in previous annual reports.

In January 2001 the Navy published a final environmental impact statement concerning the planned deployment of the SURTASS LFA sonar. In March 2001 the National Marine Fisheries Service published in the *Federal Register* proposed regulations to authorize and govern the taking of marine mammals incidental to operational use of the sonar. The proposed regulations incorporated by reference the risk analysis and other information included in the Navy's final environmental impact statement. Based on that information and the mitigation measures proposed by the Navy, the Service preliminarily concluded that use of the SURTASS LFA sonar as described in the impact statement would result in the incidental taking of only small percentages of the affected marine mammal species and populations and that the effects on the distributions, sizes, and productivity of those species and populations would be negligible. Recognizing that certain aspects of the proposed regulations were likely to be controversial, the Service held public hearings in Los Angeles, Honolulu, and at its headquarters in Silver Spring, Maryland, to receive comments on the proposed regulations from the public and interest groups.

Commission representatives attended the public hearing held in Silver Spring, Maryland, in May 2001. Most of the members of the public and representatives of interest groups who spoke at the hearing expressed concern about the adequacy of the Navy's environmental impact statement and the measures proposed by the Navy and the National Marine Fisheries Service to avoid or mitigate possible harmful effects on marine mammals. The Commission understands that similar concerns were expressed at the hearings held in Los Angeles and Honolulu in April 2001.

In June 2001 the Commission, in consultation with its Committee of Scientific Advisors, forwarded comments on the proposed regulations to the Service. Among other things, the Commission noted that the data and analyses provided in the environmental impact statement and referenced in the *Federal Register* notice were insufficient to be confident that the proposed action would affect only small numbers of marine mammals and have only negligible effects on the affected species and stocks. The Commission also pointed out that the "negligible effects" determination was based on a number of assumptions and that the monitoring and mitigation programs proposed by the Navy and tentatively endorsed by the Service appeared insufficient to confirm the validity of the assumptions. The assumptions included the following—

• For injury to occur, "an animal would have to be within the 180-dB sound field at the onset of a transmission, the likelihood of which is similar to that of a ship collision with the animal. The probability of either of these events occurring is nearly zero because of the visual and acoustic monitoring that would be utilized whenever the SURTASS-LFA sonar is transmitting."

• The studies done to assess the behavioral effects of LFA sonar transmissions on marine mammals provide an adequate and sufficiently comprehensive basis for making assumptions about the potential behavior effects on all species and under all circumstances even though those studies were limited to four cetacean species thought likely to be particularly sensitive to low-frequency sounds and no animals were exposed in the course of the studies to received levels above 155 dB.

• Possible harmful effects on the hearing and behavior of marine mammals can be avoided by not operating the LFA sonar in areas where received sound levels will exceed 180 dB within 12 nmi (22.2 km) of any coastline or within four proposed "biologically important areas" and when marine mammals are known to be within the LFA mitigation zone (180 dB received level sound field).

• Up to 95 percent of marine mammals within the LFA mitigation zone will be detected during both day and night operations using a combination of visual and passive acoustic monitoring and an ac-

tive high-frequency marine mammal monitoring (HFM3) sonar.
• The HFM3 sonar, which is similar to "fish-finder" sonars used by many commercial fishermen, is unlikely to result in the death, injury, or disruption of a biologically important behavior of any species of marine mammal.
• Uncertainties concerning the possible cumulative effects of the LFA sonar will be addressed satisfactorily by a long-term research program being planned by the Navy but not described in either the environmental impact statement or the *Federal Register* notice.

The Commission pointed out that the validity of most, if not all, of these assumptions could be confirmed by expanding the required monitoring and reporting programs and by asking the Navy to specify the research it anticipates conducting to resolve the uncertainties concerning the significance of possible cumulative long-term behavioral effects and the effectiveness of the HFM3 sonar. The Commission recommended that these and a number of related matters be addressed in any final regulations issued by the Service.

The effect of human-generated sounds on marine mammals was one of the topics addressed at a Marine Mammal Protection Act oversight hearing on 11 October 2001. The hearing, held by the House Subcommittee on Fisheries Conservation, Wildlife and Oceans, was held to receive comments from certain government agencies, the scientific community, and organizations with special interests in the Act and related issues. The Navy's views regarding the SURTASS LFA sonar and related issues were presented in a statement by the Deputy Chief of Naval Operations for Warfare Requirements and Programs. Among other things, the statement indicated that there is an immediate and critical national security need for the operational deployment of the SURTASS LFA sonar; the impact statement prepared to assess the possible environmental effects of the LFA sonar was the most comprehensive and exhaustive, scientifically based impact assessment ever undertaken by the Navy for a major seagoing combat system; extensive peer-reviewed research and risk analyses were done in the process of developing the impact statement and results support the conclusion that operational use of the LFA sonar will have negligible effects on marine mammals; and following issuance of a small-take authorization by the National Marine Fisheries Service, "the Navy will provide a detailed long-term monitoring plan, which will include—
• Navy and independent scientific analyses of the proposed mitigation measures, including verification of the effectiveness of the HFM3 sonar;
• Careful measurements and modeling of the LFA sound field at various depths and ranges prior to and during operations to ensure compliance with the 180 dB geographic restriction and the 145 dB diver criterion;
• Additional research conducted in collaboration with other Navy oceanographic research laboratories and U.S. academia, such as Woods Hole Oceanographic Institution and the Scripps Institution of Oceanography ... to help address the outstanding critical issues on the direct and indirect effects of man-made low-frequency sound on marine mammal stocks."

On 16 July 2002 the National Marine Fisheries Service published in the *Federal Register* a final rule authorizing the taking of marine mammals incidental to the operation of SURTASS LFA sonar. The Service found, among other things, that such takes will have a negligible impact on the species and stocks of marine mammals and will not have an unmitigable adverse impact on the availability of those marine mammals for subsistence purposes. On 23 July 2002 the Navy published in the *Federal Register* a notice of its final decision to employ two SURTASS LFA sonar systems based on its view that these systems are essential for detection of quiet submarines and that if they are to be effective they must be used for training as well as in real combat situations.

On 7 August 2002 a coalition of environmental groups (Natural Resources Defense Council, Inc., Humane Society of the United States, Cetacean Society International, League for Coastal Protection, Ocean Futures Society, and Jean-Michel Cousteau) sued the Navy and the National Marine Fisheries Service to block the deployment of the Navy's SURTASS LFA sonar systems. On 30 August 2002 the National Marine Fisheries Service published in the *Federal Register* a notice that the Navy had been given a one-year letter of authorization to take marine mammals incidentally during operation of these systems.

On 31 October 2002 the U.S. District Court for the Northern District of California granted the

plaintiffs' motion for a preliminary injunction. The court found that plaintiffs were likely to prevail on a number of issues, stating as follows:

> These include the likelihood of establishing that authorization of harassment of up to 12 percent of marine mammals violates the "small numbers" limitation and that NMFS has impermissibly narrowed the definition of harassment, in violation of the MMPA; that NMFS acted arbitrarily in postponing the designation of additional "off limits" areas within the ocean where marine mammals and endangered species are likely to be particularly abundant, and did not sufficiently analyze reasonable alternatives, in violation of NEPA; and that, by relying on an illegal regulatory definition of adverse modification and not including proper incidental take statements in its two biological opinions, NMFS violated the ESA.

In addition the court noted that the plaintiffs had raised serious questions regarding the Service's choice of specified geographic regions (i.e., areas where operations would be precluded to avoid effects on marine mammals) and its conclusion that the taking will not have more than a negligible impact. The court also concluded that plaintiffs had not shown that they were likely to prevail on their arguments that (1) the use of a 180-dB threshold is an improper indication of when marine mammals may be injured by SURTASS LFA sonar, (2) the Service's interpretation of "specified geographic region" was too broad, (3) the Navy should have prepared a supplemental environmental impact statement in view of the beaked whale strandings in the Bahamas associated with naval exercises, and (4) the Navy had unreasonably relied on an unpublished white paper not subject to public review. The court issued a preliminary injunction, but the injunction did not impose a complete ban on peacetime use of SURTASS LFA sonar. The Navy was allowed to use SURTASS LFA sonar in certain regions of the North Pacific Ocean and has begun to do so. Use of the sonar was restricted by extending the coastal buffer zone beyond 12 nmi and including additional biologically important areas. The parties were ordered to and did meet and confer on the terms of the injunction in November 2002. A hearing on the merits of the lawsuit is scheduled for June 2003.

Chapter VIII

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 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 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 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 on marine mammals and their habitats is conducted or supported by a number of federal departments and agencies. To determine the nature of this research and assess ways in which it can best be coordinated and used to facilitate marine mammal conservation, each year the Commission requests information on marine mammal and related research being conducted, supported, and planned by these departments and agencies.

For the 2000 survey, the Commission requested information from the following federal agencies, departments, and offices: the Department of Agriculture; the Department of the Air Force; the Department of Commerce's National Ocean Service, National Marine Fisheries Service, Office of Oceanic and Atmospheric Research, and National Sea Grant College Program; the Department of the Interior's Fish and Wildlife Service, Minerals Management Service, Biological Resources Division of the U.S. Geological Survey, and National Park Service; the Department of the Navy; the Department of State; the Department of Transportation's U.S. Coast Guard; 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.

The information obtained is being summarized for publication in the Commission-sponsored report "Survey of Federally Funded Marine Mammal Research and Studies FY94–FY00." This will be available early in 2002 from the National Technical Information Service (see Appendix B, Waring 1981 through 2000, for previous surveys).

Workshops and Planning Meetings

In 2002 the Marine Mammal Commission provided comments and recommendations to other federal agencies on a broad range of issues affecting the conservation and protection of marine mammals and marine mammal habitats. The issues included protection and recovery of endangered, threatened, and depleted species; interactions between marine mammals and fisheries; the possible direct and indirect effects of coastal and offshore development on marine mammals; people swimming with and otherwise directly interacting with cetaceans; response to marine mammal

strandings and unusual mortality events; public display of marine mammals; applications for scientific research permits; and requests for authorization to take small numbers of marine mammals incidental to a variety of industrial, military, and scientific activities.

Members of the Commission, its Committee of Scientific Advisors, and staff also helped organize or participated in meetings and workshops to—

• review and recommend actions to update or implement recovery plans for Hawaiian monk seals, Florida manatees, North Atlantic right whales, humpback whales, Steller sea lions, and the California population of sea otters;
• review and further develop take reduction plans for the East Coast gillnet fishery and other fisheries that incidentally kill and seriously injure right whales and bottlenose dolphins;
• facilitate implementation of the Marine Mammal Health and Stranding Response Program;
• prepare for the 2002 meetings of the International Whaling Commission and its Scientific Committee;
• oversee U.S. participation in the Arctic Council and its working groups established to give effect to the Arctic Environmental Protection Strategy;
• identify and coordinate federal agency efforts to resolve uncertainties concerning the possible effects of anthropogenic noise on marine mammals;
• review the National Marine Fisheries Service's research program to determine whether dolphin populations that have been depleted due to mortality associated with the tuna purse seine fishery in the eastern tropical Pacific Ocean are recovering and, if not, whether the failure to recover is due to chase and capture by tuna purse seiners;
• review co-management needs for certain marine mammal species in Alaska, including polar bears, walruses, and the Cook Inlet stock of beluga whales;
• identify management alternatives necessary to prevent collisions between ships and North Atlantic right whales and entanglement of right whales in fishing gear;
• investigate possible approaches for managing interactions between monk seals and people in the main Hawaian Islands;
• review the population status of Florida manatees;
• review issues related to the availability of warm-water refuges for manatees, now and in the foreseeable future;
• review modeling efforts related to analysis of boat-related mortality of manatees;
• review and identify management actions necessary to implement the Northwest Hawaiian Islands Coral Reef Ecosystem Reserve; and
• participate in reviews of unusual mortality events involving pilot whales, manatees, harbor seals, and beaked whales, and investigations of those events.

Commission-Sponsored Research and Study Projects

As funding permits, the Marine Mammal Commission supports research to further the purposes and policies of the Marine Mammal Protection Act. In particular, it convenes workshops and contracts for research and studies to help identify and determine how best to minimize threats to marine mammals and their habitats. Since it was established in 1972, the Commission has contracted for more than 1,000 projects ranging in amounts from several hundred dollars to $150,000.

Research and studies supported by the Commission in 2002 are described below. Final reports of most Commission-sponsored studies are available from the National Technical Information Service (NTIS) or directly from the Commission. These are listed in Appendix B. Papers and reports resulting entirely or in part from Commission-sponsored activities and published elsewhere are listed in Appendix C.

Workshops, Reviews, and Analyses

The Second International Conference on Marine Mammals of the Holarctic (North Pacific Wildlife Consulting, Anchorage, AK)—The Second International Conference on Marine Mammals of the Holarctic was convened 10–15 September 2002 in Baikal, Russia. The purpose of the conference was to provide a forum for presentation of recent research on marine mammals in arctic regions, to determine priorities for future research, and to develop cooperative programs for conservation, research, and education pertaining to these marine mammals. Marine Mammal Commission funds enabled the contractor to publish the conference abstracts and supported participation by some researchers. The abstracts, in both Russian and English, are available from the Commission.

Florida Manatee Population Ecology and Management Workshop (Society for Marine Mammalogy, Lawrence, KS)—Since the 1970s the Florida manatee has become one of the most studied marine mammals in U.S. waters. During that period, the population is thought to have experienced some undetermined level of growth. Most recently, the State of Florida has been petitioned to reconsider the listing of the manatee as endangered under Florida law, based on evidence that it has recovered to the point that listing is no longer necessary. The question of whether to downlist the Florida manatee and its actual status are matters of considerable controversy, and available scientific evidence is not sufficient to provide reliable estimates of the population's abundance and trends.

In April 2002 the manatee population working group organized a workshop, partially funded by the Marine Mammal Commission, to review research and attempt to define the current status of the manatee population. The Commission also provided funds to the Society for Marine Mammalogy to ensure that the workshop report is widely disseminated to the public, the scientific community, and natural resource managers. It is expected that the workshop report will be available in 2003.

Analysis of Mortality Trends in Florida Manatees (Florida Fish and Wildlife Conservation Foundation, St. Petersburg, FL)—In the mid-1970s the U.S. Fish and Wildlife Service and the University of Miami began a program to salvage and examine all dead manatees found in Florida. Their intent was to determine, where possible, the circumstances surrounding each death. The salvage program was transferred to the State of Florida in 1985. In the mid-1990s a detailed analysis of manatee mortality data was undertaken to review mortality patterns and trends based on records of 2,074 manatee carcasses collected between 1974 and 1992. Since 1992 more than 2,000 additional carcasses have been collected. In 2002 the Marine Mammal Commission provided support to the State of Florida to analyze the information collected from these additional carcasses. The analysis will be conducted by an independent analyst, who will also provide a summary of the published scientific literature on manatee population dynamics. The Commission anticipates receiving a final report in 2004.

Photo-Identification of Humpback Whales (*Megaptera novaeangliae*) in the Shumagin Islands, Alaska (J. Straley Investigations, Sitka, AK)—The winter distribution of endangered North Pacific humpback whales consists of reproductive aggregations in Hawaiian waters and in waters south of Japan. In the summer, the whales disperse around the North Pacific Rim for feeding. As a consequence of this annual migration, study of humpback abundance and reproductive behavior has focused on animals near Hawaii, whereas studies of foraging tend to occur in various regions around the North Pacific Rim. Historical records indicate that humpback whales were once common south of the Alaska Peninsula in summer months, but animals in this region have been poorly studied. Initial studies in the Shumagin Islands region revealed that the whales in that area are from several breeding populations, suggesting that breeding populations are not necessarily segregated during the summer feeding season. With support from the Marine Mammal Commission, the contractor collected sighting information on individual humpback whales to estimate local abundance and distribution and characterize habitat-use patterns. In addition, the contractor collected tissue samples for genetic analyses of stock structure of humpback whales in the North Pacific. Photo-identification and genetic analyses revealed that humpback whales in the Shumagin Islands are from four North Pacific breeding grounds, with most coming from breeding grounds in Hawaii. The final report is available from the Marine Mammal Commission.

Innovative Techniques for Assessing Anthropogenic Impacts on Great Whales (Center for Coastal Studies, Provincetown, MA)—Entanglement in fishing gear is a documented source of injury and mortality to cetacean species, including the humpback whale. Unfortunately, biases and limitations in detecting the occurrence of entanglements make it difficult to determine entanglement rates and changes in those rates over time. Since 1997 the Center for Coastal Studies has studied entanglement rates of humpback whales in the Gulf of Maine by monitoring scars on their caudal peduncles. In 2002 the Marine Mammal Commission provided partial support for a second study to compare entanglement rates between this population and the population breeding

in the Hawaiian Islands. The contractor also will use this information to examine potential sublethal effects of entanglement, especially with regard to reproduction. The Commission anticipates that the Center for Coastal Studies will publish the study results in 2003.

Abundance of Steller Sea Lions and Sea Otters at the Commander Islands (Russia) and Observations of Predation by Killer Whales (North Pacific Wildlife Consulting, Anchorage, AK)—Unexplained declines have been documented for northern fur seals, Steller sea lions, harbor seals, and sea otters in the Bering Sea and Gulf of Alaska. Declines in Steller sea lions and sea otters have been especially severe. Recent trends in abundance of both species at the Commander Islands, located at the western end of the Aleutian Islands, indicate that local populations of these two marine mammal species are stable in marked contrast to the declines observed elsewhere in the Aleutian Islands. The reason for these differences is not clear, but there may be important implications for recovery efforts for both species. Killer whale predation is one of the leading hypotheses for explaining at least part of the current decline in sea lions and sea otters in other regions of the Aleutian Island chain. The Marine Mammal Commission provided partial support for studies of these marine mammals in the vicinity of the Commander Islands. Specifically, the investigators will monitor and estimate abundance of the northern fur seal, Steller sea lion, and sea otter populations; collect data on distribution and pod structure of killer whales in nearshore waters; and monitor killer whale activities near Steller sea lion rookeries and concentrations of sea otters. The Commission received a preliminary report in October 2002 and anticipates receiving a final report in 2003.

A Multidisciplinary Perspective on the Nature and Importance of Changes in Arctic Sea Ice as Perceived by Alaska Natives and Western Scientists (Huntington Consulting, Eagle River, AK)—In February 2000 the Marine Mammal Commission hosted a workshop that resulted in a report entitled "Impacts of Changes in Sea Ice and Other Environmental Parameters in the Arctic." As a consequence of the workshop, western scientists and Alaska Natives have been collaborating on a research project to provide descriptions of arctic sea ice conditions in recent winters, as observed by Alaska Natives. Such descriptions are intended to take advantage of local, traditional knowledge of Alaska Natives and provide descriptions of sea ice changes on a scale smaller than that available through remote sensing technology. Changes in sea ice conditions that may result from long-term environmental trends may have profound effects on arctic ecosystems, the living resources they contain, and the Alaska Native cultures they sustain. The contractor will translate and publish Alaska Native observations of sea ice as planned subsequent to the initial workshop and complete a manuscript describing multidisciplinary perspectives (anthropological, physical, and indigenous) on sea ice and the importance of those observed changes. The Commission anticipates receiving the report in 2003.

Cetacean Interactions with Commercial Longline Fisheries in the South Pacific Region: Approaches to Mitigation (New England Aquarium, Boston, MA)—Conflicts between longline fisheries and cetaceans (particularly sperm whales, killer whales, pilot whales, and false killer whales) are known to exist in many areas and appear to be increasing in both scope and scale. Such conflicts may adversely affect both the cetaceans (through hooking or entanglement) and the fisheries (loss of catch and destruction of gear). As a consequence, they may affect the attitudes of fishermen toward cetaceans and may lead to attempts to kill or injure cetaceans. Such interactions appear to be increasing in the South Pacific, where hooked fish are being removed from longlines by small toothed whales. The contractor convened a workshop in November 2002, bringing together fishermen and scientists from the private sector and government to discuss whale depredation of fish captured in commercial longline fishing operations in the South Pacific and other regions. Specifically, the goal of the workshop was to establish a network of stakeholders to continue to improve nonlethal mitigation of this interaction. The contractor will provide a report of the workshop to the Commission in 2003.

Revision of Hawaiian Monk Seal Recovery Plan (Lloyd Lowry, Fairbanks, AK)—The original Hawaiian Monk Seal Recovery Plan was completed in 1983 by the then leader of the Protected Species Program of the Honolulu Laboratory, National Marine Fisheries Service, in cooperation with the Hawaiian Monk Seal Recovery Team. Since 1983 the plan has been supplemented

twice with work and research plans, but has never been completely revised. Over the past 20 years, the nature of the factors affecting the species and the research and management efforts aimed at recovery have changed considerably. In 2001 the Hawaiian Monk Seal Recovery Team was reconstituted and provided with a number of objectives, including revision of the plan. The team has met to discuss the plan and other issues and devised a strategy for its completion. Unfortunately, progress to date has been limited, and it is unlikely that the schedule for revision will be met. Because the plan is intended to be the primary guide to research and recovery activities, delay in plan revision may result in a corresponding delay in research and recovery efforts. In 2002 the contractor, funded by the Marine Mammal Commission, worked with the National Marine Fisheries Service and the Hawaiian Monk Seal Recovery Team to complete a first draft of the revised recovery plan.

South American Marine Mammal Meetings (Society for Marine Mammalogy, Lawrence, KS)—The South American Society of Marine Mammal Specialists was established in 1984 in Buenos Aires, Argentina. The Latin American Society of Specialists on Aquatic Mammals was founded in 1996. The 10th and 4th meetings of these societies, respectively, were held jointly in Valdivia, Chile, from 14 to 19 October 2002. These meetings have been the only opportunity for many Latin American marine mammalogists to present and discuss the results of their research. The conference facilitated the exchange of scientific information and ideas among researchers, students, and technicians from South America and other regions. Funds from the Marine Mammal Commission and the Society for Marine Mammalogy supported participation in the meetings by invited lecturers and students. The conveners will provide a summary of the workshop to the Commission in 2003.

Development of Remotely Deployed Transmitters on Pacific Walrus (U.S. Geological Survey, Anchorage, AK)—Management and conservation of the Pacific walrus has been confounded by the difficulty of studying these animals. They occur at the Bering Sea ice edge and in pack ice where they are difficult to approach. In addition, they are large animals that are difficult to sedate and dangerous to handle. As a result, basic information such as abundance, distribution, movement patterns, haul-out patterns, survival, and reproduction are all poorly understood. Such information is vital to management and conservation of the species, including assessment of various possible threats to the population. The contractor is developing more effective means of assessing the status of the Pacific walrus based primarily on remote tagging techniques.

Acoustic Primer: Underwater Sound and Marine Mammals (Richard Stern Associates, LLC, Boalsburg, PA)—Human activities, such as commercial shipping, seismic testing, construction, sonar, and military exercises, have greatly increased the amount of sound in the ocean environment. The effects of such introduced sound on marine mammals recently has become a concern, based on evidence that ambient levels have increased over time and the knowledge that sounds can have physical and behavioral effects on marine mammals that may reduce their survival and reproductive rates and, hence, their population trends. The nature and effects of introduced sound in the marine environment are poorly understood. The lack of understanding has confounded the debate about whether and to what extent such sound production must be managed. In 2002 the Marine Mammal Commission provided funding for a contractor to write a general description (a primer) of sound in the marine environment and its potential significance to marine mammals. The intent is to better inform persons who are not experts in marine acoustics but who may be involved with management decisions or otherwise concerned about potential adverse effects of anthropogenic sound in the marine environment. The Commission anticipates receiving the report in 2003.

Research of Cetacean Populations Using Bioacoustics in the Upper Gulf of California: Why is the Vaquita Distribution Extremely Restricted? (Programa Nacional de Investigación y Conservación de Mamíferos Marinos, Ensenada, Mexico)—Vaquita are endemic to the northern Gulf of California and considered to be one of the most endangered marine mammals in the world (see Chapter III). Concern for the species' survival has been expressed by the Mexican government and in many national and international forums. In 1997 Mexico began to develop a recovery strategy for the species and established a committee of international and national experts known as the International Committee for the Recovery of the Vaquita. Among other things,

the committee has stressed the importance of research activities to provide the data necessary for conservation actions, in particular, research on vaquita distribution and habitat use. Due to the difficulty of sighting these small, shy animals, the committee recommended the use of acoustic techniques to investigate distribution and habitat use.

The Commission funded a study in 2001 in which the contractor investigated the potential use of acoustic detection techniques in determining habitat use and distribution of vaquita. That work indicated that the range of the vaquita is much more restricted than previously believed. The investigators are uncertain, however, if their conclusion is correct or an artifact of their acoustic detection technology. In 2002 the Commission provided funds to the investigators to improve their technology to enhance their ability to detect vaquita and more accurately assess their abundance and distribution. The Commission anticipates receiving a report on this research in 2003.

Translation of Russian Documents on Marine Mammal Research (North Pacific Wildlife Consulting, Anchorage, AK)—The Marine Mammal Commission and the National Marine Fisheries Service possess copies of three Russian documents on marine mammal research: "Northern Fur Seals," "Results of Steller Sea Lion Research in the Russian Far East Carried Out by TINRO from the 1930s to the 1990s," and "Scientific Papers in the Area of Research, Conservation, and Harvest of Marine Mammals Published in the USSR and Russia, 1945–1998." These documents were developed in the course of earlier contracts with Russian scientists. However, they were written in Russian and are therefore of limited utility to scientists and managers unable to read Russian. The Marine Mammal Commission funded a contractor to translate from Russian to English the first two documents and partially translate the Russian marine mammal literature database (i.e., titles and key words) to make the information available to a wider range of scientists and managers. The Commission anticipates receiving copies of the translated reports in 2003.

Recovery, Archive, and Analysis of Photo-Identification Data for the Eastern North Pacific Gray Whale on Winter Breeding/Calving Range (Whale Trust, Paia, HI)—Over the past three decades, the eastern North Pacific gray whale population has recovered to a level thought to be at or near environmental carrying capacity. In 1999 and 2000 the population experienced extensive mortality as evidenced by large numbers of stranded dead and dying whales along the western coast of North America from Alaska to Mexico. Calf production also declined sharply, apparently in concert with the die-off, and many live whales appeared to be in poor condition. The die-off appeared to have ended by 2001, but counts of the population as it moved southward and northward during seasonal migrations were considerably lower than in past years. The dynamics of the eastern North Pacific gray whale are a matter of considerable interest because the population was listed as endangered prior to 1994, and because scientists have had few opportunities to observe the demographic changes that occur as a large cetacean population approaches or reaches carrying capacity.

In the 1970s and 1980s the population was considerably smaller and in a period of growth. During that time, photo-identification studies were conducted to investigate elements of life history of gray whales. Much of the data from the 1970s and 1980s still exists but is stored as photographs or on other media that are degrading with time. This degradation will soon result in the loss of data that may be useful for understanding the long-term demography of the population and its recovery. The contractor is converting data from photographic and other short-lived media to digital format for long-term preservation and studies. The Commission anticipates that the contractor will complete the work in 2003 and make results available to other researchers.

Western Gray Whales off Northeastern Sakhalin Island, Russia: Photo-Identification and Health Monitoring Studies (Texas A&M Research Foundation, College Station, TX)—The western population of gray whales appears to consist of about 100 animals. It therefore constitutes one of the most endangered marine mammal populations in the world. Little is known about this population, but understanding of it has improved greatly in the past six years as a result of collaborative research efforts by Russian and U.S. scientists. Their studies have focused on the population in the vicinity of what is probably its most important feeding ground off the northeastern coast of Sakhalin Island, Russia. At this site, the foraging patterns of these animals may be disrupted by increasing industrial activity related to the ex-

ploration, drilling, and recovery of oil. In 2002 the contractors continued long-term studies to identify the factors affecting the status of this population and the effects of those factors on gray whale foraging, survival, and reproduction. Specifically, they estimated annual return, survival rates, population abundance, and patterns of site fidelity for known individuals; documented the health status of whales determined to be unusually thin in 1999–2001; recorded calf production; and determined habitat use and primary feeding areas. Scientists reported on their research during the Commission's annual meeting in San Diego in October 2002 (see Chapter III).

History of the Marine Mammal Protection Act and the Marine Mammal Commission and Its Committee of Scientific Advisors (Robert J. Hofman, Chevy Chase, MD)—The U.S. Marine Mammal Protection Act, enacted in 1972, is unique in at least three ways: (1) it was the first legislation anywhere in the world to mandate an ecosystem approach to the conservation of living marine resources; (2) it established an independent, three-person commission to provide oversight for implementation of the Act and a nine-person scientific committee to advise the commission on matters of science; and (3) it has evolved over the years in response to both scientific knowledge and practical problems unforeseen when it was enacted.

The Act provides direction for management of marine mammal populations and also serves as a model to improve decisionmaking in wildlife management in general. Understanding the Act and its history is essential to implementing it fully and anticipating future changes and needs. In 2002 the Marine Mammal Commission provided funding for a report on the history of the Marine Mammal Protection Act, the Marine Mammal Commission, and its Committee of Scientific Advisors that will help guide scientists, legislators, and organizations with interests and responsibilities related to conservation of marine mammals and the marine environment. A report is anticipated in 2003.

General

Survey of Federally Funded Marine Mammal Research (Southern Illinois University, Carbondale, IL)—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 or supported by other federal agencies in fiscal year 2001 is being collected and will be forwarded to the contractor. Subsequently the contractor will prepare a draft report synthesizing the information. The draft will be sent to the responding agencies to verify the accuracy of the information. As with previous reports, the final report will be reviewed by the Commission, in consultation with its Committee of Scientific Advisors, to identify possible duplicative research and means to avoid duplication. The series of reports is available through the National Technical Information Service.

Assessment of the Activities of the Arctic Council and Its Subsidiary Working Groups (Huntington Consulting, Eagle River, AK)— In 1991 the eight arctic nations (Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States) adopted the Arctic Environmental Protection Strategy, through which they address issues of pollution and conservation on a circumarctic basis. In 1996 the eight nations established the Arctic Council as a high-level forum to better address issues of common concern, in particular issues of environmental protection and sustainable development. The Council has subsumed the four programs and working groups established to help implement the Arctic Environmental Protection Strategy. They are the Arctic Monitoring and Assessment Program; Conservation of Arctic Flora and Fauna; Emergency Prevention, Preparedness, and Response; and Protection of the Arctic Marine Environment. The Council also has established a Sustainable Development Working Group. Persons designated by each nation as senior arctic officials act as liaisons and provide coordination of activities between the biennial meetings of the Council. The contractor represented the Commission at the meeting of the senior arctic officials and at meetings of the Arctic Monitoring and Assessment Program Working Group and the Working Group on Conservation of Arctic Flora and Fauna, as discussed in Chapter V.

Chapter IX

PERMITS AND AUTHORIZATIONS TO TAKE MARINE MAMMALS

The Marine Mammal Protection Act places a moratorium, subject to certain exceptions, on the taking and importing of marine mammals and marine mammal products. The Act defines taking to mean "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." One such exception provides for the issuance of permits by either the Fish and Wildlife Service or the National Marine Fisheries Service, 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. Amendments enacted in 1994 provide for the issuance of permits to authorize the taking of marine mammals in the course of educational or commercial photography and for importing polar bear trophies from certain populations in Canada. The 1994 amendments also provided a general authorization for scientific research in lieu of a permit when the level of taking will not exceed Level B harassment. With the exception of those for the importation of polar bear trophies, the Marine Mammal Commission is to review all permit applications.

Another of the Act's exceptions provides for the granting of authorizations by the National Marine Fisheries Service and the Fish and Wildlife Service for the taking of small numbers of marine mammals incidental to activities other than commercial fisheries, provided that the taking will have only a negligible impact on the affected stocks. Small-take authorizations incidental to several such activities are summarized in this chapter.

This chapter discusses the Commission's review of permit applications and authorization requests that it received in 2002. This chapter also discusses information on importation of polar bear trophies, the status of permit-related regulations, considerations with respect to the export of marine mammals to foreign facilities, and steps taken to address interactions between wild marine mammals and members of the public who seek to approach, swim with, photograph, or feed them. In many instances, these interactions constitute harassment of wild marine mammals as defined under the Marine Mammal Protection Act and its implementing regulations.

Permit Application Review

Permits for scientific research, public display, species enhancement, and photography all involve the same four-stage review process: (1) receipt and initial review of the complete application by either the National Marine Fisheries Service or the Fish and Wildlife Service; (2) publication in the *Federal Register* of a notice of receipt 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 Service; and (4) final action by the Service after consideration of comments and recommendations by the Commission and the public. If captive maintenance of animals is involved, then the Services must consult with the Animal and Plant

Health Inspection Service of the U.S. Department of Agriculture to ensure that the facility is compliant with the Animal Welfare Act requirements (i.e., licensed for public display or registered for scientific research)(see also Chapter X).

Once a permit is issued, a permitee can request an amendment from the responsible agency, provided the proposed change meets statutory and regulatory requirements. Depending on the extent of the proposed change, an amendment may be subject to the same notice, review, and comment procedures as the original permit application. Amendments to permits are subject to review by the Commission. However, amendments considered under the National Marine Fisheries Service's permit regulations to be of a minor nature (i.e., those that do not extend the duration of the research beyond 12 months, request to take additional numbers or species of animals, increase the level of take or risk of adverse impact, or change or expand the location of the research) do not require Commission review. Similarly, Fish and Wildlife Service permit administration allows for minor amendments without Commission review.

The total review time for a permit (from initial receipt of an application by either agency to final action) depends on many factors, including the completeness 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 agencies, including the Commission. During 2002 the Commission, in consultation with its Committee of Scientific Advisors, provided recommendations on 19 permit applications submitted to the National Marine Fisheries Service and 8 applications submitted to the Fish and Wildlife Service. Of these, four awaited final action by the Department of Commerce and one awaited final action by the Department of the Interior at the end of 2002. The Commission's average review time—from the point at which the application was considered complete to the submission of the Commission's final letter of recommendation—for the 27 applications on which it commented in 2002 was 36 days (range: 11–102 days). The Commission also made recommendations on 19 requests to amend permits in 2002. The average time for Commission review of these requests was 30 days.

The National Marine Fisheries Service issued 19 permits during 2002, including permits for nine applications received in 2001. The average processing time, from the date the application was received by the Service until final action was taken, was 224 days (range: 74–491 days). The average processing time from the date the application was received and considered complete by the Service until final action was taken, was 170 days (range: 59–454 days). The applications that required consultation under the Endangered Species Act required an average of 359 days (range 246–491days) to complete.

The Fish and Wildlife Service issued nine permits during 2002, including permits for seven applications received in 2001. Its average processing time from the date the application was received at the Service until final action was taken was 355 days (range: 79–776 days). The average processing time from the date the application was received and considered complete at the Service until final action was taken was 193 days (range: 50–420 days).

In general, the permits issued by the Services were consistent with the Commission's recommendations. Exceptions are two permits denied by the Fish and Wildlife Service (discussed later in the export authorization section of this chapter).

Letters of Confirmation under the General Authorization

Between 6 and 16 researchers a year have obtained letters confirming that their activities may appropriately be conducted under a streamlined procedure established by the 1994 amendments to the Marine Mammal Protection Act. The amendment requires that the National Marine Fisheries Service and the Fish and Wildlife Service use this "general authorization" for 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 Commission does not review individual requests to be covered under the general authorization. During 2002, eight letters of confirmation were issued under the general authorization by the National Marine Fisheries Service. One drawback with the general authorization is its inapplicability to activities that may take endangered or threatened marine mammals. In its testimony before the House Resources Committee's

Subcommittee on Fisheries Conservation, Wildlife, and Oceans in June 1999, the Commission recommended that the general authorization be expanded to apply to such marine mammals. However, such a proposal was not included in a Marine Mammal Protection Act draft reauthorization bill submitted to Congress by the Administration in September 2002 because it was thought that an amendment to the Endangered Species Act would be a more appropriate vehicle for such a change.

As noted in the Commission's previous annual report, it appears that, for certain types of research, this streamlined process has alleviated delays associated with issuing permits.

Small-Take Authorizations

As noted earlier, under section 101(a)(5) of the Marine Mammal Protection Act, U.S. citizens may be authorized to unintentionally take small numbers of marine mammals incidental to activities other than commercial fishing when certain conditions are met. Such authorization is to be granted by the Secretaries of the Interior and Commerce. This section was added to the Act in 1981 to provide a streamlined alternative to the otherwise applicable requirement to obtain a waiver of the Act's moratorium on taking marine mammals. It can be used when the number of animals likely to be affected is small and the impacts on the size and productivity of the affected species or populations are likely to be negligible. The section was amended in 1986 to allow the taking of small numbers of depleted, as well as nondepleted, species and populations. All forms of incidental taking, including lethal taking, may be authorized under section 101(a)(5)(A). A new subparagraph, section 101(a)(5)(D), was added to the Act in 1994 to streamline small-take authorizations further if the taking will be by harassment only.

Authorizations under section 101(a)(5)(A) require the promulgation of regulations setting forth permissible methods of taking and requirements for monitoring and reporting, as well as a finding that the incidental taking will have negligible effects on the size and productivity of the affected species or stocks. Authorization of taking by incidental harassment under section 101(a)(5)(D) does not require that regulations be promulgated. Rather, within 45 days of receiving an application that makes the required showings, the Secretary is to publish a proposed authorization and notice of availability of the application for public review and comment in the *Federal Register* and in newspapers and by appropriate electronic media in communities in the area where the taking would occur. After a 30-day comment period, the Secretary has 45 days to make a final determination on the application. Authorizations under section 101(a)(5)(A) may be issued for periods up to five years. Authorizations under section 101(a)(5)(D) may be issued for periods up to one year. Both types of authorizations may be renewed.

Authorizations under Section 101(a)(5)(A)

During 2002 the Service received only one request for a small-take authorization under section 101(a)(5)(A).

North Pacific Acoustic Laboratory (NPAL)—In May 2000 the Scripps Institution of Oceanography completed a draft environmental impact statement for continued operation of the Acoustic Thermometry of Ocean Climate (ATOC) low-frequency source off the north coast of Kauai, Hawaii. In conjunction with publication of the draft environmental impact statement, Scripps applied to the National Marine Fisheries Service on 21 May 2000 for a letter of authorization to take small numbers of marine mammals incidental to operation of the source. On 24 August 2000 the Service published an advance notice of proposed rulemaking, followed by the publication of a proposed rule on 22 December 2000. The Commission provided comments on the environmental impact statement and the advance notice of proposed rulemaking on 24 July 2000 and 22 September 2000, respectively.

The Commission, in consultation with its Committee of Scientific Advisors, provided comments on the proposed rule to the Service on 7 February 2001, asking that the Commission's previous comments be incorporated by reference. Although the Commission agreed with the Service that continued operation of the sound source off Kauai is unlikely to have immediate, biologically significant effects on marine mammals, the Commission continued to be concerned about the proposed regulations. The Service published final rules regulating the operation of the sound source on 17 August 2001. On 22 January 2002 the Service published notice that it had issued a letter of au-

thorization under the final rule authorizing the University of California at San Diego, Scripps Institution of Oceanography, to take several species of marine mammals incidental to operation of a low-frequency sound source by the North Pacific Acoustic Laboratory from 15 January 2002 through 1 January 2003. Details concerning the project and the Commission's comments on the draft environmental impact statement and proposed rule are provided in previous annual reports.

Authorizations under Section 101(a)(5)(D)

Requests for small-take authorizations under section 101(a)(5)(D) considered during 2002 are described below.

Taking of Northern Elephant Seals, Harbor Seals, California Sea Lions, and Northern Fur Seals Incidental to Rocket Launching from the Naval Air Warfare Center Weapons Division, San Nicolas Island, California—In February 2001 the Department of the Navy applied to the National Marine Fisheries Service for authorization to take northern elephant seals, harbor seals, California sea lions, and northern fur seals incidental to launches of Vandal (or similar) and smaller subsonic target missiles from San Nicolas Island, California. Notice of receipt of the application and proposed authorization for it were published by the Service in the *Federal Register* on 23 April 2001.

The Commission, in consultation with its Committee of Scientific Advisors, reviewed the application and provided comments to the Service on 23 May 2001. In its comments, the Commission concurred that only small numbers of the listed species of marine mammals are likely to be taken by harassment and that the proposed activities are likely to result in no more than short-term behavioral modifications. However, the Commission recommended that (1) the authorization specify that operations be suspended until steps are taken to avoid future occurrences if a mortality or injury to a seal or sea lion occurs that appears to be related to launch activities, and (2) the Service be satisfied that the applicant's monitoring system is sufficient. The Commission noted that the Service was requiring that disruption of behavioral patterns that might occur must be of a significant nature to constitute Level B harassment. The Commission expressed concern that this interpretation did not accurately reflect the statutory definition of the Act and referred the Service to its previous letters discussing the subject in detail. The Commission also advised that the Navy should consider seeking a five-year authorization under section 101(a)(5)(A) as appropriate and that the Navy should obtain an authorization from the Fish and Wildlife Service for the small take of sea otters also present in the San Nicolas region.

Notice of issuance of a one-year letter of authorization was published by the Service in the *Federal Register* on 9 August 2001. In the notification the Service addressed the Commission's comments. Specifically, the Service referred the Commission to the 7 February 2000 *Federal Register* notice wherein the Service stated that if the only reaction to the activity of the marine mammal is within the normal repertoire of actions that are required to carry out the "behavioral pattern," the Service considers the activity not to have caused an incidental disruption provided the animal's reaction is not otherwise significant due to length or severity and therefore the reaction is not considered Level B harassment.

On 1 July 2002 the Service published notice in the *Federal Register* that the Department of the Navy had applied for a one-year authorization to take northern elephant seals, harbor seals, California sea lions, and northern fur seals incidental to missile launch operations from San Nicolas Island, California. Notice of receipt of the application and proposed authorization were published by the Service in the *Federal Register* on 3 September 2002.

The Commission, in consultation with its Committee of Scientific Advisors, concurred with the Service's preliminary determination that small numbers of northern elephant seals, harbor seals, California sea lions, and northern fur seals would likely be taken by harassment incidental to some of the anticipated target missile launches; the short-term impacts of the launches and associated activities would likely result in no more than temporary behavioral modification; and the harassment would likely have negligible effects on the affected stocks. However, the Commission reiterated its belief that the Service's efforts to redefine Level B harassment administratively to include only "biologically significant" disturbance, as again proposed in its *Federal Register* notice, is ill-advised and contrary to the statutory definition of the term.

With respect to the applicant's proposed video and audio monitoring of pinnipeds hauled out on beaches, the Commission noted that the approach

assumes that the small subgroup(s) of animals being recorded at any given time are representative of the entire aggregation of animals hauled out on the beach—an assumption that may or may not be valid. Consequently, the Commission recommended that before issuing the requested authorization, the Service be satisfied that the applicant's monitoring program is sufficient to detect the effects of the proposed target launches. The Commission also recommended that any authorization issued to the applicant specify that, if a mortality or serious injury of a seal or sea lion occurs that appears to be related to target launch activities, operations be suspended while the Service determines whether steps can be taken to avoid further injuries or mortalities or whether an incidental-take authorization under section 101(a(5)(A) is needed. Further, the Commission recommended, consistent with its previous letter to the Service, that the Service consult with the Navy to determine whether it would be appropriate to seek a more comprehensive, five-year authorization for harassment and other possible types of taking under section 101(a)(5)(A) of the Marine Mammal Protection Act. Finally, the Commission recommended that the Service advise the applicant to consult with the Fish and Wildlife Service concerning the need for an authorization to take small numbers of sea otters incidental to the proposed activities.

On 3 September 2002 the Service published a *Federal Register* notice advising that a one-year letter of authorization had been issued to the U.S. Navy, Naval Air Warfare Center Weapons Division, to take small numbers of marine mammals by harassment incidental to missile launch operations from the western end of San Nicolas Island, California. With respect to the Commission's recommendation concerning the applicant's proposed video and audio monitoring approach, the Service noted that, in developing the monitoring plan, the Navy had consulted with biologists experienced in observing the pinnipeds on San Nicolas Island. Based on those discussions, the Navy concluded that attempts to survey the hauled-out groups at close range before and after launches would result in significant disturbance and greater risk of injury to the pinnipeds than would occur using video and audio observation. The Service noted that the Navy believes that using three high-resolution video cameras and two portable cameras to monitor the hauled-out groups will provide the least invasive means of assessing the animals' responses to the launches and detecting any occurrence of injured or dead pinnipeds following a launch.

Concerning the Commission recommendation that missile launch operations be suspended in the event of a mortality or serious injury of a seal or sea lion, the Service advised that authority to suspend operations is under the jurisdiction of the Department of the Navy, not the Secretary of Commerce. The Service noted, however, that because the incidental harassment authorization does not provide for serious injury or lethal taking, the Service could suspend the incidental harassment authorization if such taking was determined to be related to missile launch activities. The Service stated that the incidental harassment authorization requires that if such mortality or serious injury occurs, the launch procedures and monitoring methods must be reviewed, in cooperation with the Service, and appropriate changes made before the next launch.

In response to the Commission's comments concerning Level B harassment, the Service noted, among other things, that interpreting the definition of Level B harassment to include every potential or possible reaction of an animal (e.g., blinking its eyes, lifting or turning its head, or moving a few feet along a beach) is inappropriate for the issuance of incidental harassment authorizations. The Service noted that, provided that an animal's reaction is not otherwise significant due to length or severity, such reactions do not have an important biological context. The Service further noted that considering such reactions as incidental takes under the Act would needlessly increase the universe of individuals who would need incidental harassment authorizations.

In regard to the Commission's recommendation that the Service consult with the Navy to determine whether it would be appropriate to seek a more comprehensive, five-year authorization for harassment, the Service stated that the Naval Air Warfare Center Weapons Division intends to apply for a five-year authorization under section 101(a)(5)(A) in the near future.

Finally, the Service indicated that it had consulted with the Fish and Wildlife Service regarding the take of sea otters incidental to missile launch operations on San Nicolas Island, and that no takes of sea otters are expected as a result of launch activities.

Taking Incidental to Moving a Steel Drilling Caisson from Port Clarence, Alaska, to McCovey Prospect in the Beaufort Sea off Alaska and Conducting Exploratory Drilling Activities—On 12 March 2002 the National Marine Fisheries Service published a *Federal Register* notice announcing receipt of a request from the Alberta Energy Company Ltd. Oil and Gas, USA, Inc., for authorization to take small numbers of marine mammals by harassment incidental to moving a steel drilling caisson from Port Clarence, Alaska, through the Bering Strait and Chukchi Sea to McCovey Prospect in the Beaufort Sea off Alaska; refueling and resupplying the caisson at McCovey Prospect; and conducting exploratory drilling activities during the winter at McCovey Prospect. The Service noted its preliminary determinations that (1) the short-term impact of the proposed activities would result, at most, in a temporary modification in behavior by certain species of whales, porpoises, and pinnipeds, and (2) any behavioral modifications made by these species to avoid the noise and visual stimuli associated with the activities were expected to have a negligible impact on their survival and recruitment.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, reviewed the application and provided comments to the Service on 29 April 2002. The Commission considered the Service's preliminary determinations to be reasonable, provided that the Service was satisfied that the proposed mitigation and monitoring activities would be adequate to detect marine mammals in the vicinity of the proposed operations and ensure that marine mammals are not being taken in unanticipated ways or numbers. In this regard, the Commission recommended that the Service require that the applicant develop an on-ice seal monitoring plan for the exploratory drilling phase of the proposed operations and ensure that the plan is adequate to identify sea lairs and other structures within a specified distance of the drilling operations and support activities and to determine whether the proposed drilling activities result in unanticipated disturbance of seals or seal habitat.

The Service issued the letter of authorization on 21 June 2002 and a subsequent revision to the authorization on 21 October 2002. *Federal Register* notices of issuance have not yet been published because the Service is anticipating the receipt of an additional revision request from the applicant.

Taking Incidental to a Pile Installation Demonstration and Replacement of the East Span Project at the San Francisco–Oakland Bay Bridge—On 7 January 2000 the National Marine Fisheries Service published a *Federal Register* notice announcing receipt of a request from the California Department of Transportation for authorization to take small numbers of Pacific harbor seals and California sea lions by harassment incidental to a pile installation demonstration project at the San Francisco–Oakland Bay Bridge.

The Marine Mammal Commission provided comments to the Service on 15 February 2000 and concurred with the Service's preliminary determinations. On 23 May 2000 the Service published a *Federal Register* notice advising that a one-year letter of authorization had been issued to the California Department of Transportation as requested.

On 26 November 2001 the Service published a *Federal Register* notice announcing the receipt of a request from the California Department of Transportation for authorization to take small numbers of Pacific harbor seals, California sea lions, and possibly gray whales by harassment incidental to further work on the bridge.

The Commission, in consultation with its Committee of Scientific Advisors, reviewed the application and provided comments to the Service on 3 January 2002. The Commission concurred that the short-term impact on marine mammals was likely to be negligible and agreed that the authorization should be granted provided that all reasonable measures will be taken to ensure the least practicable impact on the subject species and that the visual monitoring of the safety zone to be conducted before and during pile-driving operations is adequate to detect all marine mammals within the safety zone. The Service had not issued the letter of authorization at year's end.

Taking Incidental to Collecting Marine Seismic Reflection Data in Washington State—On 7 February 2002 the National Marine Fisheries Service published a *Federal Register* notice announcing receipt of a request from the U.S. Geological Survey for authorization to take small numbers of marine mammals by harassment incidental to collecting marine seismic reflection data to investigate earthquake hazards in the Straits of Georgia region of Washington State.

The Commission, in consultation with its Committee of Scientific Advisors, provided com-

ments to the Service on 11 March 2002. The Commission concurred with the Service's preliminary determination that the proposed seismic surveys would result, at most, in temporary modifications of the behavior of certain species of pinnipeds and possibly some individual cetaceans. The Commission considered the proposed monitoring plan to be adequate, and recommended that air gun transmissions be suspended if there is any indication that the animals are being adversely affected. Further, the Commission recommended that the Service advise the Geological Survey that, if there is any indication that other types of taking (e.g., mortalities) are occurring, survey activities be suspended while the Service considers whether authorization under section 101(a)(5)(A) of the Marine Mammal Protection Act is needed.

On 21 May 2002 the Service published a *Federal Register* notice advising that a one-year letter of authorization had been issued to the U.S. Geological Survey as requested. The Service adopted the Commission's recommendation that, in monitoring pinniped approaches to the active air gun array, transmissions be suspended if there is any indication that the animals are being adversely affected. The Service noted, however, that for suspension to occur, animals would have to be actively approaching the vessel and exhibiting obvious signs of distress. Operations could resume when the animal moved outside the safety zone. Concerning the suspension of the survey activities in the event of mortalities or other types of unauthorized taking, the Service noted, among other things, that the survey time is limited to two days in U.S. waters and it is unlikely that a cause-and-effect relationship would be able to be determined within a reasonable length of time to affect the work schedule; and lethal or other unauthorized taking from ship strikes or seismic noise would be highly improbable, given the relatively slow speed of the vessel and the low sound pressure levels involved.

Taking Incidental to Collecting Marine Seismic Reflection Data off Southern California—On 1 April 2002 the National Marine Fisheries Service published a *Federal Register* notice of receipt of a request from the U.S. Geological Survey for authorization to take small numbers of marine mammals by harassment incidental to collecting marine seismic reflection data to investigate the landslide and earthquake hazards off southern California.

The Commission, in consultation with its Committee of Scientific Advisors, provided comments to the Service on 29 April 2002. The Commission concurred with the Service's preliminary determination that (1) the proposed seismic surveys would result, at most, in temporary modifications of the behavior of certain species of pinnipeds and possibly some individual cetaceans, and (2) any behavioral modifications made by these species to avoid the noise and visual stimuli associated with the activities would be expected to have a negligible impact on the survival and recruitment of the affected species or stocks. The Commission recommended that before authorizing taking incidental to nighttime operations, the Service consult with the applicant to ensure that any marine mammals approaching or entering the designated safety zone around the sound source during nighttime activities can be detected in time to stop operations so that the animals are not affected adversely. The Commission further recommended that the Service require that approaches closer than the proposed safety zones be monitored and that the source be shut down if animals show signs of distress. The Commission also recommended that the applicant be required to include in the initial and final reports the species and numbers of marine mammals observed approaching and entering the designated safety zones during the day and the night.

On 24 June 2002 the Service published a *Federal Register* notice advising that a one-year letter of authorization had been issued to the U.S. Geological Survey as requested. With respect to the Commission's recommendations, the Service stated that the applicant will be capable of conducting the monitoring program required under the incidental harassment authorization for this activity. The Service noted that, as determined by the California Coastal Commission, the shutdown zones are 100 m (328 ft.) for the air gun and 30 m (98 ft.) for the other acoustic systems. The Service noted that the air gun will be used only during daylight hours. The Service concurred with the Commission's recommendation that the incidental harassment authorization require that pinniped approaches to the sound source within the safety zone be monitored and that the source be shut

down if animals show signs of distress and the authorization modified accordingly. The Service also concurred with the Commission's recommendation that the applicant be required to include in the initial and final reports the species and numbers of marine mammals observed approaching and entering the designated safety zones during both day and night.

Taking Incidental to Activities Related to the Delta IV/Evolved Expendable Launch Vehicle (EELV) at South Vandenberg Air Force Base, California—On 4 March 2002 the National Marine Fisheries Service published a *Federal Register* notice announcing receipt of a request by the Department of the Air Force, 30th Space Wing, on behalf of the Boeing Company, to take harbor seals and other small numbers of marine mammals incidental to wharf modification, transport vessel operations, cargo movement activities, and maintenance dredging activities at the harbor on South Vandenberg Air Force Base.

The Service noted that the principal means of taking would be by disturbance resulting from the presence of, and noise generated by, heavy equipment and other construction noise and construction vessel traffic during harbor modifications and dredging activities, as well as the operation of the Delta Mariner vessel itself and associated docking and cargo movement activities. The Service preliminarily determined that the effects of the proposed activities would be limited to short-term startle responses and localized behavioral changes and would have no more than a negligible impact on marine mammal stocks.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, provided comments on 15 April 2002. The Commission considered the Service's preliminary determinations to be reasonable, provided that the applicant takes all reasonable measures to ensure the least practicable impact on the subject species, and carries out the mitigation and monitoring activities as described. With respect to the former provision, the Commission suggested that the Service consider providing authorization for the disturbance of small numbers of other species, such as northern elephant seals, California sea lions, and northern fur seals, because there is a possibility that individuals of those species may be disturbed during the activities. The Commission further recommended that the Service, if it had not already done so, assess whether the monitoring required as a condition of the current and possible future incidental harassment authorizations will be adequate to detect possible nonnegligible cumulative effects and, if not, what additional steps need to be taken to ensure that any such effects will be detected before they reach significant levels.

On 23 May 2002 the Service published a *Federal Register* notice advising that a one-year letter of authorization had been issued to the Boeing Company incidentally to take small numbers of marine mammals by harassment as requested. The Service considered the Commission's suggestion that authorization be provided for the disturbance of a small number of individuals of other marine mammal species that are uncommon in the South Vandenberg Air Force Base area, yet could possibly be disturbed by the proposed activities. Based on its review of monitoring reports submitted for previous authorizations, the Service provided authorization for the incidental harassment of small numbers of California sea lions, northern elephant seals, and northern fur seals during the proposed activities. The Service did not adopt the Commission's recommendation that the Service assess the adequacy of the monitoring program to detect possible nonnegligible cumulative effects, stating its belief that the monitoring requirements, along with the requirement to report monitoring results in a timely manner, will allow the Service to assess the potential for cumulative effects on marine mammals and, if necessary, modify the conditions of the authorization to avoid significant adverse effects.

Taking of Harbor Seals Incidental to Seismic Retrofitting of Three Bridges in Humboldt County, California—On 10 April 2002 the National Marine Fisheries Service published a *Federal Register* notice announcing receipt of a request from the California Department of Transportation for an authorization to take small numbers of harbor seals by harassment incidental to seismic retrofitting of three bridges spanning Humboldt Bay in Humboldt County, California. The Service stated that, although harbor seals may modify their behavior (e.g., temporarily abandon haul-out sites and other areas) to avoid the acoustic and visual disturbance, alternative haul-out and pupping sites and feeding areas are available within the bay. The Service also stated that no take by injury or death is anticipated as a result of the proposed activities

and that harassment takes should be low due to the applicant's proposed mitigation measures. Consequently, the Service preliminarily determined that (1) the short-term impact of pile driving and other activities associated with the proposed activities should result in no more than temporary modification in the seals' behavior, and (2) the proposed action will have a negligible impact on Pacific harbor seal populations in Humboldt Bay and along the California coast.

The Commission, in consultation with its Committee of Scientific Advisors, provided comments on 10 May 2002. The Commission considered the Service's preliminary determinations to be reasonable, provided that all reasonable measures be taken to ensure the least practicable impact to the seals and that visual monitoring of the safety zone to be conducted before and during pile-driving operations be adequate to detect all marine mammals within the safety zone. With respect to the former provision, the Commission noted that, before issuing the authorization, the Service should obtain clarification as to what, if any, monitoring will be conducted to detect and mitigate potential disturbance resulting from pile-driving noise associated with the placement of small-diameter pilings. The Commission also noted that visual monitoring could be compromised during the winter months if pile-driving activity occurs in the early morning or late afternoon hours.

The Commission also noted that the Service's *Federal Register* notice stated that the Service considers that underwater sound pressure levels above 190 dB re 1FPa RMS (impulse) "could cause temporary hearing impairment (Level B harassment in harbor seals...." As it had done in previous correspondence to the Service, the Commission advised the Service that, in situations where a temporary threshold shift may lead to biologically significant behavioral effects (e.g., an increased risk of natural predation or ship strikes), it should be considered as having the potential for injury (i.e., Level A harassment). The Commission further noted that an across-the-board redefinition of temporary threshold shift as constituting Level B harassment inappropriately dismisses possible injury that can result from repeated incidents of harassment and from the cumulative effects of long-term exposure. The Service had not issued the letter of authorization at year's end.

Taking Incidental to Demolition at Mugu Lagoon by the U.S. Navy—On 29 June 2001 the National Marine Fisheries Service published a *Federal Register* notice announcing receipt of a request from the Department of the Navy for authorization to take small numbers of marine mammals by harassment incidental to the demolition and removal of about 12 buildings and associated infrastructure at the entrance of Mugu Lagoon, Point Mugu, California.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, provided comments to the Service on 30 July 2001. The Commission concurred with the Service's preliminary determination that the short-term impact of conducting the proposed activities would not cause more than the incidental harassment of small numbers of harbor seals, northern elephant seals, and California sea lions and would have a negligible impact on the affected stocks.

On 24 September 2002 the Service published a *Federal Register* notice advising that a one-year letter of authorization had been issued to the Department of the Navy to take small numbers of marine mammals by harassment incidental to the requested activities.

Taking Incidental to Strengthening the Richmond–San Rafael Bridge—In 1997 the California Department of Transportation received authorization from the National Marine Fisheries Service to take small numbers of Pacific harbor seals and California sea lions by harassment incidental to strengthening the Richmond–San Rafael Bridge in San Francisco Bay to better withstand earthquakes. The work was not completed in 1998, and on 9 November 1998, the Service received a request to renew the authorization. A notice of the request was published in the *Federal Register* on 16 February 1999. The Commission, in consultation with its Committee of Scientific Advisors, commented to the Service on 10 March 1999. In its letter, the Commission agreed that harassment of marine mammals incidental to the bridge work likely would have negligible impacts on the affected stocks and recommended that the requested authorization be issued. On 14 January 2000 the Service published a *Federal Register* notice advising that a one-year letter of authorization had been issued to the California Department of Transportation as requested.

The Service published a notice in the *Federal Register* on 24 July 2002 announcing a request by the California Department of Transportation for second renewal of the authorization to allow the taking by harassment of marine mammals during the seismic retrofit of the foundation and towers. The Service noted that the Department was also seeking to expand the currently authorized period during which work is allowed and the size of the work zone.

By letter of 30 August 2002 the Commission, in consultation with its Committee of Scientific Advisors, agreed that the Service's preliminary determinations concerning the changes to the work period are reasonable in view of the facts that there would still be a two-week quiet period before the onset of pupping, and disruptions in late August would likely be less threatening to molting seals than they would be to mother/pup pairs during the reproductive period. The Commission noted, however, that the application did not provide the rationale for shifting the work zone closer to hauled-out seals or provide sufficient information for evaluation of the potential effects of doing so; and did not discuss whether the expansion of the work area might cause further disturbance to the seals, cause seals to abandon Castro Rocks altogether, or whether there are alternative haul-out sites in the vicinity of Castro Rocks. The Commission recommended that the Service request this information from the applicant to ensure that the proposed expansion of the work area would be likely to have no more than a negligible effect.

On 30 September 2002 the Service published a *Federal Register* notice advising that a one-year letter of authorization had been issued to the California Department of Transportation to take small numbers of marine mammals by harassment incidental to the requested activities. In response to the Commission's comments, the Service stated that although the applicant has noted a shift in the use of Castro Rocks by the seals while work is going on in the immediate area, the overall numbers of seals in the area has not been reduced. Given this, the Service noted that the applicant's request to adjust the dimensions of the work zone are reasonable. The Service further noted that, assuming that the applicant can continue monitoring, it will be able to assess the changes in the work zone by comparing disturbances that occurred last year with the number of disturbances recorded once the work zone dimensions are changed, and thereby assess if the changes in the zone are having a greater impact on the seals at Castro Rocks.

The Service also stated that, given that the Department has not seen a significant decline in seal numbers at Castro Rocks due to construction thus far, it does not anticipate that the seals will permanently abandon Castro Rocks as a result of changing the dimensions of the zone. If, however, the changes appear to have more than a negligible impact on the seals, the Department will request that the exclusion zone revert to the original dimensions when the incidental harassment authorization is requested to be renewed in September 2003. The Service further noted that the eastern boundary of the zone will be relocated 300 ft. from the easternmost tip of Castro Rocks upon conclusion of work at a particular pier.

Polar Bear Trophy Imports

In 1994 the Marine Mammal Protection Act was amended to allow the Secretary of the Interior to issue permits to import sport-hunted polar bear trophies from Canada, provided that certain findings are made. Among other things, it must be found that Canada has an enforced sport-hunting program consistent with the purposes of the Agreement on the Conservation of Polar Bears and based on scientifically sound quotas that will ensure the maintenance of the affected population stock at a sustainable level. The amendments also direct the Secretary to charge a reasonable fee for permits and to use the receipts to develop cooperative research and management programs for the conservation of polar bear stocks shared by Alaska and Russia.

Regulations to implement the polar bear import provision were published by the Fish and Wildlife Service on 18 February 1997. The Service determined that 5 of Canada's 12 polar bear management units met the Marine Mammal Protection Act's criteria and that parts from those subpopulations could be imported. Shortly thereafter, the House Resources Committee, responding to concerns from both hunters and animal welfare groups that the regulations were inadequate, convened a hearing to review the Service's implementation of the polar bear import provisions. That hearing led to an amendment to the Marine Mammal Protection Act to allow imports of all polar bear trophies

legally taken in Canada before 30 April 1994, regardless of where the hunt occurred.

In 1997, as a result of additional information from the Service, the Commission contracted for a review of Canada's polar bear management program. Based on the results of that review, the Commission recommended that the Service initiate a rulemaking to allow the import of polar bear trophies from the Lancaster Sound and Norwegian Bay management units. A final rule to this effect was issued by the Service on 11 January 1999.

In January 2001 information from the Canadian authorities indicated that the polar bear population in the M'Clintock Channel management unit was considerably lower than originally believed. Consequently, the Service published an emergency interim rule finding that the M'Clintock Channel management unit no longer met the import requirements of the Marine Mammal Protection Act and that permits to import polar bears taken from this management unit after 31 May 2000 would no longer be available. The Commission commented on the interim rule, recommending that it be adopted as a permanent rule. The Commission further recommended that the Service encourage Canadian authorities to consider using more conservative population estimates (such as a minimum population estimate, rather than a midpoint estimate) in setting quotas, and that assessments of the Canadian polar bear populations be conducted more frequently, particularly for those populations for which the available data are characterized as being "fair" or "poor." The Fish and Wildlife Service published a final rule to replace the emergency interim rule on 5 October 2001. No substantive changes to the interim rule were made.

Under the 1994 amendments to the Marine Mammal Protection Act, the Fish and Wildlife Service was directed to undertake a scientific review of the impact of issuing import permits on the polar bear populations in Canada. The review was to be completed by 30 April 1996. No permits could be issued after 30 September 1996 if the review indicated that issuing such permits would have a significant adverse effect on Canadian polar bear stocks. Because the regulations authorizing imports had not been issued by the time the review was to be completed, no review was undertaken. Instead, the regulations published by the Service on 18 February 1997 specified that the review would be undertaken within two years of 20 March 1997. As of the end of 2002 the review was undergoing Fish and Wildlife Service review.

Currently, 6 out of 14 polar bear populations are approved for the import of sport-hunted trophies. The remaining populations are deferred pending additional information to make the necessary findings required under the Marine Mammal Protection Act. In 2002 the Service initiated a review of whether the Gulf of Boothia polar bear population should be added to the list of populations approved for the import of sport-hunted polar bears by U.S. citizens.

Since regulations authorizing the import of polar bear trophies took effect in 1997, 529 import permits have been issued. Of these, 132 were issued in 1997, 60 in 1998, 142 in 1999, 76 in 2000, 71 in 2001, and 48 in 2002. Funds from a $1,000 permit issuance fee dedicated to conservation initiatives for shared Alaska-Russian polar bear stocks have been used to develop a bilateral conservation agreement, conduct population surveys, collect data on polar bear habitat use, develop standard surveying protocols, and develop outreach materials.

Permit-Related Regulations

The 1994 amendments to the Marine Mammal Protection Act, among other things, added authority for the issuance of permits for commercial and educational photography and established a general authorization procedure for 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 in the wild). As part of the process to reauthorize the Marine Mammal Protection Act, the Subcommittee on Fisheries Conservation, Wildlife, and Oceans of the House Resources Committee has held several hearings to review actions taken to implement those amendments and to identify problems that may warrant additional legislation. The Commission and other agencies have recommended certain amendments to the Act's permit provisions. These and other proposed amendments are discussed in Chapter II.

To implement the 1994 amendments relating to permits, the National Marine Fisheries Service (1) published an interim final rule in October 1994 implementing the general authorization; (2) issued

final regulations in May 1996 amending the procedures for submitting and reviewing permit applications and making some, but not all, of the changes prompted by the 1994 amendments; and (3) in July 2001 published proposed revisions to its public display regulations. The Service also intends to issue specific regulations concerning permits for educational and commercial photography to supplement its existing general regulations but has yet to do so. With the exception of regulations implementing the provision added to the Act in 1994 authorizing the importation of polar bear trophies from Canada, the Fish and Wildlife Service has yet to amend any of its permit regulations to reflect the 1994 amendments.

The Commission provided extensive comments on the National Marine Fisheries Service's July 2001 proposed regulations by letter of 3 April 2002. The Commission supported the proposed regulations and their adoption as final regulations. It noted, however, that the preamble to the proposed rule was confusing and had failed to address several important issues adequately. This sometimes left reviewers with an incomplete picture of how a regulatory provision would be implemented, and often the Service neglected to explain the statutory basis behind its proposed regulations. Specific comments provided by the Commission identified those areas where further explanation was needed so that the Service could address them in the course of the rulemaking.

In the Commission's view, the biggest shortcoming in the Service's proposal was the confusing discussion of whether and how the Marine Mammal Protection Act applies to the export of marine mammals for public display purposes. Although some of this confusion stems from the underlying statutory provisions, which are not particularly clear and are internally inconsistent in places, the Service's discussion added to the confusion. In particular, the Commission took issue with the statement that the Service has no continuing jurisdiction over marine mammals once they are exported. The Commission suggested that a more accurate portrayal of the situation is that the Service does have such continuing jurisdiction, but that, absent the cooperation of the country to which the marine mammals are exported, it lacks an effective way to exercise that jurisdiction.

To clarify this and related points, the Commission provided an analysis of the Act's permit provisions as they relate to exports to foreign display facilities. Through this analysis, the Commission concluded that the statute clearly applies to exports of marine mammals and places an obligation on all recipients of marine mammals exported from the United States to meet certain requirements. Although recognizing that its analysis was not necessarily the only way possible to interpret the Act's permit provisions, the Commission believes its analysis best reconciles the conflicts inherent in those provisions. Using that analysis, the Commission concluded that the Act's permit provisions (1) provide foreign facilities with the authority to obtain marine mammals from U.S. facilities if they meet requirements comparable with those applicable to domestic facilities; (2) require foreign facilities receiving marine mammals from the United States to continue to meet those comparability requirements; and (3) provide for the seizure of the animals or the assessment of penalties by the United States if the facility fails to meet those obligations.

Having concluded that the Service has continuing authority over marine mammals exported from the United States to foreign display facilities, the question becomes how best to exercise that jurisdiction. To do this, the Service currently requires, and under the proposed rule would continue to require, that the government of the country to which the marine mammals are to be exported provide a comity statement, giving reasonable assurance that the country will recognize the actions of the United States taken with respect to the animals under the Marine Mammal Protection Act. Although the Service correctly explained that comity is a recognition of the actions of one government by another, the Commission noted that, in several places, the proposed rule did not apply to this definition. Rather, under the proposed rule, the Service would require the foreign government to indicate that it would use its own laws to ensure continued compliance with the requirements of the Marine Mammal Protection Act. The Commission noted several problems with this approach. Foremost among these was the fact that the statement would not provide any assurance that actions taken by the Service to enforce the Act would be recognized by the foreign government. This being the case, it was not clear to the Commission that, under the proposed rule, the Service would be able to meet its responsibility of ensuring compliance

with the requirements of the Act as they pertain to foreign facilities.

The Commission indicated that it would not necessarily be averse to a system that relies more heavily, or even entirely, on the foreign government for monitoring its facilities and ensuring comparability with U.S. standards. It added, however, that such a system does not appear to comport with the existing provisions of the Marine Mammal Protection Act. Therefore, the Commission recommended, as it has in congressional testimony, that the Service work with the interested parties to design a new system for authorizing exports to foreign facilities that could be considered during reauthorization of the Act. The Commission noted that such a system would need to achieve the goal of ensuring that the exported marine mammals will be well cared for throughout their maintenance in captivity, but should more realistically reflect the ability of U.S. agencies to identify and correct problems at foreign facilities, and should not establish unnecessary barriers to the exchange of animals among qualified facilities. As of the end of 2002 no action to pursue such an alternative had been taken.

The Commission's comments also raised several other points concerning the Service's proposed public display regulations. Among other things, the Commission recommended that the final regulations—

• either conform to the mandate of section 104(c)(8)(C) regarding pre-Act progeny born in captivity or provide additional explanation for the Service's belief that marine mammals born in captivity before the Act's effective date are properly beyond the scope of the regulations;
• provide greater flexibility in approving facilities at which unreleasable, rehabilitated marine mammals may be maintained;
• discuss in greater detail the proposal to allow the temporary release of captive marine mammals as part of a training exercise, in particular, whether relying on the Animal and Plant Health Inspection Service to regulate such activities would allow limitations to be imposed for the purpose of protecting wild marine mammals;
• clarify that permits for acquiring marine mammals for public display are not necessary in all cases because section 104(c)(2) provides alternative mechanisms for providing such authorizations, not because the Service no longer has jurisdiction over issues related to the care and maintenance of marine mammals maintained for purposes of public display;
• discuss the statutory basis for the proposal to allow certain specimen material from marine mammals exported from the United States to be imported back into the United States without obtaining a permit;
• explain how determinations will be made that marine mammals to be imported are from a source that will have the least possible effect on wild populations;
• describe the legal underpinnings for the proposal to include in each marine mammal import permit an authorization to export the animal back to the original holder, subject only to a 15-day notification requirement;
• explain the statutory basis for the proposed prohibition on releasing captive marine mammals into the wild unless authorized under a permit or pursuant to a separate regulation concerning beached or stranded animals (i.e., that the release of marine mammals into the wild constitutes a taking and, unless authorized, is unlawful);
• describe the principles that would be used to establish quotas governing the permanent removal of marine mammals from the wild and the procedures that would be followed in setting such quotas;
• indicate clearly whether the Service believes that public display permits under the Marine Mammal Protection Act can only be issued to U.S. facilities, inasmuch as they are the only facilities eligible for licensing under the Animal Welfare Act;
• clarify that a proposal to allow marine mammals collected from the wild to be maintained for up to six months in a temporary facility would be applicable only to newly captured animals and explain how such a provision would relate to the standards applicable under the Animal Welfare Act; and
• discuss how the proposed section concerning the seizure of captive marine mammals would be applicable to foreign facilities.

As of the end of 2002 the Service was continuing to review the comments received on the proposed rule to determine how best to proceed with the rulemaking.

Resolution of this issue might best be addressed through amendment of the Animal Welfare Act or the Marine Mammal Protection Act. Until this occurs, however, the Services consider

requiring a comity statement and a certification of accuracy from the foreign government, combined with a comparability recommendation from the Animal and Plant Health Inspection Service, as reasonable requirements consistent with the export provisions of the Marine Mammal Protection Act.

Application for Export Authorization

The Commission identified another issue regarding the export of marine mammals for purposes of public display in a 13 July 2001 letter to the Fish and Wildlife Service in response to an application from two Japanese public display facilities seeking authorization to capture and export sea otters from Alaska. The Commission noted that, in accordance with the review of the Marine Mammal Protection Act's export provisions conducted by the Commission, the Fish and Wildlife Service, and the National Marine Fisheries Service in anticipation of the Act's reauthorization, it has concluded that the Act authorizes the issuance of such permits. Specifically, the Commission noted that section 101(a) of the Act, which sets forth the exceptions to the Act's moratorium, specifies that permits may be issued to authorize the taking and importation of marine mammals but does not mention export permits. Similarly, section 104, the Act's permitting provision, authorizes the Services to issue permits that allow the taking and importation of marine mammals but does not include a similar authority for issuing export permits.

The Commission further noted that only a facility that is registered or holds a license under the applicable provisions of the Animal Welfare Act (7 U.S.C. § 2131 *et seq.*) can obtain a permit to take (e.g., collect from the wild) marine mammals for purposes of public display under section 104(c)(2)(A) of the Marine Mammal Protection Act. However, inasmuch as the Animal Welfare Act applies only to domestic facilities, and the licensing and registration provisions of that Act pertain exclusively to such facilities, it follows that a foreign facility cannot meet the requirements for obtaining a permit to take marine mammals for purposes of public display. The Commission noted that, although it could be argued that the licensing or registration requirement applies only to domestic facilities and that a foreign facility qualifies for a taking permit if it demonstrated comparability with the Animal Welfare Act standards, such an interpretation is at odds with the clear language of the Act and without any support in the legislative history of the 1994 amendments.

In light of these concerns, the Commission recommended that the Service work with the appropriate congressional committees to identify and correct any unintended consequences of the 1994 amendments that resulted from the addition of the prohibition on exporting marine mammals. In the meantime, however, the Commission believed that the Service had no choice but to deny the requested permit. The Service responded to the Commission by letter of 30 July 2002, indicating that the permit had been denied based on concerns regarding the status of wild stocks of northern sea otters in Alaska. In regard to the export issue, the Service indicated that it did not share the Commission's interpretation that authority to take and export marine mammals for public display does not exist under the 1994 amendments to the Act but did not provide any rationale to support that view. The Service indicated that it would continue to work with the Commission and the National Marine Fisheries Service, which agreed with the Commission's interpretation, to clarify the issue.

Interactions with Marine Mammals in the Wild

Under the Marine Mammal Protection Act, all activities involving any type of "taking" of marine mammals—including harassment—are prohibited unless somehow authorized or permitted under the Act's provisions. As discussed elsewhere in this chapter, permits and small-take authorizations are issued to authorize taking in a variety of instances. However, in many cases, members of the public do not seek or obtain any type of authorization to cover activities that may result in the taking of marine mammals, particularly taking by harassment.

Public interactions with marine mammals in the wild have greatly increased over the past several years, and there is growing evidence that such activities may be adversely affecting the animals' welfare. Such interactions typically involve close approaches to observe, photograph, pose with, touch, swim with, or otherwise interact with the

animals. Although such activities generally are not motivated by a desire to harm the animals, they can pose substantial risks to both the humans and the wild marine mammals involved. Risks to people include injury or death from being bitten, rammed, or otherwise attacked. Animals may be driven from preferred habitat, injured by people trying to touch or prod them, debilitated by inappropriate, contaminated, or spoiled food, or have their behavior changed in ways that encourage them to interact with humans and become pests. Even when no immediate injury results, marine mammals may become habituated to people and boats and, as a result, be exposed to risks they might not otherwise face. Because such human interactions have the potential to disturb or injure wild marine mammals, they, in many instances, constitute harassment under the Marine Mammal Protection Act.

In 1991 the National Marine Fisheries Service amended its regulatory definition of the term "take" to include feeding marine mammals in the wild. As such, feeding marine mammals in the wild clearly constitutes a prohibited act. The dividing line between actions that constitute a taking and those that do not in other contexts is not always so clear. This prompted the Service to develop guidelines for responsibly viewing marine mammals in the wild and to initiate a nationwide public education and outreach campaign encouraging passive viewing of wildlife from a distance.

In 1996 the Commission wrote to the National Marine Fisheries Service recommending that the Service advise both the public and those offering tours that involve approaching marine mammals that direct interactions with marine mammals that have the potential to disrupt the animals' behavioral patterns constitute harassment under the Marine Mammal Protection Act. The Commission noted that the regulatory definition of "take" includes feeding marine mammals in the wild and, as such, feeding bottlenose dolphins to attract them, or as part of a tour, clearly violates the Marine Mammal Protection Act. In May 2000, based on the results of a literature review and earlier pilot study for which it had contracted, the Commission advised the National Marine Fisheries Service that interactions with dolphins in the wild are likely to result in at least Level B harassment under the Marine Mammal Protection Act and, in some cases, could result in the death or injury of people or marine mammals. The status of interactive programs with wild marine mammals was reviewed during the Marine Mammal Commission's 10–12 October 2000 annual meeting. Based on information presented at that meeting, the Commission again wrote to the Service on 12 December 2000 recommending, among other things, that it move quickly to develop and adopt appropriate and enforceable regulations concerning human–marine mammal interactions in the wild and offering to assist the Service in developing the regulations. The Commission recommended that the regulations specify that any activity intended to enable in-water interactions between humans and dolphins in the wild constitutes a taking and is prohibited.

In July 2001, at the National Marine Fisheries Service's request, the Commission reviewed a draft policy statement designed to address inappropriate and potentially harmful interactions between the public and marine mammals in the wild. The policy would clarify that closely approaching, swimming with, touching, or attempting to elicit a response from wild marine mammals constitutes harassment as defined in the Marine Mammal Protection Act. In a 16 July 2001 letter to the Service, the Commission expressed its understanding that the Service still intends to promulgate regulations to clarify that interactions between the public and wild marine mammals constitute a taking, and acknowledged that, in the interim, the policy would provide the public with appropriate guidance as to how the statutory definition of harassment pertains to these activities.

On 30 January 2002 the Service published its policy in conjunction with an advance notice of proposed rulemaking addressing what interactions between the public and wild marine mammals constitute takings under the Marine Mammal Protection Act. Also during 2002 the Service's Office of Protected Resources continued its education and outreach efforts directed at interaction problems. These included a "Protect Dolphins" campaign, the issuance of press releases and other information through the media, and cooperative projects with the Watchable Wildlife Program (a national consortium of government agencies and conservation organizations dedicated to responsible wildlife viewing). The Service's Office of Law Enforcement also participated in education and outreach efforts, but nevertheless found it necessary to issue a number of citations for violations of the taking prohibition.

At the Commission's annual meeting in October 2002, which focused on marine mammal species occurring in waters off the U.S. West Coast, Alaska, and Hawaii, the Commission was briefed by Service representatives about interaction problems involving the public and elephant seals, sea lions, and harbor seals in California and monk seals and spinner dolphins in Hawaii.

At that time, agency representatives advised the Commission that the National Oceanic and Atmospheric Administration's Office of the General Counsel and the Service's Southwest Regional Office do not consider public harassment of marine mammals to be a priority issue and are choosing not to enforce, or to selectively enforce, the harassment provisions of the Marine Mammal Protection Act. Reasons given for assigning low priority to this issue included the effort and time required for prosecuting even simple cases (due to the likelihood of appeals, etc.), the large number of violations occurring, and the belief that prosecuting tourists who the agency believes commit most of the violations "would not do any good anyway because they are unlikely to be repeat offenders." The representatives indicated that prosecuting harassment cases is unlikely to be given high priority "until someone like Congress tells them to make it a priority."

In the exchanges at the Commission's meeting, the Commission advised the Service that, unless priority is given to this issue, supported by dedicated and consistent enforcement efforts, the measures currently being taken by some parts of the agency to address the interaction problem will continue to be ineffective. The Commission further advised the Service that it would be following up with the agency on this matter. A letter to the Service was in preparation at year's end.

Further, the Commission plans to follow up on previous correspondence to the National Marine Fisheries Service and the Fish and Wildlife Service, recommending that they initiate discussions to develop consistent guidelines for viewing and approaching the various species of marine mammals under their respective jurisdictions, and consider strengthening cooperative enforcement efforts between the two agencies and with state enforcement officers in an effort to achieve greater compliance with the laws applicable to the conservation of marine mammals. As noted in the previous annual reports, the Commission has expressed its concern to the Fish and Wildlife Service about the level of interactions between people and manatees in the Crystal River area and cited evidence that at least some manatees have altered their behavior to avoid human interference.

Chapter X

MARINE MAMMALS IN CAPTIVITY

Under the Marine Mammal Protection Act, permits to take marine mammals may be issued by the National Marine Fisheries Service or the Fish and Wildlife Service, depending on the species of marine mammal involved, for purposes of public display, scientific research, or enhancing the survival or recovery of a species or stock. In addition, the Department of Defense is authorized to take and maintain marine mammals for research and defense-related purposes under the Defense Authorization Act of 1986. Sick and injured marine mammals may also be maintained in captivity temporarily for rehabilitation aimed at their eventual return to the wild, and long-term placement in captivity is sometimes necessary when release is not possible. Amendments to the Marine Mammal Protection Act's permit provisions enacted in 1994 limited the authority of the National Marine Fisheries Service and the Fish and Wildlife Service over issues related to the supervision, care, and transportation of marine mammals maintained in captivity for purposes of public display or species enhancement. Since its inception, the Marine Mammal Commission has worked with the Services to ensure the safety and well-being of marine mammals maintained in captivity.

Care and Maintenance Standards

The Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) regulates the humane handling, housing, care, treatment, and transportation of captive marine mammals and other warm-blooded animals under the Animal Welfare Act. APHIS originally adopted standards applicable to marine mammals in 1979 and incorporated amendments in 198, and, as discussed below, in 2001.

In 1995 APHIS initiated a negotiated rulemaking to review and revise its marine mammal standards and guidelines. The Commission, the National Marine Fisheries Service, and the Fish and Wildlife Service all participated as nonvoting observers on the negotiated rulemaking committee, which was composed of representatives of the public display and animal welfare communities, affiliated professional organizations, and the government agencies. In 1996 the committee agreed on consensus language for proposed amendments to the sections of the existing regulations concerning feeding, sanitation, employees and attendants, transportation, veterinary care, general facility systems (such as water and power supplies and waste disposal), certain space requirements, and separation of animals. Consensus was not reached on the regulatory sections that address the most contentious and potentially costly issues, including special considerations regarding compliance and variances, indoor facilities (which includes provisions on ambient temperatures, ventilation, and lighting), outdoor facilities (which includes temperature and shelter requirements), space, and water quality. After considering projected costs for additional negotiating sessions, the likelihood of the committee reaching consensus on the remaining issues, and the need to extend the committee's charter, APHIS decided not to pursue the negotiated rulemaking to develop the remaining sections of the proposed rule and to use traditional rulemaking methods instead. Proposed regulations based on the consensus language were published in February 1999 and are summarized in previous annual reports. A final rule, which did not differ significantly from the proposed rule, was published

on 3 January 2001. On 30 May 2002 APHIS published an advance notice of proposed rulemaking for the remaining sections of its care and maintenance regulations and, as discussed in the following section, its current swim-with-the-dolphin regulations.

Swim-with-the-Dolphin Regulations

In 1998 APHIS published a final rule establishing standards for programs that allow members of the public to enter the water and interact with captive dolphins. Prior to enactment of the 1994 Marine Mammal Protection Act amendments, such programs had been regulated by the National Marine Fisheries Service. The rule includes standards for the humane handling, care, and treatment of cetaceans used in swim programs. Among other things, the rule establishes requirements concerning the size of enclosures in which swim programs may be conducted and sets forth standards pertaining to veterinary care programs, personnel qualifications, the handling of animals, and recordkeeping.

In response to industry complaints that the rule was overly broad, APHIS published a *Federal Register* notice on 14 October 1998 announcing that, until further notice, it would not apply certain provisions of the swim regulations to facilities that offer only wading programs, but would examine matters pertaining to these types of programs separately. Wading programs are defined as programs in which human participants interact with dolphins by remaining stationary and nonbuoyant. On 2 April 1999 APHIS published a *Federal Register* notice seeking public comment on whether there was a need to regulate wading programs.

On 30 May 2002 APHIS published an advance notice of proposed rulemaking for the remaining sections of its marine mammal care and maintenance regulations and for amendments to the current swim-with-the-dolphin regulations. APHIS specifically requested comments on—

- what components should be considered when determining space requirements for each species;
- how interactive activities involving humans and marine mammals should be regulated;
- whether allowable temperature ranges for air and water should be established for each marine mammal species;
- whether the representative average adult lengths used in the current tables should be revised;
- whether minimum pool depths for each species should be established and, if so, what those depths should be;
- whether minimum pool width or longest straight-line swimming distance is more important; and
- whether any interactive programs with humans and captive marine mammals currently exist that are not considered in the advance notice of proposed rulemaking.

The Commission had previously provided a detailed review of APHIS' marine mammal transportation, care, and maintenance standards, identifying issues that it believes need to be addressed in a revision of those standards. Accordingly, the Commission saw no need to provide comments in response to APHIS' advance notice of proposed rulemaking. It decided to defer additional comment until the agency publishes the specific standards that it is considering in the proposed rule. As of the end of 2002 APHIS had not published proposed amendments to existing marine mammal care and maintenance standards.

Reintroduction of "Keiko" to the Wild

As discussed in previous annual reports, the Free Willy/Keiko Foundation undertook a program in 1996 to rehabilitate a long-term captive killer whale named Keiko. Keiko, the killer whale featured in the movie *Free Willy*, was captured off Iceland in 1979. The animal lived in an Icelandic aquarium, a facility in Canada, and a facility in Mexico City before being moved to the Oregon Coast Aquarium in 1996 under a public display permit issued to the Foundation by the National Marine Fisheries Service. In September 1998 the Free Willy/Keiko Foundation sought authorization from the Service to return Keiko to Iceland for further rehabilitation and, if possible, eventual release to the wild. Prior to the export of the animal to Iceland, the Service advised the Foundation that, if Keiko were to be released to the wild, the ap-

proach taken would need to be comparable with that required to obtain a scientific research permit under the Marine Mammal Protection Act, including the development of a sound scientific research protocol including a monitoring plan for assessing the animal's health and welfare following release. In 1998 the Ocean Futures Society, the successor to the Foundation, advised the Service that it would obtain full scientific peer review of a reintroduction protocol. The animal was exported under a public display permit issued by the National Marine Fisheries Service upon assurance from the government of Iceland that it would afford comity to a Service enforcement decision that the requirements of the Marine Mammal Protection Act and/or the Animal Welfare Act were not being met. The Icelandic government also required that the Society obtain a scientific research permit or the equivalent thereof from Iceland's Animal Welfare Board to release the animal. Upon arrival in Iceland, Keiko was maintained in captivity in a bay near Vestmannaeyjar, off Iceland's south coast.

In late May 2000 the Society provided its reintroduction protocol to the Animal Welfare Board of Iceland, the National Marine Fisheries Service, the Marine Mammal Commission, and APHIS, as well as to several other experts. The Animal Welfare Board issued a permit authorizing Keiko's release on 9 June 2000, prior to receipt of reviewers' comments. Reintroduction efforts, which included attempting to teach Keiko to eat live fish, were conducted during the summer of 2000. After reviewing the 2000 reintroduction effort, Ocean Futures amended the protocol for the 2001 season. The Commission's comments on the initial and amended protocols are discussed in detail in the annual reports for 2000 and 2001.

Based on the results of the 2001 season, Ocean Futures concluded that the reintroduction program could take considerably longer than initially envisioned and announced that it was exploring moving Keiko to a less expensive and more accessible site in Iceland. However, reintroduction efforts continued in 2002. In August 2002 the National Marine Fisheries Service and the Commission were informed that responsibility for the reintroduction project had been returned to the Free Willy/Keiko Foundation, in partnership with the Humane Society of the United States.

Early in August 2002 the Commission learned through press releases that in late July, during a reintroduction excursion in which handlers led Keiko from his bay pen into open waters, Keiko had separated from the tracking boat, was no longer under human control, and was being tracked via radio and satellite telemetry. On 21 August the Commission received a memorandum from eight former employees of Ocean Futures Society who had worked as Keiko's handlers during previous reintroduction efforts. The former handlers expressed their concern about Keiko's welfare and the reintroduction effort, noting among other things, that—

• since leaving Icelandic waters, neither Keiko nor other free-ranging killer whales had been visually sighted in the area of Keiko's VHF signal;
• Keiko had failed to demonstrate an ability to forage independently in the wild or an ability to navigate the waters at any significant distance from the bay pen;
• the reintroduction team should have the ability to intervene and lead him to safety if necessary;
• because Keiko was no longer under human control and in unfamiliar waters, it was critical that he be closely monitored visually for a minimum of one month and by satellite and radio tag for one year;
• the animal care staff recently hired to carry out the reintroduction project lacked the long-term perspective and experience with respect to Keiko's behavior during previous reintroduction attempts and in comparison with the behavior of other killer whales; and
• problems may exist with the regulatory framework under which Keiko was being maintained because the animal was no longer in Icelandic waters.

Concerned about the animal's welfare, the Commission and the National Marine Fisheries Service subsequently requested a briefing on these developments, which was held via teleconference on 28 August 2002. Project representatives clarified that the public display permit under which Keiko is maintained continued to be held by the Free Willy/Keiko Foundation. Project representatives expressed optimism with respect to Keiko's progress during the 2002 summer season and with the animal's current status. Unlike in previous summers, Keiko consistently had chosen to spend time in the vicinity of wild killer whales. They explained that on 14 July, Keiko's satellite tag was replaced with one modified for a longer battery life. During

an excursion the following day, Keiko separated from the boat and began swimming near wild whales on the feeding ground, at which point the tracking boat withdrew. The tracking boat subsequently sighted Keiko in the presence of wild killer whales on 27 and 30 July. Throughout August, further attempts to make visual sightings were unsuccessful. However, satellite telemetry data on 9 August placed Keiko 165 miles from his bay pen in Iceland. VHF signals received on 14 August indicated his location as 1,200 miles north of the Faroe Islands. According to satellite data, between 14 and 28 August Keiko had continued to swim eastward for long distances each day. On 28 August, the day of the teleconference, he was approximately 80 to 110 miles off Norway. Diving data received since early August suggested that Keiko had been able to forage successfully. Consequently, the project leaders concluded that Keiko was successfully adjusting to life in the wild and that continued satellite tracking was not necessary.

After 27 days without a visual sighting of Keiko, on 29 August the Commission learned that Keiko was within two miles of the coast of Norway, and a team sent to Norway by the project was able to photograph and videotape the animal. After reviewing the images, the project veterinarian reported that Keiko appeared to be in good health and showed no indications of any weight loss.

On 1 September the Commission learned through the media that Keiko had arrived in a small fjord in Norway, about 250 miles northwest of Oslo, apparently after having followed a Norwegian fishing vessel into port. The whale immediately became a tourist attraction, with children and adults swimming with him, climbing on his back, and feeding him. The project team in Norway worked with the public and the Norwegian government to curtail public interactions with Keiko in an effort to avoid jeopardizing the reintroduction process. On 4 September project representatives again briefed the Commission and the Service on the team's activities and discussions with the Norwegian government. They indicated that they planned to continue to monitor Keiko's physical condition and to work with the Norwegian government to develop guidelines concerning public interactions with the whale. There were no plans at that point to transport Keiko to another area, to put him in a pen, or to feed him. Subsequently, however, the team drew blood samples and administered antibiotics in response to Keiko's observed listless behavior. The team also began feeding the animal when it appeared that he was not eating wild fish.

In October the Commission learned that the project had received permission from the Norwegian government to relocate Keiko to Taknes Bay, approximately 200 miles north of Oslo. The new location was considered to be an excellent site for the reintroduction program because it is protected from winter ice and severe weather conditions, is less accessible to the public, and provides good access to wild killer whales when they arrive in the area to feed on herring during January, February, and March. According to project representatives, the local community enthusiastically supported maintaining Keiko in Taknes Bay, and because he was still being fed, local fishermen were willing to provide a steady source of herring. Project representatives stated that Keiko will be kept active through excursions and physical conditioning sessions and will be given some opportunities to feed on his own, which he does not yet do reliably. When the wild whales arrive in early 2003, reintroduction efforts will resume. The Commission continues to have concerns about Keiko's ability to survive in the wild, including his ability to forage on his own and to integrate with other wild killer whales. The Commission will continue to be involved in monitoring this issue during 2003.

Polar Bear Traveling Exhibit, Suarez Brothers Circus

As discussed in the Commission's previous annual report, the Fish and Wildlife Service, in consultation with APHIS, issued a permit to the Circo Hermanos Suarez (Suarez Brothers Circus) on 3 May 2001 to import seven captive polar bears from Jamaica to Puerto Rico for purposes of public display as part of a traveling exhibit. In commenting on the application, the Commission had raised several questions about the applicant's arrangements for transport and maintenance of the animals and apparent discrepancies and inaccuracies in the applicant's inventory information and documentation required under the Convention on International Trade in Endangered Species of Fauna and Flora (CITES) provided with the application. The Commission had also expressed con-

cern about the appropriateness of maintaining polar bears in an outdoor facility in a tropical climate. The Commission had recommended that, before issuing a permit to the Circus, the Fish and Wildlife Service, in consultation with APHIS, obtain additional information concerning the adequacy of the facility and its animal care program, and, if necessary, reinspect the facility to ensure that the applicant's arrangements for the transport, care, and maintenance of the animals meet the applicable requirements and provide for the health and well-being of the bears. The Commission also recommended that APHIS, in consultation with independent veterinarians experienced in captive marine mammal care and maintenance, review the appropriateness of maintaining polar marine mammals in outdoor tropical environments and, if appropriate based on the results of that review, revise its standards accordingly. However, many of the Commission's recommendations were not included in the permits issued by the Fish and Wildlife Service or acted on by APHIS.

When the bears arrived in Puerto Rico late in May 2001, inspections conducted by APHIS revealed several areas of noncompliance with applicable Animal Welfare Act regulations. Among other things, the APHIS reports indicated that—

• the bears were provided only limited access to pools of water;
• water quality of the pools was apparently not being monitored;
• water temperature in the pools exceeded 80 degrees;
• mechanical ventilation or cooling was lacking or unused;
• the structural strength of the bears' primary enclosures was inadequate; and
• the animals, one of which had a fungal-like skin condition, had not been examined by the attending veterinarian.

Throughout 2001 the Commission, the Fish and Wildlife Service, and APHIS exchanged letters regarding the condition of the bears, the facility's compliance with the requirements of the permit, and the underlying statutory provisions. In letters of 29 June 2001 and 13 July 2001 to the Fish and Wildlife Service and APHIS, respectively, the Commission urged the Service and APHIS to take necessary measures to ascertain the health and welfare of the bears and force the owners to improve the bears' living conditions and the level of care being provided.

After reinspecting the facility APHIS informed the Commission by letter of 20 July 2001 that—

• it was making continuing efforts to ensure that the Circus satisfactorily addressed the identified problems to bring the facility into compliance;
• an inspection conducted in late June 2001 had found the facility to be in compliance;
• it had no documented evidence that polar bears cannot be maintained humanely in warm environments, noting that the health and well-being of polar bears being housed at southern U.S. facilities did not appear to be adversely impacted.

In late August 2001 the Puerto Rico Department of Natural Resources reported that the bears had been maintained in a transport vehicle for 24 hours in very poor conditions and high temperatures while the Circus was moving to San Juan. Puerto Rican officials subsequently filed charges against the Circus for two violations of Puerto Rico's animal protection laws. In early March 2002 the presiding judge acquitted the Circus of those charges.

In October 2001 the Commission wrote to APHIS and the Fish and Wildlife Service recommending, among other things, that APHIS, in consultation with the Fish and Wildlife Service, undertake an immediate inspection of the facility by government and independent experts. Details of that letter are discussed in the Commission's 2001 annual report.

In November 2001 the Fish and Wildlife Service informed the Commission that APHIS had advised the Service that, although the Suarez Brothers Circus had been "... cited on occasion for noncompliance, the problems identified have been promptly corrected." The Service said it would continue to monitor the information received from APHIS regarding the Circus' compliance with the requirements of the Animal Welfare Act. The Fish and Wildlife Service further noted that it had opened an investigation concerning the origin and identity of one of the Circus' bears and, if it appeared that violations of federal wildlife laws had occurred, it would refer the case for review and possible prosecution. Despite these assurances, the Commission continued to question the conditions under which the bears were being maintained.

In early 2002 the Commission learned that the Circus was planning to request authorization from the Fish and Wildlife Service to export the animals from Puerto Rico. On 8 February 2002 the Commission wrote to the Service requesting assurance that the Commission would be consulted before the issuance of any CITES permit or other approval that would authorize export of the polar bears from Puerto Rico. The Commission noted that one of the issues yet to be fully resolved was whether the marine mammal inventory and CITES documentation provided with the facility's original permit application were accurate. The Commission requested that the Fish and Wildlife Service provide an update as to—

• where the Service's enforcement investigation stood (i.e., whether it was still ongoing and, if so, when it was expected to be completed);
• what issues the Service was investigating;
• which issues concerning the discrepancies noted by the Commission and others remained outstanding and which had been resolved;
• the specifics of any such resolution (what information was reviewed and what conclusions were reached); and
• what additional steps, if any, the Fish and Wildlife Service planned to take with respect to these issues.

On 21 March 2002 the Commission forwarded to the Fish and Wildlife Service a copy of a letter it had received from Dr. Pedro Nuñez, a private-practice veterinarian who had assisted Service personnel in obtaining hair and bucal/saliva samples from the polar bears. The Commission noted that in his letter, Dr. Nuñez discussed his on-site observations of the bears and his concerns about the animals' welfare. The Commission further noted that Dr. Nuñez' observations appeared to confirm several of the Commission's concerns.

On 29 March 2002 the Commission responded to questions concerning the Suarez polar bears that had been posed by members of the House Subcommittee on Fisheries Conservation, Wildlife, and Oceans following an 11 October 2001 hearing on the Marine Mammal Protection Act. Before its transmittal to Congress, the Commission's response was cleared by the Office of Management and Budget. The Subcommittee noted that the issue with the Suarez Circus polar bears had brought to light problems concerning traveling facilities that display marine mammals and with the administrative performance of APHIS and the Fish and Wildlife Service. The Subcommittee therefore requested (1) the Commission's position on the issue; (2) the Commission's opinion as to whether APHIS or the Fish and Wildlife Service has sufficient regulatory ability under the Marine Mammal Protection Act or the Animal Welfare Act to seize the bears; (3) what the Commission believes the two Services should be doing to ensure the humane care and treatment of the bears; and (4) what regulatory errors the Commission believes occurred in the licensing or permitting of the Circus that allowed the animals to be imported into the United States.

The Commission's response noted that —

(1) The Commission remained concerned about care being provided to the Suarez Circus polar bears. If reports and videotapes provided to the Commission by animal welfare groups accurately portray the conditions under which the animals are being maintained, it appears that either the Circus has failed to meet the applicable care and maintenance standards or the "minimum standards" promulgated by APHIS are too minimal to accomplish the stated goal of the Animal Welfare Act. In this regard, the Commission explained that—

• the controversy concerning the bears' care and maintenance underscores problems with relying on subjective standards to measure compliance under the Animal Welfare Act (e.g., what constitutes acceptable temperature ranges for marine mammals);
• steps had not been being taken to determine whether the Circus was complying with the requirements concerning facility temperatures during those times when inspectors were not present. There apparently was no heightened requirement for the facility to demonstrate ongoing compliance even after repeated problems had been documented; and
• questions remained as to the adequacy of the Circus' veterinary program and the appropriateness of its training methods. As a related matter, APHIS' dismissal of the Commission's request for copies of the bears' medical records failed to recognize the oversight function and unique role of the Commission concerning activities of federal agencies pertaining to marine mammals;

(2) Both APHIS and the Fish and Wildlife Service can, under their respective authorities, seize animals under certain circumstances. However, APHIS had indicated that their inspector had "not observed signs of animal suffering that would prompt confiscation of the animals." Neverthe-

less, the Commission noted, section 104(e) of the Marine Mammal Protection Act arguably provides sufficient authority for the Fish and Wildlife Service to seize animals if their health or welfare is jeopardized by a facility's noncompliance with care and maintenance standards before completing the procedures for revoking a permit.

(3) The most crucial thing that APHIS should be doing to determine the adequacy of the Circus' care and maintenance program would be to conduct an unannounced, interagency inspection involving APHIS, the Fish and Wildlife Service, the Commission, and appropriate outside experts. In addition, APHIS needed to take steps to enhance its ability to monitor compliance by the Circus during those times when its inspectors are not present; review the appropriateness of maintaining polar marine mammals in outdoor facilities in tropical environments; set specific performance criteria with respect to allowable temperatures for the maintenance of the Suarez polar bears; and clarify its position concerning the legality and appropriateness of using training methods that involve the striking or prodding of the animals. The Commission also identified the need for the Fish and Wildlife Service to bring its investigations of the identities and origins of the Suarez Circus bears to a swift conclusion and take any remedial action that might be warranted.

(4) In the Commission's view, there were at least two things that the reviewing agencies should have done before authorizing the importation of the Suarez Circus polar bears that were not done. The Fish and Wildlife Service should have done more to resolve questions concerning the accuracy of the CITES documentation and the identities and origins of the bears. APHIS should have made a more concerted effort to ascertain compliance with all aspects of the applicable care and maintenance requirements at the outset, including a review of the facility's plans for maintaining temperatures within an acceptable range and for providing veterinary care.

On 27 March 2002 the Fish and Wildlife Service published notice in the *Federal Register* that the Suarez Circus had applied for a CITES permit to reexport the polar bears. On 28 March 2002 the Commission staff advised the Fish and Wildlife Service that, although the Commission did not routinely review such permits, in this instance it was interested in reviewing the application. However, because the information provided was incomplete, the Commission could not begin its review.

On 8 April 2002 the Fish and Wildlife Service responded to three of the Commission's previous letters (29 June 2001, 4 October 2001, and 8 February 2002), all of which are discussed in the previous annual report. Key issues the Service addressed were (1) the agencies' views on the credibility and use of information supplied by the public, nongovernmental organizations, and scientists; (2) the timing and format in which the Commission's positions on broad policy issues are delivered; and (3) the agencies' respective roles and responsibilities concerning permitting under the Marine Mammal Protection Act.

In its response to the Commission's 29 June 2001 letter, which had requested clarification from the Fish and Wildlife Service regarding its consultative process with APHIS and steps taken by the applicant (i.e., the Suarez Brothers Circus) to clarify numerous discrepancies in inventory and CITES documentation, the Service noted that—

• the Fish and Wildlife Service recognizes and supports APHIS authority as the implementing agency for the Animal Welfare Act and its expertise in evaluating the ability of a licensee to provide for the adequate care and maintenance of marine mammals. Based on consultations with APHIS, the Fish and Wildlife Service was satisfied that the Circus could adequately provide for the care and maintenance of the animals.

• discussions concerning the Circus' pending application and compliance issues had occurred on several occasions at monthly interagency meetings. Inspection reports concerning the Circus' compliance with Animal Welfare Act provisions should be requested directly from APHIS;

• before issuing the permit authorizing importation of the bears, the Fish and Wildlife Service had requested and received additional information from the Circus concerning CITES documentation and the origins of the bears. This information led the Service to conclude that the information was adequate to determine that the animals were obtained in a manner consistent with the requirements of the Marine Mammal Protection Act.

Concerning the Commission's letter of 4 October 2001, which had expressed concerns about the origin of the bears, the care and maintenance of the bears by the Circus, and whether the Circus was providing an education or conservation pro-

gram as required by the Marine Mammal Protection Act, the Service noted that—

• the Service has continued to consult, on both a formal and informal basis, with APHIS. APHIS considered the Circus to have satisfactorily corrected previous problems concerning noncompliance with the applicable Animal Welfare Act standards.

• had the Circus been found guilty of violating Puerto Rican animal protection laws, the Fish and Wildlife Service would have addressed the violation appropriately. However, the judge found the Circus not guilty of that charge.

• the Fish and Wildlife Service's Division of Law Enforcement had investigated the Circus's performance to evaluate the conservation program being offered. Based on that evaluation, the Service requested and received additional information from the Circus concerning its conservation and education program. Subsequent complaints concerning the consistency of the Circus' conservation message with the public display permit requirements of the Marine Mammal Protection Act had prompted the Service to continue to investigate the matter.

• the Fish and Wildlife Service must base its actions on information that can be reasonably substantiated as fact. In this regard, based on specific information provided and questions raised by Zoo Atlanta in July 2001, the Service initiated an investigation into the identity of one of the Circus' bears. This led to the bear being seized by the Service when it was learned that the bear in question was not that claimed by the Circus. In contrast, the Service did not believe that the information submitted by animal rights groups was sufficient to prompt an investigation.

• the Service, in consultation with APHIS, continues to monitor the activities of the Circus.

In regard to the Commission's 8 February 2002 letter, which had raised several concerns regarding the Circus' application for a permit to authorize reexport of the bears, the Fish and Wildlife Service stated that—

• the Circus' re-export application would be reviewed, and a determination made, based on criteria for a CITES reexport certificate and consistent with the Service's regulations and applicable comity requirements.

• as discussed at interagency liaison meetings, the Service believed that the CITES certificate from Jamaica, under which import had been allowed, had inaccurately recorded original CITES information regarding some of the animals. The Service believed that these inaccuracies reflect a problem with the issuance of certificates associated with the movement of the animals through several different countries and not, per se, false documentation.

• the Service was waiting for receipt of additional clarifying information before taking final action on the reexport application. The Service also provided the Commission with a copy of the Circus' amended CITES application and a copy of the Service's letter to the Circus requesting additional information in support of the application.

On 7 August 2002 the Fish and Wildlife Service provided the Commission with the information the Suarez Brothers Circus had submitted in support of its application for a CITES reexport certificate. The Commission commented on the reexport permit request on 11 September 2002. The Commission noted that a crucial consideration in determining whether or not to issue a CITES reexport permit was whether the applicant had made a sufficient showing that the bears had been acquired lawfully. The Commission believed that heightened scrutiny of the information submitted was appropriate, inasmuch as one of the bears imported by the Circus had already been conclusively determined not to be the bear it was purported to be in the original application. The Commission noted that specific information as to how that misidentification occurred would be useful in determining the likelihood that there may be other misrepresentations concerning the identities and origins of the other bears maintained by the Circus. Other concerns identified by the Commission included—

• the lack of source information (e.g., bills of sale, wills, or other contemporaneous documentation) for some, if not all, of the referenced transactions;

• the lack of CITES permits for each of the transactions that involved export of the bears from other countries;

• uncertainty as to whom two bears had been sold or transferred in the 1980s;

• notarized statements of transfers that contained no indications of the bears' identities; and

• an explanation of the basis for changes that had been made to the Jamaican CITES reexport certificate issued in 26 May 2001.

The Commission requested that the Fish and Wildlife Service provide it with a copy of a document sent to the Service from the Canadian government on 5 July 2002 that apparently raised additional questions concerning the identities of two bears exported from Canada to Germany during the 1980s. The Commission also requested that it be sent any other documents relevant to the bears' origin or chain of ownership that had not yet been provided, noting its belief that additional, contemporaneous documentation was needed to validate the identities of the animals and to meet the regulatory permit issuance criteria. The Commission suggested that, absent a sufficiently documented chain of custody establishing the animals' identities, genetic analyses be conducted and age estimates made to determine if glaring inconsistencies existed between those results and the Circus' claims of the bears' origins. The Commission also suggested that the animals be examined to determine if they have mouth tattoos or other markings that may help identify or help trace their origins.

In addition, the Commission expressed concern about the Circus' ability and commitment, as the recipient facility (in this case the Circus would be both the exporting and receiving facility), to meet two of the comparability requirements of the Marine Mammal Protection Act — that it continue to meet care and maintenance standards that are comparable with those applicable to U.S. facilities under the Animal Welfare Act, and that it offer an adequate educational or conservation program. With respect to these requirements, the Commission noted that the Circus had had a spotty record of compliance with APHIS regulations while in the United States and did not initially come into compliance with those regulations until additional equipment (e.g., chillers and fans) had been obtained. The Commission noted that it was not clear that all of this equipment would accompany the facility when it leaves Puerto Rico. Therefore, the Commission recommended that the Fish and Wildlife Service ascertain precisely what arrangements had been or would be made to ensure that the air and water temperatures within the facility will be maintained at acceptable levels if the bears are exported. As for the requirement that educational materials be provided to the public by the Circus, the Commission noted that it was not clear whether the Circus intended to continue to provide such materials if the bears were exported or when the current supply of brochures was exhausted or whether the Circus would obtain copies of the educational materials in languages other than Spanish. The Commission recommended that the Service ascertain the Circus' plans in this regard and obtain the necessary assurances that appropriate materials would be provided to the public on an ongoing basis.

More generally, the Commission requested the Service to indicate (1) whether it agreed that meeting the comparability requirements of section 104(c)(9) of the Marine Mammal Protection Act is a continuing obligation that the Circus would need to meet if the bears were exported and, if so, (2) what steps it intended to take to ensure that the Circus continued to meet those requirements.

Of more immediate concern, the Commission questioned whether the Circus, which was at that time traveling in St. Thomas (U.S. Virgin Islands) and St. Maarten (Netherlands Antilles) without the bears, was continuing to "maintain facilities for the public display of marine mammals that are open to the public on a regularly scheduled basis ..." as required by the Marine Mammal Protection Act.

In view of these concerns, the Commission concluded that the documentation provided by the Circus fell short of that necessary to make the required findings under the Fish and Wildlife Service's regulations.

In late October 2002 the Commission was contacted by an attorney from the U.S. Attorney's Office in Puerto Rico who had accompanied local Department of Natural Resources officers on a visit to the Circus' facility in Yabucoa, Puerto Rico, where the bears were being maintained while the Circus was touring other islands in the Caribbean. The attorney alleged that the animals were living in "a deplorable state." She noted, among other things, that the animals' skin was broken as a result of fleas and ticks, the bears were being maintained in a very small tent with a mud floor, and ducks and stray dogs were allowed to wander in and out of the tent. She indicated that consultations between the Department of Justice and the Fish and Wildlife Service's Division of Law Enforcement were under way to explore options available for addressing the situation.

Rather than relying on second-hand information as to the conditions under which the bears were being maintained, the Commission, on 5 November 2002, sent a member of its Committee of

Scientific Advisors with experience as a polar bear curator to meet with Fish and Wildlife Service enforcement agents and to visit the Yabucoa site. He reported the existence of substandard conditions and practices and believed the situation at the facility to be unsuitable. He identified several reasons why he thought the situation was not likely to improve and had the potential to get significantly worse. He reported that the chilling system for the tent and pools had apparently been malfunctioning and that the system might be removed because of the facility's nonpayment to the company that owned it. Without this cooling equipment, the bears would be exposed to what he considered to be intolerable temperatures for polar bears. He also noted that, if a bear were to become seriously ill, there was no demonstrated ability for the facility to isolate it from direct exposure to the other bears unless the transport cage were used to house only the sick animal, requiring the other bears to be kept in the tent enclosure the entire time. The Commission provided the report to the Fish and Wildlife Service on 6 November 2002.

That same day, the Commission learned that Fish and Wildlife Service enforcement officers had seized the bears because of several alleged violations of the Marine Mammal Protection Act and the applicable permit, including the failure to provide a public display facilitiy open to the public on a regularly scheduled basis; failure to provide educational materials to the public, and failure to maintain the bears in humane and healthful conditions. At the time of the seizure, a team of veterinarians was on site to examine the animals and administer any necessary medical treatment. On 19 November 2002 the bears, accompanied by a bear expert from the American Zoo and Aquarium Association and a veterinarian, were flown to their eventual destinations at three accredited U.S. mainland zoos. One bear died in transit. The American Zoo and Aquarium Association is performing a necropsy to identify the cause of death. Those results were pending at year's end. The other five bears were reported to be gaining weight and doing well in their new zoos.

Appendix A

MARINE MAMMAL COMMISSION RECOMMENDATIONS IN 2002

3 January	Commerce, commenting to the National Marine Fisheries Service on a request from the California Department of Transportation for authorization to take small numbers of California sea lions, Pacific harbor seals, and gray whales by harassment incidental to construction to replace the east span of the San Francisco-Oakland Bay Bridge; concurring with the Service that small numbers of these species are likely to be taken by harassment and that such take is likely to be negligible; and agreeing that the authorization should be granted, provided that all reasonable measures are taken to ensure the least practicable impact on the species and that visual monitoring prior to and during pile-driving operations will be adequate to detect all marine mammals within the safety zone.
7 January	Commerce, public display permit, Funtime, Inc., d/b/a Six Flags Worlds of Adventure.
14 January	Commerce, photography/filming permit, Daniel J. Cox.
23 January	Interior, permit to import one polar bear mount for the purpose of public display, The Newark Museum.
23 January	Commerce, commenting to the National Marine Fisheries Service on cooperative management of marine mammals in Alaska; noting that, based on presentations at the Commission's 2001 annual meeting, significant progress has been made but that a lack of funding seems to be a central issue for most management efforts; noting that a number of areas are in need of further development; recommending that the Service work with Alaska Native organizations to develop and implement a cooperative agreement for ice seals; recommending that Service scientists work closely with Native hunters and Native organizations to develop and expand biosampling efforts and address questions related to the conservation of walruses, harbor seals, and ringed seals; and encouraging the Service and Alaska Native organizations to learn from existing, co-management models.
30 January	State of Hawaii, commenting to the Hawaii Division of Aquatic Resources on the proposed adoption of administrative rules to designate state waters in the Northwestern Hawaiian Islands as a marine fisheries management area; supporting adoption of the proposed rules; recommending that the rules specify that management actions within state waters be as consistent as possible with those of the National Reserve; recommending that ecosystem management be based on a precautionary management approach implemented through close cooperation between the Division and the federal agencies responsible for the region's two National Wildlife Refuges and the Coral Reef Ecosystem Reserve; and suggesting that the language on prohibited activities be expanded to include a prohibition on the intentional discharge of any waste materials other than cooling waters or engine exhaust.
7 February	Commerce, amendment of scientific research permit, James Harvey.
7 February	Interior, scientific research permit, Charles Grossman, Xavier University.
15 February	Commerce, amendment of scientific research permit, Northeast Fisheries Science Center.
19 February	Environmental Protection Agency, commenting on the agency's intent to develop regulations under the Clean Water Act on standards for cooling water intake structures at existing facilities; expressing concern about the possible effects on endangered Florida manatees; recommending that the regulations include a

provision to defer requirements for Florida power plants that attract substantial numbers of manatees to their outfalls if compliance would significantly alter or disrupt thermal discharges during winter months until a plan of action has been developed to ensure that Florida manatees would not be significantly affected by power plant alterations; and recommending that the agency initiate consultations with the Fish and Wildlife Service pursuant to section 7 of the Endangered Species Act and prepare an environmental impact statement on the proposed regulations.

5 March — Commerce, scientific research permit, Jennifer Moss Burns.

6 March — Commerce, authorization to transfer animals to the U.S. Navy pursuant to the National Defense Authorization Act of 1986.

11 March — Commerce, commenting to the National Marine Fisheries Service on a request from the U.S. Coast Guard seeking authorization to take small numbers of harbor porpoises, killer whales, Dall's porpoises, harbor seals, California sea lions, and elephant seals incidental to collecting marine seismic reflection data in the Straits of Georgia region of Washington State; concurring with the Service that only small numbers are likely to be taken by harassment and that such take is likely to be negligible; agreeing that the authorization should be granted provided that the monitoring program is carried out as described in the application, and that, if there is any indication that animals are being adversely affected, air gun transmissions be suspended while the Service considers whether authorization under section 101(a)(5)(A) of the Marine Mammal Protection Act is needed.

20 March — Commerce, permit to import one beluga whale for the purpose of public display, Sea World, Inc.

22 March — Commerce, commenting to the National Marine Fisheries Service on the draft "Status Review of Southern Resident Killer Whales (*Orcinus orca)* from the Pacific Northwest"; agreeing with the Service's biological review team that the southern resident population of killer whales is a reproductively discrete population; noting that the biological review team was unable to resolve whether the population constitutes a distinct population segment; recommending that the draft status review be expanded to consider other criteria for significance as indicated by (1) the findings of Congress when it passed the Endangered Species Act and (2) the stated purpose of the Act, including an analysis of the ecological significance of the population to the marine ecosystems of the northeast Pacific; and recommending that the Service act in a precautionary manner to ensure the recovery and conservation of the southern resident killer whale population.

25 March — Commerce, permit to import two killer whales for the purpose of public display, Funtime, Inc., d/b/a Six Flags Worlds of Adventure.

2 April — Commerce, amendment of scientific research permit, Daniel Costa.

2 April — Commerce, scientific research permit, Jennifer A. Hurley.

3 April — Commerce, commenting to the National Marine Fisheries Service on a proposed rule concerning public display permits under the Marine Mammal Protection Act; expressing support for adoption as final regulations with certain exceptions; noting that the proposed rule is confusing and fails to adequately address several important issues, particularly with respect to the export of marine mammals; and encouraging the Service to work with interested parties to design a system that assures that marine mammals exported from the United States will be well cared for while maintained in captivity, that more realistically reflects the ability of the Service and other U.S. agencies to identify and correct problems at foreign facilities, and that avoids creation of unnecessary barriers to the exchange of marine mammals among qualified facilities.

15 April — Commerce, commenting to the National Marine Fisheries Service on a request from the Department of the Air Force on behalf of the Boeing Company seeking authorization to take small numbers of Pacific harbor seals by harassment incidental to activities related to the Delta IV/Evolved Expendable Launch Vehicle (EELV) at Vandenberg Air Force Base, California; concurring with the Service that only small numbers are likely to be taken by harassment and that such take is likely to be negligible, provided that (1) all reasonable measures are taken to ensure the least practicable impact on harbor seals and any other species that might be disturbed during the activities, and (2) mitigation and monitoring activities are carried out as described in the Service's *Federal Register* notice and the application; and recommending that the Service assess

whether the monitoring required as a condition of this authorization and other authorizations concerning Delta Mariner vessel operations and maintenance dredging activities will be adequate to detect possible non-negligible cumulative effects.

26 April — Interior, commenting to the Minerals Management Service on the draft "Programmatic Environmental Assessment for Geological and Geophysical Exploration for Mineral Resources on the Gulf of Mexico Outer Continental Shelf"; noting that the document provides an excellent summary and analysis of available information on the marine mammal fauna of the northern Gulf of Mexico and the effects of anthropogenic sound on marine mammals; noting, however, that the document does not provide an adequate basis for concluding that (1) geological and geophysical activities, by themselves and in combination with other exploration and development activities, will have negligible effects on marine mammal stocks in the Gulf of Mexico or (2) the proposed mitigation measures will be adequate to insure that any effects on marine mammals will be negligible; suggesting that significance criteria set forth in the draft environmental assessment be reviewed and clarified to ensure that they address the intents and provisions of the National Environmental Policy Act and the Marine Mammal Protection Act; and suggesting that (A) a power analysis be conducted to determine whether periodic aerial surveys and/or surveys from vessels carrying out acoustic surveys would be capable of detecting non-negligible, population-level changes caused by exploration or development activities in the northern Gulf; (B) the Service consult with the National Marine Fisheries Service and the oil and gas industry on the design, funding, and implementation of an appropriate monitoring program; and (C) the Service modify the environmental assessment accordingly and include in the monitoring program the measures necessary to assure that oil and gas exploration and development activities in the northern Gulf of Mexico have negligible effects on marine mammals.

29 April — Interior, permit to import polar bear parts for the purpose of scientific research, Annalisa Berta, San Diego State University.

29 April — Commerce, commenting to the National Marine Fisheries Service on a request from the U.S. Geological Survey seeking authorization to take small numbers of marine mammals by harassment incidental to collecting marine seismic reflection data off southern California; concurring with the Service that only small numbers of marine mammals are likely to be taken by harassment and that such take is likely to be negligible; recommending that, before authorizing taking incidental to nighttime operations, the Service consult with the applicant to ensure that any marine mammals approaching or entering the designated safety zone around the sound source can be detected in time to stop operations; the Service require that marine mammal approaches closer than the proposed safety zones be monitored and that the sound source be shut down if the animals show signs of distress; and the applicant be required to identify the species and numbers of marine mammals observed approaching and entering the designated safety zones during the day and during the night in the initial and final reports.

29 April — Commerce, commenting to the National Marine Fisheries Service on a request from the Alberta Energy Company Ltd. Oil and Gas, USA, Inc., for authorization to take small numbers of bowhead whales, beluga whales, gray whales, killer whales, harbor porpoises, ringed seals, bearded seals, spotted seals, polar bears, and walruses (authorization being requested from the FWS) by harassment incidental to (1) moving a steel drilling caisson from Port Clarence, Alaska, through the Bering Strait to the McCovey Prospect in the Beaufort Sea, (2) refueling and re-supplying the caisson at the McCovey Prospect, and (3) conducting exploratory drilling activities during the winter at the McCovey Prospect; concurring with the Service that only small numbers of marine mammals are likely to be taken by harassment and that such take is likely to be negligible, provided that the Service is satisfied that the proposed mitigation and monitoring activities will be adequate to detect marine mammals in the vicinity of the proposed operations and ensure that marine mammals are not being taken in unanticipated ways or numbers; and require the applicant to develop an on-ice seal monitoring plan for the exploratory drilling phase of the proposed operations; and ensure that the plan is adequate to (1) identify the locations of seal lairs and other structures within a specified distance of the drilling operations and support activities and (2) to determine if the proposed drilling activities result in unanticipated disturbance of seals or seal habitat.

8 May — Commerce, commenting to the National Marine Fisheries Service on a request from the American Petroleum Institute seeking authorization to take by harassment small numbers of bottlenose dolphins and spotted dolphins incidental to the removal of oil and gas drilling and production structures in the Gulf of Mexico; concurring with the Service that the proposed activity will likely take only small numbers of dolphins by harassment and that such taking, during the one-year period of the authorization, will likely

have only a negligible impact on the species, provided that the removals are done as described in the application and that no animals are present within the ranges at which tissue and hearing damage could occur when explosives are used; and recommending that the Service's final regulations clarify that detonations be postponed if any one of three monitoring methods (aerial, shipboard, or subsurface surveillance) is precluded by weather and/or sea conditions.

10 May — Commerce, commenting to the National Marine Fisheries Service on a request by the California Department of Transportation seeking authorization to take small numbers of Pacific harbor seals incidental to seismic retrofitting of three bridges spanning Humboldt Bay in Humboldt County, California; concurring with the Service that (1) only small numbers of harbor seals are likely to be taken by harassment, (2) the short-term impact of pile-driving and associated activities should result in no more than a temporary modification in the behavior of harbor seals, and (3) the proposed action will have a negligible impact on Pacific harbor seal populations in Humboldt Bay and along the California coast; recommending that, prior to issuing the authorization, the Service obtain clarification from the applicant concerning plans to monitor and mitigate certain pile-driving noise and be satisfied that visual monitoring prior to and during pile-driving operations is adequate to detect all marine mammals within the project safety zone; and reiterating the Commission's concern that an across-the-board redefinition of temporary threshold shift as constituting level B harassment inappropriately dismisses possible injury that can result from repeated or long-term exposure to such sounds.

14 May — Commerce, commenting to the National Ocean Service on the draft "Hawaiian Islands Humpback Whale National Marine Sanctuary Management Plan"; recommending that the draft plan be adopted subject to modifications based on public and agency comments; the sanctuary managers, in consultation with the National Marine Fisheries Service, revise the existing whale-watching regulations for the sanctuary and adjacent waters off Hawaii to incorporate restrictions on vessel speeds near humpback whales; the draft plan be revised to accelerate the schedule for considering other marine resources, including Hawaiian monk seals, that might be added to the scope of sanctuary management; the draft plan be expanded to include provisions for developing a voluntary code of conduct for responsible whale-watching by commercial operators using sanctuary waters; and the description of activities to enhance communication between scientists, managers, and user groups be expanded to include annual meetings of researchers and managers to exchange information.

17 May — Commerce, commenting to the National Ocean Service on the draft "Reserve Operations Plan for the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve"; recommending that the final plan (1) incorporate all comments made by the Advisory Council for the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve on the February 2002 draft plan, (2) emphasize the purposes of the Reserve as stated in Executive Order 13178, (3) include conservation and recovery of Hawaiian monk seals as a prominent feature, (4) establish a strategy to deal expeditiously with the regulation and enforcement of activities that occur within the Reserve and in adjacent conservation areas, and (5) provide a more complete and detailed strategy to address research and monitoring activities within the Reserve.

23 May — Commerce, commenting to the National Ocean Service on the key issues to be addressed in converting the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve into a National Marine Sanctuary; recommending that (1) any action to designate the Reserve as a National Marine Sanctuary, include the precautionary management principle and the other management provisions set forth in Executive Order 13178, and (2) during the process of considering National Marine Sanctuary status for the Reserve, the Service (a) address jurisdictional boundary issues with the State of Hawaii and the U.S. Fish and Wildlife Service and logistical and resource needs, (b) develop and implement a plan to assess and monitor marine resources, (c) establish a cooperative interagency agreement with the involved federal and state management agencies, and (d) develop management measures concerning the activities of researchers and visitors to the Northwestern Hawaiian Islands.

30 May — Commerce, scientific research permit, Northwest Fisheries Science Center.

30 May — Commerce, scientific research permit, National Marine Mammal Laboratory.

30 May — Interior, renewal of scientific research permit, Alaska Science Center, U.S. Geological Survey.

31 May — Commerce, recommending to the National Marine Fisheries Service the temporary closure of the Great South Channel right whale critical habitat area to gillnet and lobster fishing to protect an exceptionally large

	concentration of feeding North Atlantic right whales.
12 June	Commerce, amendment of scientific research permit, Terrie Williams, Long Marine Laboratory.
12 June	Interior, scientific research permit, Charles Grossman, Xavier University.
26 June	Commerce, amendment of scientific research permit, Peter L. Tyack.
26 June	Interior, offering general comments to the U.S. Fish and Wildlife Service on the Service's draft stock assessment reports for the Pacific walrus, polar bear (two stocks), and Alaska sea otter (three stocks).
26 June	Commerce, authorization to continue scientific research after the accidental death of a beluga whale, National Marine Mammal Laboratory.
28 June	Interior, commenting to the U.S. Fish and Wildlife Service on a proposed rule to establish a process for issuing exemptions to those involved in regulated activities in the Barge Canal manatee refugee in Brevard County, Florida, noting that the proposed regulations seem to be inappropriate and would send a conflicting message to the regulated public on the importance of previously adopted refuge regulations; recommending that (1) the use of any technological device (e.g., acoustic beams or side-scan sonar) to detect manatees in the Barge Canal be contingent on its demonstrated effectiveness, (2) the public be allowed a full opportunity to review mitigation measures that would be in place to protect manatees under a proposed exemption, (3) the public be given an opportunity to comment on any terms and conditions that would be applicable under an exemption; and (4) any exemption be revoked if it is determined that there is more than a negligible risk of taking manatees or impeding recovery of the species.
28 June	Commerce, amendment of scientific research permit, Sam H. Ridgway.
2 July	Commerce, scientific research/photography/video permit, Andrew R. Szabo.
2 July	Interior, scientific research permit, Hubbs-Sea World Research Institute.
2 July	Interior, scientific research permit, Diedrich Beusse.
10 July	Commerce, providing nominations to the National Marine Fisheries Service for memberts of expert panels to review certain aspects of the Service's research on the effects of chase and encirclement of dolphins in the eastern tropical Pacific tuna fishery.
16 July	Commerce, amendment of scientific research permit, Leszek Karczmarski.
16 July	Interior, amendment of scientific research permit, Iskande L. V. Larkin.
24 July	Commerce, commenting to the National Marine Fisheries Service on the draft 2002 stock assessment reports for marine mammals in the U.S. Atlantic, Pacific, and Alaska regions.
26 July	Interior, amendment of scientific research permit, Biological Resources Division, U.S. Geological Survey, Santa Cruz, California.
2 August	Commerce, commenting to the National Marine Fisheries Service on the "Environmental Assessment on the Effects of the National Marine Fisheries Service Permitted Scientific Research Activities on Threatened and Endangered Steller Sea Lions"; and four scientific research permits -- Randall W. Davis, Glenn R. Van Blaricom, Oregon Department of Fish and Wildlife, Alaska SeaLife Center
6 August	Interior, amendment of scientific research permit, office of Marine Mammal Management, U.S. Fish and Wildlife Service.
6 August	Commerce, commenting to the National Marine Fisheries Service on a request by the Naval Air Weapons Station, China Lake, seeking authorization to take small numbers of northern elephant seals, harbor seals, California sea lions, and northern fur seals by harassment in the vicinity of San Nicolas Island, California, incidental to anticipated target missile launches; concurring with the Service's preliminary determinations that only small numbers of those species would likely be taken by harassment incidental to some of the anticipated launches, (2) the short-term impacts of the launches and associated activities would likely result

in no more than temporary behavioral modification and (3) the harassment would likely have negligible effects on the affected stocks; reiterating its belief that the Service's efforts to redefine level B harassment administratively to include only "biologically significant" disturbance is ill-advised and contrary to the statutory definition of the term; recommending that (A) prior to issuing the requested authorization, the Service assure that the applicant's monitoring program is sufficient to detect the effects of the proposed target launches, (B) the authorization specify that, if a death or serious injury of a seal or sea lion occurs that appears to be related to target launch activities, operations be suspended while the Service determines whether steps can be taken to avoid further injuries or deaths or whether an incidental-take authorization under section 101(a(5)(A) of the Marine Mammal Protection Act is needed, (C) the Service consult with the Navy to determine whether it would be appropriate to seek a more comprehensive, five-year authorization for harassment and other possible types of taking under section 101(a)(5)(A) and (D) the Service advise the applicant to consult with the Fish and Wildlife Service concerning the need for an authorization to take small numbers of sea otters incidental to the proposed activities.

8 August — Interior, amendment of scientific research permit, New College of the University of South Florida.

9 August — State of Florida, commenting to the Florida Fish and Wildlife Conservation Commission on a petition to remove the Florida manatee from Florida's list of endangered and threatened species; expressing the view that the current definitions of the World Conservation Union and the State of Florida to identify endangered and threatened species are fundamentally flawed and inappropriate for marine mammals, sea turtles, and perhaps certain other long-lived species; recommending that the State develop a new set of species' classification definitions that will trigger management actions in time to prevent a species from deteriorating to a point where its chances of recovery are undermined.

16 August — Commerce, permit to import one harbor seal for the purpose of public display, Point Defiance Zoo and Aquarium.

16 August — Commerce, permit to import one Steller sea lion for the purpose of scientific research, Mystic Aquarium.

16 August — Commerce, amendment of scientific research permit, Center for Coastal Studies.

16 August — Commerce, scientific research permit, Robert A. Garrott.

16 August — Commerce, scientific research permit, National Marine Mammal Laboratory.

23 August — Commerce, amendments of four scientific research permits -- Jan Straley, Craig Matkin, North Gulf Oceanic Society, Dena Matkin.

23 August — Commerce, scientific research permit, Markus Horning, Department of Marine Biology, Texas A&M University.

23 August — Commerce, amendment of scientific research permit, Ocean Alliance/Whale Conservation Institute.

27 August — Commerce, scientific research permit, Southeast Fisheries Science Center.

30 August — Sakhalin Energy Investment Company Ltd., commenting on the "Western Gray Whale Protection Plan: A Framework for Monitoring and Mitigation Measures Related to Sakhalin Energy Oil and Gas Operations on the Northeast Coast of Sakhalin Island, Russia"; noting that the plan provides a useful conceptual basis for identifying and describing potential effects of oil and gas operations on the western gray whale and a useful basis for identifying needed research and for implementing mitigation and prevention measures; and pointing out shortcomings in the plan due to insufficient information on potential interactions between oil and gas operations and gray whales, and vagueness of descriptions of mitigation and protection measures.

30 August — Commerce, commenting to the National Marine Fisheries Service on a request from the California Department of Transportation seeking renewal of its authorization to take small numbers of harbor seals and California sea lions incidental to structural modification of the Richmond-San Rafael Bridge; concurring with the Service's preliminary determinations that changes to the work period are reasonable; noting, however, that the application did not provide the rationale for shifting the work zone closer to hauled-out seals, sufficient information for evaluating the potential effects of doing so, or discuss (a) whether expansion of the work area might cause further disturbance to the seals or cause seals to abandon Castro

Rocks altogether or (b) whether there are alternative haul-out sites near Castro Rocks; recommending that the Service request this information from the applicant to ensure that the proposed expansion of the work area would have no more than a negligible effect.

4 September — Commerce, scientific research permit, Gregory D. Bossart, Harbor Branch Oceanographic Institution.

10 September — Interior, commenting to the U.S. Fish and Wildlife Service on the findings and recommendations of the Commission's 15-17 April 2002 Hawaiian monk seal program review; commending the Service, the Navy, and the Coast Guard for their continuing efforts to clean up contaminants in the Hawaiian Islands National Wildlife Refuge and the Midway Atoll National Wildlife Refuge; and recommending that the Service (1) do everything possible to secure additional funding to complete the Tern Island seawall project as soon as possible, (2) consult with the National Marine Fisheries Service to ensure that monk seal field crews are able to carry out essential research and management work at French Frigate Shoals during the period of seawall construction, (3) consult with the National Marine Fisheries Service to develop new permit conditions that would allow a more aggressive effort to identify and remove sharks preying on monk seal pups at Trig Island, and (4) continue to consult with the National Marine Fisheries Service on visitor access and development proposals at Midway Island.

10 September — Commerce, commenting to the National Marine Fisheries Service on findings and recommendations of the Commission's 15-17 April 2002 Hawaiian monk seal program review; recommending that the Service implement all the recommended actions set forth in the report of that review as they apply to the Service; commending the Service for its support of monk seal recovery work; commending the Service's Honolulu Laboratory for conducting an effective monk seal research program; and recommending that (1) monitoring and mitigation work at the six major breeding sites in the Northwestern Hawaiian Islands and various foraging studies be continued at no less than the current levels of support; (2) additional funding and at least one additional staff member be provided to the Laboratory to expand monk seal monitoring work in the main Hawaiian Islands; (3) a detailed monk seal foraging plan be developed by the Laboratory; (4) additional funding and at least one additional full-time staff member be provided to the Pacific Islands Area Office to help coordinate and carry out work to manage human interactions with monk seals; (5) a cooperative agreement be developed with the Hawaii Division of Aquatic Resources; (6) a main Hawaiian Islands monk seal management task force be established; (7) in updating the Hawaiian Monk Seal Recovery Plan, the Hawaiian Monk Seal Recovery Team devote particular attention to defining research and management objectives, describing required tasks, and clarifying responsibilities among various partner agencies and groups; (8) the Recovery Team hold annual reviews to develop advice on the Service's research and management plans for each coming year; and (9) all fishery management measures effective in the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve be incorporated into any fishery management proposals developed as part of the process for designating the reserve as a national marine sanctuary.

10 September — Transportation, commenting to the U.S. Coast Guard on the findings and recommendations of the Commission's 15-17 April 2002 Hawaiian monk seal program review; commending the Coast Guard for its efforts to remove chemical contaminants from Tern Island; and recommending that the Coast Guard (1) approve a funding request to complete clean-up of a dump site on Tern Island, and (2) consult with the Fish and Wildlife Service to determine how best to integrate that clean-up work into the seawall construction schedule when those funds are made available.

10 September — State of Hawaii, commenting to the Hawaii Division of Aquatic Resources on the findings and recommendations of the Commission's 15-17 April 2002 Hawaiian monk seal program review; noting that the Division has made important contributions to the monk seal recovery program; expressing support for the Division's plans to develop both a cooperative agreement with the National Marine Fisheries Service and a grant request under section 6 of the Endangered Species Act to expand its efforts to conserve monk seals, sea turtles, and other protected species; and urging that the Division adopt a management program for state waters in the Northwestern Hawaiian Islands that is consistent with measures adopted to protect living marine resources in the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve.

10 September — Commerce, commenting to the National Ocean Service on the findings and recommendations of the Commission's 15-17 April 2002 Hawaiian monk seal program review; conveying the findings and recommendations of that review; recommending that (1) the precautionary management principles, fishery management measures, and other provisions set forth in the Executive Orders establishing the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve be incorporated into any proposal to

convert the reserve into a national marine sanctuary, (2) reserve managers establish an interagency task force or committee to coordinate agency research and management activities in the Northwestern Hawaiian Islands, (3) steps be taken through that task force or committee to ensure that research and other activities within the reserve are compatible with the conservation needs of monk seals and other protected species, and (4) a portion of reserve funding and vessel support be used to provide logistical support for research and management activities in the area by other agencies, including the National Marine Fisheries Service's Honolulu Laboratory's monk seal program staff.

11 September — Interior, Convention on International Trade in Endangered Species of Wild Fauna and Flora permit to authorize export of polar bears, Suarez Brothers Circus.

17 September — Commerce, amendment of scientific research permit, Alaska Department of Fish and Game.

17 September — Commerce, commenting to the National Marine Fisheries Service on a request by the Department of the Navy on behalf of the Naval Base, Ventura County, Califronia seeking authorization to take small numbers of harbor seals, northern elephant seals, and California sea lions by harassment incidental to the demolition and removal of approximately 12 buildings and associated infrastructure located at the entrance of Mugu Lagoon, Point Mugu, California; concurring with the Service's preliminary determination that the short-term impacts of the proposed activities would not cause more than the incidental harassment of small numbers of these species and would have a negligible impact on these stocks.

17 September — Commerce, scientific research permit, Michael Castellini.

25 September — Commerce, commenting to the National Marine Fisheries Service's Alaska Regional Office on the report "New Information Indicates Fine-Scaled Stock Structure for Harbor Seals in Alaska"; noting that further delays in redefining harbor seal stocks pose an unnecessary and unwarranted risk to their recovery and conservation and to the Native cultures that depend on healthy harbor seal stocks; and recommending that the Service, with the Alaska Native Harbor Seal Commission, more forward expeditiously to (1) redefine stock structure in accordance with new scientific information; (2) review the status of the newly defined stocks; and (3) as appropriate, develop and implement suitable recovery and conservation measures.

4 October — Interior, authorization to continue scientific research, U.S. Geological Survey.

9 October — Commerce, scientific research permit, Cynthia T. Tynan.

25 October — Commerce, commenting to the Secretary of Commerce on the "Report of the Scientific Research Program under the International Dolphin Conservation Program Act"; expressing the view that there is an insufficient basis for making a determination that the practice of chasing and encircling dolphins with purse seine nets in the eastern tropical Pacific tuna fishery is not having a significant adverse impact on depleted dolphin stocks; and noting the results of the Service's research program that, although not conclusive, provide evidence that the practice of chasing and encircling dolphins is having adverse affects on the recovery of depleted dolphin stocks and that the magnitude of those effects, at both the individual and population levels, may be significant.

28 October — Interior, scientific research permit, Marine Wildlife Veterinary Care and Research Center, California Department of Fish and Game.

4 November — Commerce, amendment of scientific research permit, Southwest Fisheries Science Center.

4 November — Commerce, commenting to the National Marine Fisheries Service on its intent to prepare an environmental impact statement on the take reduction plan for the western North Atlantic coastal stock of bottlenose dolphins; commenting that the scope of the environmental impact statement must provide a basis for determining, with a reasonable level of confidence, whether existing management measures plus those in the plan, will achieve the take reduction goals of the Marine Mammal Protection Act; and suggesting that the Service review the issues raised in the take reduction team's critique of research and monitoring efforts regarding bottlenose dolphin/fishery interactions on the western North Atlantic coast, and that it address them in the evaluation of different alternatives in the environmental impact statement.

15 November — Commerce, permit to import and re-export cetacean and pinniped (except walrus) parts, Michael Moore.

18 November	Commerce, scientific research permit, United States Air Force, 30th Space Wing.
18 November	Commerce, scientific research permit, Belinda L. Rubinstein, New England Aquarium.
18 November	Commerce, commenting to the Director of the National Marine Fisheries Service's Office of Protected Resources, on a proposed rule to designate the eastern North Pacific southern resident stock of killer whales as depleted under the Marine Mammal Protection Act; noting that the Service may have relied on inaccurate information in its finding that listing the stock under the Endangered Species Act was not warranted; and recommending that the Service (1) reconsider its determination or provide additional justification, (2) develop a plan for reviewing the taxonomic status of killer whales, and (3) proceed with its depletion designation and prepare a conservation plan that identifies the recovery level for the stock, identifies actions needed to conserve the stock and protect important habitat.
27 November	Commerce, scientific research permit, Northeast Fisheries Science Center.
27 November	Commerce, amendment of scientific research permit, National Marine Mammal Laboratory.
27 November	Commerce, commenting to the Assistant Administrator for Fisheries, National Marine Fisheries Service on the conservation of endangered North Atlantic and North Pacific right whales, expressing concern about the pace of progress to address research and management needs, given the species'critical status; recommending that the Service (1) complete a proposed action plan to prevent right whale deaths and injuries by ships along the eastern United States, (2) prohibit fishing with gillnets or traps in designated right whale critical habitats along the U.S. east coast during period of peak right whale occurrence, (3) establish a 1 January 2004 deadline by which groundlines on strings of two or more crab or fish traps must be either sinking or neutrally bouyant, (4) require all gear modifications currently applicable to the east coast lobster fishery apply to all crab or fish traps or pots in areas where North Atlantic right whales are likely to occur, and (5) provide funding to charter a vessel to carry out research using satellite telemetry to determine the movement and habitat use patterns of North Pacific right whales.
27 November	Commerce, commenting to the Assistant Administrator for Fisheries, National Marine Fisheries Service on the status of gray whale populations in the eastern and western North Pacific; commending the Service for its efforts to assess and monitor the status of the eastern gray whale population; recommending that funding and support be continued at recent levels for research and monitoring of the eastern North Pacific population; commending the Service collaborating with Russian scientists to assess and monitor the status and habitat-use patterns of western North Pacific gray whales off Sakhalin Island; and recommending that the Service increase its support of research on the western North Pacific population.
2 December	Commerce, annual reauthorization of four scientific research permits -- Jim Darling, Ph.D., University of Hawaii at Manoa, Dan Salden, Marsha Green, Ph.D.
6 December	Interior, commenting to the Alaska Regional Director of the U.S. Fish and Wildlife Service on the stock structure of sea otters in Alaska; commending the Service and the U.S. Geological Survey for their research and management efforts related to the northern sea otter; and recommending that the Service (1) complete a formal determination of the species' status under the Endangered Species Act as soon as possible, (2) include the various research and management partners on a recovery team to facilitate coordinated research and management actions, and (3) begin, as soon as possible, to assemble a recovery team and initiate the development of a recovery plan.
10 December	Interior, commenting to the U.S. Fish and Wildlife Service on recovery needs for the California sea otter; recommending that the Service (1) make every effort to meet its schedule for providing a revised recovery plan for public review by January 2003, (2) ensure that the plan describes how the recovery effort will be implemented, (3) reconstitute the recovery team and convene periodic meetings to discuss and develop advice on recovery-related issues, (4) as needed, facilitate common-ground meetings for the affected parties to seek resolution of conflicts, and (5) make every effort to release a draft supplemental environmental impact statement summarizing a review of the sea otter translocation program by February 2003.
23 December	Interior, commenting to the U.S. Fish and Wildlife Service on conservation needs for sea otters in Washington state; recommending that the Service (1) provide adequate resources to complete the stock assessment for Washington sea otters on a timely basis, (2) appoint a Washington state sea otter coordinator or take other steps as may be necessary to ensure that the efforts of all cooperating agencies and

groups are well coordinated, and (3) continue to support and facilitate cooperative research and management in Washington and British Columbia to resolve questions about the relationship between sea otters in these two areas.

23 December — Commerce, commenting to the National Marine Fisheries Service on a petition to designate the AT1 pod of Alaska transient killer whales as depleted under the Marine Mammal Protection Act; recommending that the Service designate the AT1 pod of transient killer whales as a depleted stock and reiterating a previous recommendation that the Service develop a long-term research plan for North Pacific killer whales to provide the level of information needed to address various issues, including stock structure and status.

31 December — Commerce, commenting to the National Marine Fisheries Service on the need to take prompt action to develop and provide for review by the parties to the formal rulemaking to limit the taking of Cook Inlet beluga whales by Alaska Natives a proposed schedule for developing a long-term, science-based harvest regime as directed by the presiding administrative law judge.

Appendix B

REPORTS OF COMMISSION-SPONSORED ACTIVITIES AVAILABLE FROM THE MARINE MAMMAL COMMISSION[1] OR THE NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)[2]

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)

Baur, D.C. 1996. Legal ramifications of the GATT panel reports on the United States' ban on the importation of yellowfin tuna products. Final report for MMC contract T94071375. NTIS PB97-104756. 102 pp. (A06)

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 northwest 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:

[1] **S**ingle copies of designated reports are available on request from the Marine Mammal Commission, 4340 East-West Highway, Room 905, Bethesda, Maryland 20814; telephone: (301) 504-0087; fax: (301) 504-0099.

[2] Price codes for reports available from NTIS 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.

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 MM2079341-0. 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. Final report for MMC contracts MM6AC026 and MM1300702-9. 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)
Huntington, H.P. 1997a. The Arctic Environmental Protection Strategy and the Arctic Council: A review of United States participation and suggestions for future involvement. Final report for MMC contract T53698333. NTIS PB97-174437. 35 pp. (A04)
Huntington, H.P. 1997b. A report of the sixth working group meeting for the program for the Conservation of Arctic Flora and Fauna (CAFF). Final report for MMC contract T53699196. NTIS PB98-114168. 229 pp. (A12)
Huntington, H.P. 1998a. A report of the experts meeting and the eleventh working group meeting of the Arctic Monitoring and Assessment Program (AMAP). Final report for MMC contract T53700292. Available from the Marine Mammal Commission.
Huntington, H.P. 1998b. A report of the meeting of senior Arctic officials under the Arctic Council, Whitehorse, Yukon Territory, Canada, May 9–11, 1998. Final report for MMC contract T53700292. Available from the Marine Mammal Commission.
Huntington, H.P. 1998c. A report of the conference, "Sustainable Development in the Arctic: Lessons Learned and the Way Ahead," Whitehorse, Yukon Territory, Canada, May 12–14, 1998. Final report for MMC contract T53700292. Available from the Marine Mammal Commission.
Huntington, H.P. 1998d. A report of the meeting of senior Arctic officials under the Arctic Council and the first ministerial meeting of the Arctic Council, Iqaluit, Northwest Territories, Canada, September 14–18, 1998. Final report for MMC contract T53700292. Available from the Marine Mammal Commission.
Huntington, H.P. 1999a. A Report on the Seventh Meeting of the Working Group for the Conservation of Arctic Flora and Fauna (CAFF), Yellowknife, Northwest Territories, Canada, April 28–30, 1999. Final report for MMC contract T53700292. NTIS PB 99-150526. 202 pp. (A11)
Huntington, H.P. 1999b. Report of the Meeting of the Sustainable Development Working Group and Senior Arctic Officials under the Arctic Council, Anchorage, Alaska, May 3–5, 1999. Final report for MMC contract T53700292. NTIS PB99-155004. 219 pp. (A11)
Huntington, H.P. 1999c. A Report on the Twelfth Meeting of the Arctic Monitoring and Assessment Program (AMAP) Working Group, Helsinki, Finland, December 7–9 1998. Final report for MMC contract T53700292. NTIS PB-2000-102445. 298 pp. (A14)
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 bottlenose 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 phenol-ogy 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)

Kenney, R.D. 1994. Anomalous 1992 spring and summer distributions of right whales (*Eubalaena glacialis*) and other cetaceans in continental shelf waters off the northeastern United States and adjacent Canada. Final report for MMC contract T94070648. NTIS PB99-102493. 66 pp. (A05)

Kirk. A.G., and K.G. Vanderhye. 1996. Marine Mammal Commission Working Bibliography on Physical and Chemical Constituents in the Marine Environment and Effects on Marine Mammals. 100 pp. Available from the Marine Mammal Commission, Bethesda, Maryland.

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)

Long, A.K. 2000. Marine Mammal Commission Working Bibliography on Contaminants in the Marine Environment and Effects on Marine Mammals (Third Edition). 122 pp. Available from the Marine Mammal Commission, Bethesda, Maryland.

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. 1984. Habitat protection needs for the subpopulation of West Indian manatees in the Crystal River area of northwest Florida. NTIS PB84-200 250. 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 PB93-154995. 241 pp. (A11)
Marine Mammal Commission. 1995. Annual report of the Marine Mammal Commission, calendar year 1993. Report to Congress. NTIS PB95-154530. 260 pp. (A11)
Marine Mammal Commission. 1995. Annual report of the Marine Mammal Commission, calendar year 1994. Report to Congress. NTIS PB95-173233. 280 pp. (A13)
Marine Mammal Commission. 1996. Annual report of the Marine Mammal Commission, calendar year 1995. Report to Congress. NTIS PB96-157482. 235 pp. (A11)
Marine Mammal Commission. 1997. Annual report of the Marine Mammal Commission, calendar year 1996. Report to Congress. NTIS PB97-142889. 262 pp. (A13)
Marine Mammal Commission. 1998. Annual report of the Marine Mammal Commission, calendar year 1997. Report to Congress. NTIS PB98-124357. 258 pp. (A13)
Marine Mammal Commission. 1999. Annual report of the Marine Mammal Commission, calendar year 1998. Report to Congress. NTIS PB99-143087. 247 pp. (A13)
Marine Mammal Commission. 1999. Marine Mammals and Persistent Ocean Contaminants: Proceedings of the Marine Mammal Commission Workshop, Keystone, Colorado, 12–15 October 1998. 150 pp + vii. Available from Marine Mammal Commission, Bethesda, Maryland.
Marine Mammal Commission. 2000. Annual report of the Marine Mammal Commission, calendar year 1999. Report to Congress. 243 pp. + xvi. Available from the Marine Mammal Commission, Bethesda, Maryland.
Marine Mammal Commission. 2001. Annual report of the Marine Mammal Commission, calendar year 2000. Report to Congress. 253 pp. + iv. Available from the Marine Mammal Commission, Bethesda, Maryland.
Marine Mammal Commission. 2002. Annual report of the Marine Mammal Commission, calendar year 2001. Report to Congress. 253 pp. + iv. Available from the Marine Mammal Commission, Bethesda, Maryland.
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)
Moore, M.J., B.A. Jensen, P.K.Hamilton, R.Sears, and J.J. Stegeman. 1998. An assessment of large whale stocks around South Georgia and their use as reference for northern stocks. Final report for MMC contract T53698016. NTIS PB98-150030. 56 pp. (A05)
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. 1995. 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)

Read, A.J. 1998. Possible applications of new technology to marine mammal research and management. Final report for MMC contract T30919695. NTIS 36 pp.

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)

Reeves, R.R. 2000. The Value of Sanctuaries, Parks, and Reserves (Protected Areas) as Tools for Conserving Marine Mammals. Final report for MMC contract T74465385. 50 pp. Available from the Marine Mammal Commission, Bethesda, Maryland.

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)

Samuels, A., and L. Bejder. 1998. A pilot study of habitual interaction between humans and wild bottlenose dolphins near Panama City Beach, FL. Final report for MMC contract T53700894. 19 pp. Available from the Marine Mammal Commission.

Samuels, A., L. Bejder, and S. Heinrich. 2000. A Review of the Literature Pertaining to Swimming with Wild Dolphins. Final report for MMC contract T74463122. 57 pp. + diskette. Available from the Marine Mammal Commission, Bethesda, Maryland.

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. 2l 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)

Testa, J.W. 1997. Importation of polar bear trophies from Canada under the 1994 amendments to the Marine Mammal Protection Act. Final report for MMC contract T53698443. NTIS PB97-167175. 13 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 FY74–90. 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)

Waring, G.H. 1996. Survey of federally-funded marine mammal research and studies FY74–FY95. Final report for MMC contract T30919035. NTIS PB97-104749. 115 pp. (A07)

Waring, G.H. 1998. Survey of federally-funded marine mammal research and studies FY74–FY96. Final report for MMC contract T53696403. NTIS PB98-148281. 125 pp. (A08)

Waring, G.H. 1998. Survey of federally-funded marine mammal reseach and studies FY74–FY97. Final report for MMC contract T53699523. NTIS PB98-121816. 141 pp. (A08)

Waring, G.H. 1999. Survey of federally-funded marine mammal research and studies FY74–FY98. Final report for MMC contract T53700674. NTIS PB99-171720. 150 pp. (A09)

Waring, G.H. 2000. Survey of federally-funded marine mammal research and studies, FY74–FY99. Final report for MMC contract T74464724. NTIS PB2001-103492. (A10)

Waring, G.H. 2002. Survey of federally-funded marine mammal research and studies, FY74–FY00. Final report for MMC contract T-3322455. Marine Mammal Commission, Bethesda, MD.

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	$8.00	$16.00
A02	12.00	24.00
A03	23.00	46.00
A04	25.50	51.00
A05	27.00	54.00
A06	29.50	59.00
A07	33.00	66.00
A08	36.00	72.00
A09	41.00	82.00
A10	44.00	88.00
A11	47.00	94.00
A12	51.00	102.00
A13	54.00	108.00
A14	56.00	112.00
A15	58.00	116.00
A16	60.00	120.00
A17	62.00	124.00
A18	65.50	131.00
A19	67.50	135.00
A20	69.50	139.00
A21	71.50	143.00
A22	77.00	154.00
A23	79.00	158.00
A24	81.00	162.00
A25	83.00	166.00
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. Documents announced prior to 1996 (*i.e.,* those with a PB-95 designation or earlier) are subject to an out-of-print surcharge. In addition, there is a $5.00 handling charge on domestic orders ($10.00 on foreign orders). When ordering, include the NTIS accession number (*e.g.*, PB98-265- 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 1-800-533-NTIS (6847) or (703) 605-6000 or fax (703) 605-6900. You may also place orders by e-mail (orders@ntis.fedworld.gov) or through the NTIS Web site at http://www.ntis.gov/ordernow.

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)

Baur, D.C., M.J. Bean, and M.L. Gosliner. 1999. The laws governing marine mammal conservation in the United States. Pp. 48–86. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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 ursi-nus*)—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)

Bowen, W.D., and D.B. Siniff. 1999. Distribution, population biology, and feeding ecology of marine mammals. Pp. 423-484. *In* J.E. Reynolds III and S.A. Rommel (eds). Biology of Marine Mammals. Smithsonian Institution Press, Washington, DC.

Boyd, I.L., C. Lockyer, and H.D. Marsh. 1999. Reproduction in marine mammals. Pp. 218–286. *In* J.E. Reynolds III and S.A. Rommel (eds). Biology of Marine Mammals. Smithsonian Institution Press, Washington, DC.

Bräger, S., B. Würsig, A. Acevedo, and T. Henningsen. 1994. Association patterns of bottlenose dolphins (*Tursiops trun-catus*) in Galveston Bay, Texas. Journal of Mammalogy 75(2):431–437. (MMC contract T75133708)

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 MM3309558–7)

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 NMFS12. (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., M. Berube, and D.K. Matilla. 1995. Sex ratio of the Gulf of Maine humpback whale population. Marine Mammal Science 11(2):227–231. (MMC contracts T10156643 and T30918256)

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 MM1800925–5)

Clapham, P.J., and P. J. Palsbøll. 1997. Molecular analysis of paternity shows promiscuous mating in female

humpback whales (*Megaptera novaeangliae*, Borowski). Proceedings of the Royal Society of London B246:95–98. (MMC contracts T10156643 and T30918256)

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)

Costa, D.P., and T.M. Williams. 1999. Marine mammal energetics. Pp. 176–217. *In* J.E. Reynolds III and S.A. Rommel (eds). Biology of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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 (*Eubalae-na 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)

Dedina, S. 1999. Saving the Gray Whale. University of Arizona Press, Tucson, AZ.

Dedina, S., and E. Young. 1995. Conservation as communication: Local people and gray whale tourism in Baja California Sur, Mexico. Whalewatcher 29(2)8–13. (MMC contract T10155592)

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.

Deutsch, C.J., R.K. Bonde, and J.P. Reid. 1998. Radio-tracking manatees from land and space: Tag design, implementation, and lessons learned from long-term study. Marine Technology Society Journal 32(1):18–29. (MMC contract T6810889–2).

Dizon, A.E., S.J. Chivers, and W.F. Perrin. 1997. Molecular Genetics of Marine Mammals. Society for Marine Mammalogy, Special Publication No. 3. (MMC contract T10155673)

Domning, D.P. (ed). 1984-Present. *Sirenews*, Newsletter of the IUCN/Species Survival Commission, Sirenian Specialist Group. Howard University, Washington, D.C.

Domning, D.P. 1996. Bibliography and index of the Sirenia and Desmostylia. Smithsonian Contributions to Paleobiology, Number 80. Smithsonian Institution Press, Washington, D.C. 611 pp. (MMC Contract T10155631)

Domning, D.P. 1999. Endangered species: the common denominator. Pp. 332–341. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

Dowling, T.E., and W.M. Brown. 1993. Population

structure of the bottlenose dolphin (*Tursiops truncatus*) as determined 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 (*Stenel-la 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)

Elsner, R. 1999. Living in water: solutions to physiological problems. Pp. 73–116. *In* J.E. Reynolds III and S.A. Rom-mel (eds). Biology of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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. Fedo-seev (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.

Fraker, M.A., and B.R. Mate. 1999. Seals, sea lions, and salmon in the Pacific Northwest. Pp. 156–178. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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)

Gambell, R. 1999. The International Whaling Commission and the contemporary whaling debate. Pp. 179–198. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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., J. Harwood, and V.J. Lounsbury. 1999. Marine mammal die-offs: causes, investigations and issues. Pp. 367-395. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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)

Gosliner, M.L. 1999. The tuna-dolphin controversy. Pp. 120–155. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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 allomater-nal 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)

Hamilton, P.K., A.R. Knowlton, M.K. Marx, and S.D. Kraus. 1998. Age structure and longevity in North Atlantic right whales *Eubalaena glacialis* and their relation to reproduction. Marine Ecology Progress Series 171:285–292.

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 MM4AC002, MM5AC020, MM6AC027, MM7AC025, MM13008882, 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)

James Dobbin Associates, Inc. 1984. Compilation and mapping of available biological, ecological and socio-economic information bearing on the protection, management and restoration of the southern sea otter. Prepared for the U.S. Fish and Wildlife Service, Washington, DC. 117 pp. + appendices. (MMC contract 14–16–0009–81–050)

Johnson, P.A., B.W. Johnson, and L.R. Taylor. 1981. Inter-island 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 MM7AC008, MM8AC005, MM1533497–8, MM2079219–4, MM2324713–8, MM2911098–4)

Katona, S.K., and S.D. Kraus. 1999. Efforts to conserve the North Atlantic right whale. Pp. 311-331. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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 15:385–414. (MMC contract T94070648)

Kimball, L.A. 1999. The Antarctic Treaty System. Pp. 199–223. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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)

Kirk, A.G., and K.G. Vanderhye. 1996. Marine Mammal Commission working bibliography on physical and chemical constituents in the marine environment and effects on marine mammals. Available from the Marine Mammal Commission, Bethesda, Maryland. 100 pp.

Klimley, A.P., and D.G. Ainley (eds). 1996. Great white sharks: The biology of *Carcharodon carcharias*. Academic Press, San Diego. 517 pp. (MMC contract T94070415)

Knowlton, A.R., S.D. Kraus, D.F. Meck, and M.L. Mooney-Seus. 1997. Shipping/Right Whale Workshop. Report 97–3. New England Aquarium, Boston, Massachusetts. (MMC contract T53696940)

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.

Laist, D.W. 1996. Entanglement of marine life in marine debris including a comprehensive list of species with entanglement and ingestion records. Pages 99–139 *in* J.M. Coe and D.R. Rogers (eds). Marine Debris: Sources, Impacts, and Solutions. Springer-Verlag, New York NY.

Laist, D.W. 1996. Marine debris entanglement and ghost fishing: A cryptic and significant type of bycatch? Pages 33–39 *in* Proceedings of the Solving Bycatch Workshop: Considerations for Today and Tomorrow, 25–27 September 1995, Seattle WA. Report No. 96-03. Alaska Sea Grant College Program, Fairbanks AK.

Laist, D.W., J.M. Coe, and K.J. O'Hara. 1999. Marine debris pollution. Pp. 342–366. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

Laist, D.W., A.R. Knowlton, J.G. Mead, A.S. Collet, and M. Podesta. 2001. Collisions between ships and whales. Marine Mammal Science 17(1):35–75.

Lavigne, D.M. 1999. The Hawaiian monk seal: management of an endangered species. Pp. 246–266. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

Lavigne, D.M., V.B. Scheffer, and S.R. Kellert. 1999. The evolution of North American attitudes toward marine mammals. Pp. 10–47. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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 bottle-nosed 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 seals: population ecology, behavior and physiology. University of California Press, Berkeley. 414 pp. (MMC contract T75133724)

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. Bever-ton, and D.M. Lavigne (eds). Marine Mammals and Fisheries. George Allen and Unwin, London. (MMC contract MM1533596–4)

Lowry, L.F., K.J. Frost, R. Davis, D.P. DeMaster, and R.S. Suydam. 1998. Movements and behavior of satellite-tagged spotted seals (*Phoca largha*) in the Bering and Chukchi Seas. Polar Biology 19:221–230.

Mangel, M., and R.J. Hofman. 1999. Ecosystems: patterns, processes, and paradigms. Pp. 87–98. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

Mangel, M., L.M. Talbot, G.K. Meffe, M.T. Agardy, D.L. Alverson, J. Barlow, D.B. Botkin, G. Budowski, T. Clark, J. Cooke, R.H. Crozier, P.K. Dayton, D.L. Elder, C.W. Fowler, S. Funtowicz, J. Giske, R.J. Hofman, S.J. Holt, S.R. Kellert, L.A. Kimball, D. Ludwig, K. Magnusson, B.S. Malayang, III, C. Mann, E.A. Norse, S.P. Northridge, W.F. Perrin, C. Perrings, R.M. Peterman, G.B. Rabb, H.A. Regier, J.E. Reynolds, III, K. Sherman, M.P. Sissenwine, T.D. Smith, A. Starfield, R.J. Taylor, M.F. Tillman, C. Toft, J.R. Twiss, Jr., J. Wilen, and T.P. Young. 1996. Principles for the conservation of wild living resources. Ecological Applications 6(2):338–362. (MMC contract T94071553)

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, T94071511, 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)

Marmontel, M., T.J. O'Shea, H.I. Kochman, and S.R. Hum-phrey. 1996. Age determination in manatees using growth-layer-group counts in bone. Marine Mammal Science 12(1):54–88. (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 l):113–116. (MMC contract MM6AD054)

Meffe, G.K., W.F. Perrin, and P.K. Dayton. 1999. Marine mammal conservation: guiding principles and their implementation. Pp. 437–454. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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 7MM2324802–7)

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)

Moore, M.J., S.D. Berrow, B.A. Jensen, P. Carr, R. Sears, V.J. Rowntree, R. Payne, and P.K. Hamilson. 1999. Relative abundance of large whales around South Georgia (1979–1998). Marine Mammal Science 15(4):1287–1302. (MMC contract T53698016)

Morales, V.B., D. Olivera G., and P. Ramírez G. 1996. Conserva-ción de los manatíes en la región del Caribe de México y Belice. Informe Técnico prepared for El Colegio de la Frontera Sur, Number MM01, Consejo Nacional de Ciencia y Tecnologia, N9301–2017. 131 pp. (MMC Contract T10155657)

Nafziger, J.A.R. 1978. The management of marine mammals after the fishery conservation and management act. Willa-mette 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)

Naveen, R. 1996. Human activity and disturbance: building on Antarctic site inventory. Pages 389–400 *in* Foundations for Ecological Research West of the Antarctic Peninsula. American Geophysical Union, Washington, D.C. (MMC contract T10155660)

Naveen, R. 1997. Compendium of Antarctic Peninsula visitor sites: a report to the Governments of the United States and the United Kingdom. U.S. Department of State (Washington) and U.K. Foreign and Commonwealth Office (London). 243 pp. (MMC contract T10155660)

Naveen, R. 1997. The Oceanites site guide to the Antarctic Peninsula. Oceanites, Inc., Chevy Chase, MD. 128 pp. (MMC contract T10155660)

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)

Northridge, S.P., and R.J. Hofman. 1999. Marine mammal interactions with fisheries. Pages 99–119. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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)

O'Shea, T.J. 1999. Environmental contaminants and marine mammals. Pp. 485–563. *In* J.E. Reynolds III and S.A. Rommel (eds). Biology of Marine Mammals. Smithsonian Institution Press, Washington, DC.

Pabst, D.A., S.A. Rommel, and W.A. McLellen. 1999. The functional morphology of marine mammals. Pp. 15–72. *In* J.E. Reynolds III and S.A. Rommel (eds). Biology of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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, Wash-ington, 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)

Palsbøll, P., J. Allen, M. Berube, P. Clapham, T. Feddersen, P. Hammond, R. Hudson, H. Jorgensen, S. Katona, A. Larsen, F. Larsen, J. Lien, D. Matilla, J. Sigurjónsson, R. Sears, T. Smith, R. Sponer, P. Stevick, and N. Øien. 1997. Genetic tagging of humpback whales. Nature 388:767-769. (MMC contracts T10156643 and T30919556)

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, *Strongylocen-trotus franciscanus*, near Santa Cruz, California. Fishery Bulletin (NOAA) 75(3):645–648. (MMC contract MM6AC029)

Perrin, W.F. 1999. Selected examples of small cetaceans at risk. Pp. 296–310. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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.

Gill-nets and Cetaceans. Report of the International Whaling Commission (Special Issue 15). 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)

Ragen, T.J., and D.M. Lavigne. 1999. The Hawaiian monk seal: biology of an endangered species. Pp. 224–245. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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)

Reeves, R.R., R.J. Hofman, G.K. Silber, and D. Wilkinson. 1996. Acoustic deterrence of harmful marine mammal-fishery interactions: proceedings of a workshop held in Seattle, Washington, 20–22 March 1996. U.S. Department of Commerce, NOAA Technical Memorandum, NMFS-OPR-10. 68 pp. (MMC contract T30919705)

Reeves, R.R., and J.G. Mead. 1999. Marine mammals in captivity. Pp. 412-436. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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, J.E., III. 1999. Efforts to conserve the manatees. Pp. 267–295. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

Reynolds, J.E., III, 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)

Reynolds, J.E., III, D.K. Odell, and S.A. Rommel. 1999. Marine mammals of the world. Pp. 1–14. *In* J.E. Reynolds III and S.A. Rommel (eds). Biology of Marine Mammals. Smithsonian Institution Press, Washington, DC.

Reynolds, J.E. III, and S. A. Rommel (eds.). 1999. Biology of Marine Mammals, Smithsonian Institution Press, Washington, DC. 578 pp.

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)

Samuels, A., L. Bejder, R. Constantine, and S. Heinrich. 2003. A review of swimming with wild cetaceans with a special focus on the Southern Hemisphere. *In* N.J. Gales, M. Hindell, and R. Kirkwood (eds.). Marine Mammals and Humans: Towards a Sustainable Balance. Melbourne University Press.

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 (*Balaenop-tera 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). (MMC contracts MM4465854–4 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)

St. Aubin, D.J., J.R. Geraci, and V.J. Lounsbury. 1996. Rescue, rehabilitation, and release of marine mammals: an analysis of current views and practices. Proceedings of a workshop held in Des Plaines, Illinois, 3–5 December 1991. NOAA Technical Memorandum, NMFS–OPR-8. 65 pp. (MMC contract T75136433)

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)

Stevick, P., N. Øien, and D. Matilla. 1998. Migrations of a humpback whale between Norway and the West Indies. Marine Mammal Science 14(1):162–166. (MMC contract T30919556)

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)

Talbot, L.M. 1996. Living resource conservation: an international overview. Available from the Marine Mammal Commission, Bethesda, Maryland. 56 pp. (MMC contract T94071553)

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)

Twiss, J.R., Jr., and R.R. Reeves (eds.). 1999. Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC. 471 pp.

Tyack, P.L. 1999. Communication and cognition. Pp. 287–323. *In* J.E. Reynolds III and S.A. Rommel (eds). Biology of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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 la Instituto de Biologia, Universidad Nacional Autonoma de Mexico, Serie Zoologia 47(2):203–207. (MMC contract MM6AD052)

Wartzok, D., and D.R. Ketten. 1999. Marine mammal sensory systems. Pp. 117–175. *In* J.E. Reynolds III and S.A. Rommel (eds). Biology of Marine Mammals. Smithsonian Institution Press, Washington, DC.

Weber, M.L. 2002. From abundance to scarcity: A Histroy of U.S. Marine Fisheries Policy. Island Press, Washington, D.C. 245 pp.

Weber, M.L. White paper on the establishment of a marine fisheries oversight commission. The David and Lucile Packard Foundation. Available from Wildlife Consultants International, L.L.C., The Plains, VA.

Weller, D.W., V.G. Cockcroft, B. Würsig, S.K. Lynn, and D. Fertl. 1997. Behavioral responses of bottlenose

dolphins to remote biopsy sampling and observations of surgical biopsy wound healing. Aquatic Mammals 23(1):49–58. (MMC contract T75133708)

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)

Wells, R.S., D.J. Boness, and G.B. Rathbun. 1999. Behavior. Pp. 324–422. *In* J.E. Reynolds III and S.A. Rommel (eds). Biology of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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).

Wilkinson, D., and G.A.J. Worthy. 1999. Marine mammal stranding networks. Pp. 396–411. *In* J.R. Twiss Jr. and R.R. Reeves (eds). Conservation and Management of Marine Mammals. Smithsonian Institution Press, Washington, DC.

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)

Zemsky, V.A., A.A. Berzin, Y.A. Mikhalyev, and D.D. Tormosov. 1995. Materials on whaling by Soviet Antarctic whaling fleets (1947–1972). Center for Russian Environmental Policy, Moscow. 320 pp. (In Russian) (MMC contract T10157150)

Appendix D

STATEMENT OF THE MARINE MAMMAL COMMISSION

Statement of John E. Reynolds, III, Ph.D.
Chairman, Marine Mammal Commission
Submitted to the House Committee on Resources,
Subcommittee on Fisheries Conservation, Wildlife and Oceans
for the Hearing Regarding Reauthorization of the
Marine Mammal Protection Act
13 June 2002

Thank you for providing the Marine Mammal Commission with the opportunity to present its views on H.R. 4781, the Marine Mammal Protection Act Amendments of 2002, and to share its thoughts on other issues that currently are not addressed in the bill. I will first discuss the provisions of the introduced bill.

H.R. 4781 addresses some, but not all, of the issues identified by the Commission in previous testimony as warranting review or revision during the reauthorization process. For the most part, we agree that the proposals included in the bill are appropriate and, except as noted below, we support their inclusion in the legislation. Specific comments on certain provisions follow.

Section 3—Technical Corrections

The Commission concurs that the proposed corrections are appropriate and should be made. It is unclear, however, why other technical amendments are not also being proposed. Most notable among these is the elimination of section 114 and references thereto made in other sections of the Act. Section 114, which provided an interim exemption to allow the incidental taking of marine mammals in commercial fisheries, was supplanted by section 118 under the 1994 amendments and no longer is in effect. We would welcome the opportunity to work with your staff to identify other areas where technical corrections are needed.

Section 4—Limited Authority to Export Native Handicrafts

As noted in previous Commission testimony, several provisions of the Act were not revised in 1994 to reflect the prohibition on exporting marine mammals that was added at that time. One of these was the cultural exchange provision (§§101(a)(6)), which was also added by the 1994 amendments. As such, the Commission believes that the proposed amendment set forth in section 4 of the bill is needed and appropriate. Nevertheless, we continue to believe that other provisions also need to be updated to account for the export prohibition. Also, there is a need to revise section 102(a)(4) of the Act, which, as amended in 1994, reinstituted an enforcement mechanism whereby the government must show that the taking underlying an otherwise illegal transport, purchase, sale, or export of a marine mammal or marine mammal product was also in violation of the Act. This problem had previously been recognized and rectified by Congress in 1981. The Commission has worked with the other responsible agencies to develop a comprehensive set of amendments to address the export issue for inclusion in the Administration bill.

There also is one drafting point concerning section 4 of the bill that we would like to call to your attention. Whereas the heading refers to the export of Native handicrafts, the provision itself is broader than that and applies to legally possessed "marine mammal products." The heading should be revised to correspond to the statutory provision so as to avoid possible confusion.

Section 6—Take Reduction Plans

This section adopts some, but not all, of the recommendations made in the bill transmitted by the previous Administration. In this regard, we support the Committee's recognition of the need to expand the coverage of section 118 to include other fisheries that may be having adverse impacts on marine mammals. We question, however, whether the National Marine Fisheries Service will be able to provide the information that would be required under an amended section 118 (f)(4)(B) unless the coverage under subsections (c), (d), and (e) is also expanded to provide the tools necessary to collect that information.

Section 7—Pinniped Research

The Commission agrees that more needs to be done to develop effective, non-lethal methods for deterring pinnipeds from engaging in harmful interactions with fishing operations. Presumably this is the focus of the proposed amendment, inasmuch as paragraph (2) of the proposed provision would require the Secretary to include representatives of the commercial and recreational fishing industries among those tasked with developing the research program. However, by referring more generally to "nuisance pinnipeds," the provision suggests that its intent is broader than just fishery interactions. It therefore would be helpful if the Committee, in its report on the bill, were to provide additional guidance as to what types of problems it expects the program to address.

Section 8—Marine Mammal Commission

While we appreciate the Committee's interest in providing the Commission with greater flexibility in allocating its resources to meet its responsibilities, there also needs to be a recognition that there is some minimum staff size below which the Commission is no longer able to function effectively or to meet the demands of its increasing workload. Congress previously determined that 11 was the minimum staff size below which operation of the Commission would be compromised. We trust that by proposing this amendment the Committee is not backing away from its tradition of support for and recognition of the value of having a fully staffed and effectively operating Marine Mammal Commission. The appropriation levels that would be authorized under this subsection (b) should be sufficient to ensure that the Commission will be able to continue to function effectively.

Section 12—Polar Bear Permits

As the Commission noted in its testimony before the Committee last October, there is little purpose served by the notice and comment requirements of section 104 as they pertain to the issuance of permits authorizing the importation of polar bear trophies from Canada. The only question for the Service to consider at the application stage is whether the bear was legally taken from an approved population. As such, the Commission supports the intent of the proposed amendment. We do, however, have two drafting suggestions. In proposed paragraph (2), the phrase "required to be" should be inserted after the words "application was" to clarify that this provision applies whenever a notice should have been published whether or not publication actually occurred. Also, a conforming amendment is needed to the first sentence of section 104(c)(5)(D) to delete the phrase ", expeditiously after the expiration of the applicable 30 day period under subsection (d)(2),."

Section 14—Marine Mammal Commission Administration

As indicated at the October hearing, the limitation on the daily amount that the Commission can spend on experts or consultants has effectively precluded us from using such services for some time. We appreciate the Committee's recognition of this problem and agree that the Commission should be put on an equal footing with other agencies in our ability to make use of such services.

* * * * *

Two issues not addressed in the introduced bill but on which the Chairman specifically requested testimony are the Act's definition of harassment and the bilateral agreement negotiated between the United States and Russia concerning the conservation and management of the shared Alaska-Chukotka population of polar bears.

Congress showed remarkable vision in writing and enacting the Marine Mammal Protection Act three decades ago. Since that time, scientists have come to better understand both the nature of human impacts on aquatic ecosystems and on marine mammals and other species. Although we have learned a great deal in the past 30 years, our knowledge is by no means perfect in either area. Thus it is important for Congress to continue to be proactive and farsighted. It also is important to facilitate scientific research to help clarify the nature and extent of possible impacts.

The issue of what constitutes harassment is one area where considerable uncertainty remains. In previous testimony before this Committee, the Commission has indicated that the existing definition of harassment in the Marine Mammal Protection Act has created some practical difficulties related to interpretation and enforcement. The Commission has been working with other involved federal agencies to address these difficulties.

In October 2000 the United States and Russia concluded a bilateral agreement for the conservation of the shared population of polar bears that inhabits the Bering and Chukchi Seas. Currently, hunting on the Russian side is not allowed; however, it is believed that an unknown level of illegal taking is occurring. The ability to regulate the number of bears removed from the population is expected to take on added importance when the Russian Federation legalizes polar bear hunting, which it is expected to do shortly. Other provisions of the Agreement, such as the prohibition on taking cubs and female bears with cubs, the use of aircraft and large motorized vehicles and vessels to hunt bears, and the taking of polar bears using poison or traps, will help ensure that the United States is fully meeting its obligations under the multilateral 1973 Agreement on the Conservation of Polar Bears. Other expected benefits of the bilateral Agreement include an enhanced research effort, which is expected to improve our ability to estimate the size of the population and to determine whether the level of removals is sustainable. Before the Agreement takes effect, it must be ratified by the Senate. In addition, implementing legislation will be needed. It is expected that the Agreement will be transmitted for ratification soon. Proposed implementing legislation has been drafted and is currently undergoing review within the Administration.

Implementation of the Agreement is strongly supported by the Alaska Native community and by several conservation organizations. The Commission believes that implementation of the Agreement will significantly enhance our ability to conserve the Alaska-Chukotka polar bear population and to protect the subsistence lifestyles of Native hunters in Alaska. We therefore encourage this Committee to take all necessary action to see that this occurs.

The Commission would also like to take this opportunity to highlight another issue that has previously been aired before the Committee, the expansion of the existing authority under section 119 of the Act to enable the National Marine Fisheries Service and the Fish and Wildlife Service to enter into cooperative agreements with Alaska Native organizations. The Commission believes that such a provision, if carefully crafted, would help guarantee that conservation measures, when necessary, can be implemented before a population has been reduced to a point where it is depleted. We note that such a provision, which had been included in a working draft bill circulated by Committee staff near the end of the last session, has been omitted from the introduced bill. We hope that this does not reflect a determination that a harvest management amendment does not merit further consideration.

The Commission also continues to believe that other provisions of the Act can benefit by amendment. These are described briefly below.

Taking Incidental to Commercial Fisheries (Section 118)

Section 118 currently requires that a take reduction plan be developed for each strategic stock that interacts with a category I or II fishery, regardless of the level of such interactions or whether the reason the stock is considered to be strategic is largely independent of fisheries interactions. The Commission recommends that the Committee consider an amendment to specify that a take reduction plan need not be prepared for those strategic stocks for which mortality or serious injury related to fisheries is inconsequential.

The Commission also believes that further consideration should be given to an amendment to clarify that it constitutes a violation of the Act to participate in any category I or II fishery without having registered under section 118, regardless of whether incidental takes occur. A related amendment that also needs to be considered would specify that all participants in category I or II fisheries, whether registered or not, are subject to the observer requirements of section 118. The Commission also believes that revisions to this section are needed to enable the responsible agencies to obtain reliable information on the numbers and types of fishery-related mortalities and injuries involving California sea otters.

Previous Commission testimony has noted that available funding has not always been sufficient to place observers within all fisheries that need to be monitored or to place them at levels needed to provide statistically reliable information. We again call this issue to your attention and recommend that you consider possible solutions, including securing contributions from the involved fisheries.

Permits (Section 104)

The draft bill has picked up on some, but not all, of the permit-related issues highlighted by the Commission during previous hearings on Marine Mammal Protection Act reauthorization. The Commission continues to be concerned about the appropriateness of maintaining certain marine mammals - most noticeably cetaceans - in traveling exhibits, which present special problems for successful maintenance. We again encourage the Committee to look at this issue more closely.

Since the hearing last October, the Commission has submitted comments on the National Marine Fisheries Service's proposed public display regulations. Among other things, the Commission's letter provides a detailed analysis of the provisions pertaining to exports of marine mammals to foreign public display facilities. The Committee may find this to be of interest and we would be pleased to provide you with a copy if you like.

In its letter to the Service, the Commission concluded that the current system does not work particularly well. Determinations of facility comparability are based exclusively on paper submissions, rather than physical inspections, as are required for domestic facilities. Foreign facilities are asked to provide a letter of comity from the host government to enable the Service to enforce the Marine Mammal Protection Act against the facility if violations occur after the animals have been exported, even though the agency has few, if any, resources available to ascertain compliance by foreign facilities. Representatives of the public display community have advocated that it is sufficient to make a determination of comparability at the time of export without any mechanism in place to ensure that the animals are well cared for once they have left the United States. We disagree, and believe, as we recommended to the National Marine Fisheries Service in our comment letter, that there is merit in convening the interested parties to review the current system with a view to identifying whether there are ways to better achieve the goal of providing reasonable assurance that marine mammals exported from the United States will be well cared for throughout the duration of their maintenance in captivity, and which realistically reflects the ability of U.S. agencies to identify and correct deficiencies at foreign facilities, while not establishing unnecessary barriers to the exchange of marine mammals among qualified facilities. We hope that this is an undertaking that the Committee will want to endorse.

Miscellaneous Issues

Under section 405 of the Act only donations and other monies specifically earmarked for use with respect to unusual mortality events can be placed in the Marine Mammal Unusual Mortality Event Fund. That is, funds generally appropriated to the National Marine Fisheries Service for implementing the Marine Mammal Protection Act may not be used for that purpose, even in those years when a large number of unusual mortality events might occur. The Commission again calls your attention to this issue in hopes that greater flexibility will be provided in how unusual mortality responses can be funded.

As noted in previous testimony, the penalties that may be assessed for violations of the Act have not been increased since its original enactment 30 years ago. This being the case, the maximum penalties available under the Marine Mammal Protection Act are quite low as compared to other natural resources statutes. We encourage the Committee to review the penalties available under sections 105 and 106 and consider increasing them to reflect changes in economic circum-

stances since 1972. The Commission also encourages the Committee to give consideration to amending the forfeiture provisions of section 106 to allow the seizure and forfeiture of a vessel's cargo (i.e., catch) for fishing in violation of section 118.

Another enforcement-related amendment that the Committee might want to consider concerns how penalties assessed under the Act may be used. A freestanding amendment, enacted in 1999 and codified as part of the Marine Mammal Protection Act, authorizes the Fish and Wildlife Service to use fines collected under the Act for activities directed at the protection and recovery of marine mammals under the agency's jurisdiction. We believe that similar authority for the National Marine Fisheries Service would likewise benefit that agency's ability to carry out its responsibilities under the Act.

Another provision that merits revision by the Committee is section 110, which identifies specific research projects to be carried out by the regulatory agencies. The time frames for completing the existing activities set forth in this section have elapsed. As such, those provisions that are no longer operative should be deleted. In their place, the Committee should consider a more generic directive to the agencies, enabling the agencies to pursue pressing, broad-scale projects. Among the studies that might be worthwhile are an investigation of ecosystem-wide shifts in the Bering and Chukchi Seas and an examination of possible changes in the coastal California marine ecosystem that may be contributing to the recent declines in the California sea otter population.

Although the Marine Mammal Protection Act establishes explicit procedures to address lethal takes and serious injuries due to fisheries, it is important to note that there are other ways by which marine mammals are lethally taken or seriously injured incidental to human activities. The Committee may wish to consider whether activities such as, for example, boat or ship strikes of whales might be dealt with more effectively through a take reduction process or some other mechanism.

We appreciate the opportunity to provide testimony to the Committee on the Marine Mammal Commission's views on H.R. 4781, the Marine Mammal Protection Act Amendments of 2002, and would welcome the opportunity to work with the Committee and its staff during the reauthorization process.