MARINE MAMMAL COMMISSION

Annual Report to Congress

2000

Marine Mammal Commission
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Chapter I

INTRODUCTION

This is the 28th Annual Report of the Marine Mammal Commission, covering the period 1 January through 31 December 2000. 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-related issues and events that have come under the purview of the Marine Mammal Commission during the year. 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 previous annual reports, it provides a record of the evolution and progress of U.S. policies and programs to conserve marine mammals and their habitats. To ensure accuracy, drafts of the report were reviewed by involved federal and state agencies and knowledgeable individuals.

Personnel

The Commission consists of three members nominated by the President and confirmed by the Senate. The Marine Mammal Protection Act requires that Commissioners be knowledgeable in marine ecology and resource management. At the end of 2000 the Commissioners were John E. Reynolds, III, Ph.D. (Chairman), Eckerd College, St. Petersburg, Florida; Paul K. Dayton, Ph.D., Scripps Institution of Oceanography, La Jolla, California; and Vera Alexander, Ph.D., University of Alaska, Fairbanks.

The Commission's staff includes Robert H. Mattlin, Ph.D., Executive Director; Timothy J. Ragen, Ph.D., Scientific Program Director; David W. Laist, Policy and Program Analyst; Michael L. Gosliner, General Counsel; Suzanne Montgomery, Special Assistant to the Executive Director; Jeannie K. Drevenak, Permit Officer; Nancy L. Shaw, Administrative Officer; and Darel E. Jordan, Staff Assistant.

During 2000 two of the Commission's long-time senior staff members retired from government service. They were John R. Twiss, Jr., who served as executive director from the establishment of the Commission in 1974 until his retirement on 1 September 2000, and Robert J. Hofman, Ph.D., the Commission's scientific program director from 1975 until 30 June 2000.

The Commission Chairman, 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. At the end of 2000 the committee members were Lloyd F. Lowry (Chairman), Fairbanks, Alaska; Daryl J. Boness, Ph.D., Smithsonian Institution, Washington, DC; Frances M. D. Gulland, Vet. M.B., Ph.D., The Marine Mammal Center, Sausalito, California; Steven K. Katona, Ph.D., College of the Atlantic, Bar Harbor, Maine; Galen B. Rathbun, Ph.D., Cambria, California; Stephen B. Reilly, Ph.D., National Marine Fisheries Service, La Jolla, California; Barbara L. Taylor, Ph.D., National Marine Fisheries Service, La Jolla, California; Peter L. Tyack, Ph.D., Woods Hole Oceanographic Institution, Woods Hole, Massachusetts; and Douglas Wartzok, Ph.D., University of Missouri, St. Louis. Mr. Caleb Pungowiyi, president of the Robert Aqqaluk Memorial Trust, Kotzebue, Alaska, serves as Special Advisor to the Marine Mammal Commission on Native Affairs.

During 2000 Joseph R. Geraci, V.M.D., Ph.D., National Aquarium in Baltimore, Baltimore, Maryland; Bruce R. Mate, Ph.D., Oregon State University, Newport; and Jeanette A. Thomas, Ph.D., Western Illinois University, Moline, completed their terms of service on the Committee of Scientific Advisors.

Funding

Appropriations to the Marine Mammal Commission in the past five fiscal years have been as follows: FY 1996, $1,190,000; FY 1997, $1,189,000; FY 1998, $1,185,000; FY 1999, $1,240,000; and FY 2000, $1,265,000. The Commission's appropriation for the current fiscal year, FY 2001, is $1,696,260.

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 yet to be reauthorized since then, its provisions remain in effect and Congress continues to appropriate funding to carry out its mandates.

As a matter of course, Congress examines the implementation of the Act during the reauthorization process and 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 changes were made to the Act's tuna–dolphin provisions (see Chapter IV). Most recently, the Act was amended by enactment of 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. These amendments are discussed in Chapter VI of this report.

As expected, Congress began the process to reauthorize the Marine Mammal Protection Act during 1999. As discussed in the previous annual report, the Subcommittee on Fisheries Conservation, Wildlife, and Oceans of the House Resources Committee held an initial hearing on 29 June 1999 at which the 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 and described the steps taken to implement the 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 its 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 previous annual report. No further hearings were held during 1999, and no reauthorization bill was introduced during the 1999 session of Congress.

6 April 2000 Hearings

Two additional oversight hearings were held by the Subcommittee on Fisheries Conservation, Wildlife, and Oceans during 2000, both on 6 April. The Chairman of the Commission testified at the first hearing, which examined implementation of section 118 of the Marine Mammal Protection Act, the new regime to govern the taking of marine mammals incidental to commercial fisheries enacted in 1994. A summary of the Commission's statement is provided below. The full text is provided in Appendix D of this report. The Commission was not asked to testify at the second hearing, which examined actions taken under section 119 of the Act, a provision added in 1994 to authorize the Fish and Wildlife Service and the National Marine Fisheries Service to enter into cooperative agreements with Alaska Native organizations aimed at conserving marine mammals and co-managing subsistence uses.

Fisheries Hearing

The first hearing on 6 April 2000 examined progress in implementing the new incidental take regime for fisheries and considered ways in which the

process might be improved. Witnesses included the Chairman of the Commission, the Deputy Assistant Administrator for Fisheries of the National Marine Fisheries Service, and representatives of various groups that had participated on take reduction teams, representing the fishing industry, environmental organizations, and the scientific community.

The Commission's testimony summarized the applicable statutory requirements and the efforts of the five take reduction teams that have been established to address the most pressing fishery–marine mammal interaction problems. The Commission concluded that the existing requirements for developing and implementing take reduction plans appeared to be appropriate and fundamentally sound, but noted that the Service has had difficulty meeting all section 118 requirements in a timely manner. The Commission noted that these delays seemed to be undermining the confidence of take reduction team members in the process, may expose the Service to litigation risks, and, for some marine mammals, such as the northern right whale, may be significantly affecting the species' prospects for recovery.

With respect to the Atlantic Large Whale Take Reduction Plan, the Commission expressed the view that the only sure way to reduce entanglement risks for the critically endangered right whale is to prevent hazardous fishing gear from being deployed in areas where right whales are most likely to occur. The Commission therefore called on Congress to prod the Service into taking all necessary steps to implement fisheries closures designed to eliminate hazardous fishing gear from those areas designated as right whale critical habitat during times of the year when whales are most likely to be present. The Commission further recommended that Congress encourage the Service to develop adaptive regulatory strategies that enable it to institute temporary restrictions in other fishing areas during periods when concentrations of right whales are detected.

The Commission also identified problems that had been encountered in implementing the Gulf of Maine Harbor Porpoise Take Reduction Plan. Because of constantly changing fishery closures being imposed at the recommendation of the New England Fishery Management Council, it had been difficult for the take reduction team to provide timely advice on regulatory measures needed to achieve marine mammal take reduction goals. In the Commission's view, there is a need to coordinate the different regulatory regimes to ensure that all measures necessary to achieve take reduction goals are reflected in and implemented through a comprehensive plan.

The Commission's testimony also reiterated a suggested statutory change that it had recommended at the 29 June 1999 hearing. The Commission noted that section 118 currently requires that a take reduction plan be developed for each strategic stock of marine mammals regardless of whether there is a significant level of fishery-related mortality and serious injury. Inasmuch as some stocks are considered strategic solely because they are listed as endangered or threatened under the Endangered Species Act or designated as depleted under the Marine Mammal Protection Act, not because of a high incidence of fishery interactions, the Commission recommended that a plan not be required for those strategic stocks for which mortality and serious injury resulting from fishing operations are inconsequential.

The Commission also called on Congress not to lose sight of other threats faced by marine mammals as those involved begin to find solutions to problems involving fishery-related takes. In this regard, the Commission's testimony highlighted the threats to Florida manatees posed by boat collisions and, more generally, by habitat degradation. It also identified the effects of ocean contaminants on marine mammals as a growing concern. During the hearing, it was suggested that a process similar to that used for developing take reduction teams under section 118, which involves all affected constituencies, might be brought to bear on some of these problems.

The Commission's testimony concluded by noting that most research and conservation actions under the Marine Mammal Protection Act and other wildlife statutes are undertaken in response to acute, often controversial conservation issues. However, there is also a need for more effective recovery strategies that anticipate and develop solutions to emerging problems before they reach a critical stage. The Commission therefore recommended that Congress consider the need to build these alternatives into the Act as it takes up reauthorization.

Hearing on Cooperative Agreements under Section 119

Witnesses at the second hearing included the Assistant Administrator for Fisheries of the National Marine Fisheries Service, the Alaska Regional Director of the Fish and Wildlife Service, and representatives of five Alaska Native organizations. The Native organizations represented at the hearing were the Indigenous People's Council for Marine Mammals, the Alaska Nanuuq Commission, the Alaska Native Harbor Seal Commission, the Aleut Marine Mammal Commission, and the Alaska Sea Otter and Steller Sea Lion Commission.

The National Marine Fisheries Service's testimony discussed efforts that had been made to conclude cooperative agreements with Alaska Native organizations concerning beluga whales, harbor seals, Steller sea lions, and northern fur seals. Despite these successes, the Service noted certain shortcomings with respect to the implementation of section 119. For example, the process for negotiating cooperative management agreements is lengthy and, for some species, it may not be clear which Native group or groups should be party to an agreement. With regard to this last point, the Service expressed its preference for entering into co-management agreements with tribally authorized organizations in light of administration policies concerning tribal sovereignty and because of enforcement considerations. The Service expressed concern as to whether committees set up to help implement cooperative agreements are subject to the Federal Advisory Committee Act. The Service also noted that its efforts under section 119 have been constrained to some extent by funding limitations.

The Fish and Wildlife Service described its efforts to develop and implement cooperative agreements for sea otters, polar bears, and Pacific walruses. The key shortcoming concerning the existing statutory provision identified by the Service was the inability of the parties to conclude an agreement that includes enforceable provisions for managing subsistence harvests of marine mammals stocks before they become depleted.

Both Services and the representatives of the Native organizations indicated that they were working together to develop an amendment proposal to enable the parties to enter into true co-management agreements that would provide for joint regulation of taking for subsistence purposes before depletion. Members of the House Resources Committee, including the Committee chairman, encouraged the agencies and the Native groups to conclude work on such a proposal so that it could be considered during the 2000 congressional session.

Development of A Co-Management Proposal

Spurred by the Committee's interest in the co-management proposal, the agencies continued their discussions with Native groups. These efforts culminated in a two-day negotiating session in Anchorage on 15–16 May 2000. A member of the Commission's staff, as well as representatives of the Fish and Wildlife Service and the National Marine Fisheries Service, participated in the discussions on behalf of the government. Native interests were represented by the Indigenous People's Council for Marine Mammals.

Participants at the meeting believed that co-management agreements should be addressed in a separate section of the Act and that the existing section 119 should remain intact to accommodate cooperative efforts other than full co-management. They also worked out proposed language for the new provision that would provide for the National Marine Fisheries Service and the Fish and Wildlife Service to enter into co-management agreements with Alaska Native tribes or tribally authorized organizations to regulate subsistence use of marine mammals by Alaska Natives, notwithstanding the authority for such taking under section 101(b) of the Act. Co-management agreements would include a management plan that (1) identifies the parties to the agreement and the stock or species and geographical area covered, (2) is based on biological information and traditional ecological knowledge, (3) provides for a sustainable harvest that is designed to prevent populations from becoming depleted, (4) has clearly defined enforcement and implementation processes, and (5) specifies the duration of the agreement and sets forth procedures for periodic review and termination. Once such an agreement has been concluded, it would become unlawful for any person within the geographical area to which it applies to take, transport, sell, or possess a marine mammal in violation of any ordinance or

regulation adopted by the signatory tribe or organization. As with cooperative agreements under section 119, co-management agreements under the new provision would authorize grants to the Native parties for purposes of developing and implementing the agreements. Other provisions agreed to by the participants spelled out the effect of a depletion finding for a species subject to a co-management agreement, provided for public notice and review before concluding co-management agreements, provided separate funding authority to implement the new provisions, and placed limits on the ability of the State of Alaska to obtain management authority for species or stocks subject to co-management agreements. The language agreed to at this meeting, with a few technical modifications, was reflected in proposed amendments transmitted to Congress by the Secretary of Commerce and the Secretary of the Interior.

Proposed Amendments

After extensive interagency consultations and coordination, the Secretary of Commerce and the Secretary of the Interior on 16 August 2000 transmitted to Congress a draft reauthorization bill entitled the Marine Mammal Protection Act Amendments of 2000. 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 2005. 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. 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).

Co-Management

The centerpiece of the proposed bill was the co-management provision worked out between the agencies and representatives of the Alaska Native hunting community. Unlike existing section 119, which also enables the National Marine Fisheries Service and the Fish and Wildlife Service to enter into cooperative agreements with Alaska Native organizations, the co-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 Native organization 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. Co-management agree-ments 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 co-management amend-ment would require the Service to provide draft regu-lations and consult with co-management partners before imposing any restrictions on Native taking and to seek their advice before making a depletion finding concerning any species or stock covered by the agree-ment. In addition, as noted above, the proposed amendment would provide for cooperative enforce-ment by the Services and Native organizations, would limit the ability of the State of Alaska to secure the transfer of management authority for marine mammal species covered by co-management agreements, would provide an opportunity for public review and comment prior to approval of a co-management agreement, and would authorize specific funding to carry out the new provisions.

Cultural Exchanges and Exports

As part of a package of permit-related amendments enacted in 1994, a provision was added 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, the proposed bill would amend several sections of the Act to indicate when exports of marine mammals or marine mammal products are allowed. Among other things, the proposed amendments would clarify 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. In addition, the proposed bill would clarify 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 direct export of marine mammals taken from U.S. waters by foreign facilities. The proposed amendments to section 104 would merely supplement the existing mechanisms for authorizing exports by adding another alternative; they would not require that a permit be obtained in those instances where a permit currently is not required.

The proposed bill would also amend 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 transporting, purchasing, selling, or exporting marine mammals or marine mammal parts is prohibited unless otherwise authorized regardless of whether the underlying taking was in violation of the Act.

Permit-Related Amendments

Three sections of the proposed bill would address specific problems that have arisen with respect to permits under the Act. As discussed in the polar bear section of Chapter III, 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 determinations to be made are whether the trophy to be imported was legally taken in Canada from an authorized management unit, and no public comment has ever been received, the proposed bill would streamline 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 be required to make available on a semiannual basis a summary of all such permits issued or denied.

As discussed in Chapter X, there has been some dispute as to whether releasing captive marine mammals to the wild constitutes a taking that requires authorization. The Commission, the National Marine Fisheries Service, and others have taken the view that releasing marine mammals has the potential to injure the animals or wild populations exposed to the animals and, therefore, should be considered to be a taking. This view was adopted in a 1999 enforcement proceeding brought by the Service against individuals who had released two long-term captive dolphins without obtaining authorization. To codify this interpretation, the proposed bill would add 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.

Chapter X also notes that 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. The pro-posed bill would reinstate 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 enacted in 1988. The proposed bill would strike the interim exemption provisions (section 114 of the Act), which are no longer operative, and make certain modifications to the current provisions. Most notably, the proposed amendments would expand the coverage of the incidental take regime to include not only commercial fisheries, but recreational fisheries as well. This 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. Other proposed amendments would (1) clarify 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) clarify 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) consolidate all section 118 prohibitions into a single subparagraph to eliminate possible confusion, (4) eliminate 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) require that California sea otters be factored into monitoring and observer placement decisions, even though takings of this species are not authorized. The 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 proposed bill 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, the proposed bill would increase the maximum civil penalty from $10,000 to $50,000 for each violation. Maximum criminal fines would be 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 be increased from $25,000 to $50,000. Another proposed amendment would allow 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 would also add 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.

Marine Mammal Commission Administration

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. The proposed bill would eliminate this restriction and place the Commission on an equal footing with other government agencies.

Marine Mammal Health and Stranding Response

Under the proposed bill, appropriations would be authorized to carry out Title IV of the Marine Mammal Protection Act through fiscal year 2005. In addition, proposed amendments to section 402 (data collection), section 403 (stranding response agree-

ments), and section 406 (indemnification) would specify that these provisions apply to disentanglement activities as well as to stranding responses.

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 under this provision, however, should now have been completed. Therefore, the proposal submitted to Congress 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. The proposed amendments also included an authorization for separate funding to be directed at research projects under section 110 but did not recommend specific funding levels.

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 proposed bill would redefine the term "harassment." Level A harassment would be redefined as any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild. Level B harassment would be 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.

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 agencies on actions needed to conserve marine mammals. To meet this charge, the Commission devotes special attention to particular species and populations that are vulnerable to various types of human impacts. Such species may include marine mammals listed as endangered or threatened under the Endangered Species Act or depleted under the Marine Mammal Protection Act (Table 1), as well as other species or populations facing special conservation challenges.

During 2000 special attention was directed to a number of endangered, threatened, or depleted species or populations. As discussed below, these include North Atlantic right whales, the western North Pacific stock of gray whales, mid-Atlantic coastal bottlenose dolphins, Cook Inlet beluga whales, Hawaiian monk seals, Steller sea lions, southern sea otters, and Florida manatees. Other species not so listed, but which received special attention, include eastern North Pacific gray whales, Gulf of Maine harbor porpoises, bottlenose dolphins (other than the mid-Atlantic coastal bottlenose dolphins), Pacific walruses, polar bears, and sea otters in Alaska.

North Atlantic Right Whale (*Eubalaena glacialis*)

The North Atlantic right whale was the first species of large whale to be hunted and, in many respects, the most highly prized. Sought relentlessly by commercial whalers from the eleventh century to the mid-twentieth century, North Atlantic right whales were exploited so thoroughly that they were all but eliminated from many parts of their historic range (e.g., the eastern North Atlantic and the Gulf of St. Lawrence in the western North Atlantic). Despite an international ban on hunting right whales adopted in 1935, they continued to be killed into the 1950s by nations slow to adopt the measure, by illegal whaling, and for scientific research under an international provision allowing nations to unilaterally authorize their citizens to take any whale species for that purpose.

Since the 1950s intentional taking of the species appears to have stopped; however, the remaining population is now so small that even occasional human-caused deaths from ship strikes and incidental entanglement in fishing gear are a major obstacle to recovery. With the total number of North Atlantic right whales perhaps numbering about 300 whales, the only large whale species more endangered is the North Pacific right whale (*E. japonica*), whose abundance is uncertain but generally thought to be less. At this level of abundance, which is less than half the size of remaining populations of pandas and some tigers, North Atlantic right whales also are one of the world's most endangered mammals.

The only remaining population of North Atlantic right whales occurs in the western North Atlantic Ocean off the U.S. and Canadian coasts. Through intensive studies at five seasonal high-use habitats, scientists from the New England Aquarium, Center for Coastal Studies, University of Rhode Island, East Coast Ecosystems, and other whale research organizations have compiled a right whale photo identification catalogue thought to include almost every individual in the population. The New England Aquarium serves as curator of the catalogue. By analyzing the life history of whales resighted by the cooperating research groups, as well as mortality records from stranded or floating carcasses, scientists have concluded that the population increased at about 2 percent per year during the mid- to late 1980s, but that it declined by 2 percent per year

Table 1. Marine mammals listed as endangered (E) or threatened (T) under the Endangered Species Act and depleted (D) under the Marine Mammal Protection Act, as of 31 December 2000

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 dugon*	E/D	Northern Indian Ocean from Madagascar to Indonesia; Philippines; Australia; southern China; Palau
Otters			
Marine otter	*Lutra felina*	E/D	Western South America; Peru to southern Chile
Southern sea otter	*Enhydra lutris nereis*	T/D	Central California coast
Seals and Sea Lions			
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; northwest 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 to California (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*	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
Western Pacific gray whale	*Eschrichtius robustus*	E/D	Western North Pacific Ocean
Sei whale	*Balaenoptera borealis*	E/D	Oceanic, all oceans
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.

during most of the 1990s. These trends contrast sharply with those of most other large whale populations, which have increased steadily at annual rates of about 4 percent or more since the cessation of most whaling in the 1980s.

Human-related mortality due to shipping and commercial fishing is considered to be a significant factor limiting right whale population growth. Over the past decade (1991–2000), half of all dead right whales found along the U.S. and Canadian coasts (11 of 22 carcasses) have shown evidence of either collision with large ships or entanglement in commercial fishing gear (i.e., gillnets or lines from lobster traps). Preventing such deaths has become even more urgent because of a series of alarmingly poor calving years. Between 1982 and 1992, an average of about 12 calves born per year was documented by researchers. In only two of those years were fewer than 11 calves seen. In six of the last eight years, however, calf counts have been nine or fewer, despite increased search effort, and in 1998, 1999, and 2000, only six calves, four calves, and one calf, respectively, were seen. With such low calf production and such a large proportion of mortality due to human causes, prospects for survival of the population are exceedingly grim.

The population's five known high-use habitats include a southern calving area and four northern feeding areas (Fig. 1). The calving area occurs along the coasts of Georgia and northeastern Florida, where pregnant females, females with newborn calves, and some juveniles typically begin arriving in late December or early January. By April, most have generally departed on their return migration north. The location of the rest of the population during these months is largely unknown. The four northern feeding grounds include two areas off Massachusetts: Cape Cod Bay, with peak periods of abundance typically between February and April, and the Great South Channel east of Cape Cod Bay, with peak abundance usually between April and June. Two other feeding areas are in Canadian waters: the Bay of Fundy, used principally between August and September, and the Roseway Basin off the southern tip of Nova Scotia, used in late summer and fall (although the area apparently was all but abandoned by right whales throughout much of the 1990s). Most females with calves seem to prefer the more protected waters of Cape Cod Bay and the Bay of Fundy during the spring and summer, respectively.

The calving grounds and two feeding areas in U.S. waters were designated as critical habitat for North Atlantic right whales under the Endangered Species Act in 1994. The two feeding areas in Canada have been designated as whale conservation areas. Neither designation confers specific regulations to protect right whales; however, they have served as a focus for other regulatory and public awareness efforts (see below). Two other areas that also may be important feeding areas, but are not well studied include Jeffreys Ledge off northeastern Massachusetts and New Hampshire, which is used by right whales in summer and between October and January, and the Georges Basin region, including the northern edge of Georges Bank, which is used in spring.

The National Marine Fisheries Service is responsible for research and management actions to promote the recovery of North Atlantic right whales under both the Marine Mammal Protection Act and the Endangered Species Act. Much of the research and recovery work, however, depends on independent research groups and the cooperation of other federal and state agencies. Working with the Service in this regard are the New England Aquarium, the Center for Coastal Studies, the University of Rhode Island, the International Fund for Animal Welfare, East Coast Ecosystems (an independent Canadian research organization), the Humane Society of the United States, the U.S. Navy, the U.S. and Canadian Coast Guards, the Army Corps of Engineers, the Environmental Protection Agency, Canada's Department of Fisheries and Oceans, the Massachusetts Division of Fisheries, the Georgia Department of Natural Resources, the Florida Fish and Wildlife Conservation Commission, the University of Georgia, and the Woods Hole Oceanographic Institution.

In 1991, pursuant to provisions of the Endangered Species Act, the Service adopted a recovery plan to organize and guide right whale recovery work. Subsequently it established two regional implementation teams whose members included representatives of many of the agencies and groups noted above. One team addresses recovery needs for the right whale calving grounds off the southeastern U.S. coast, and the other focuses on right whales, as

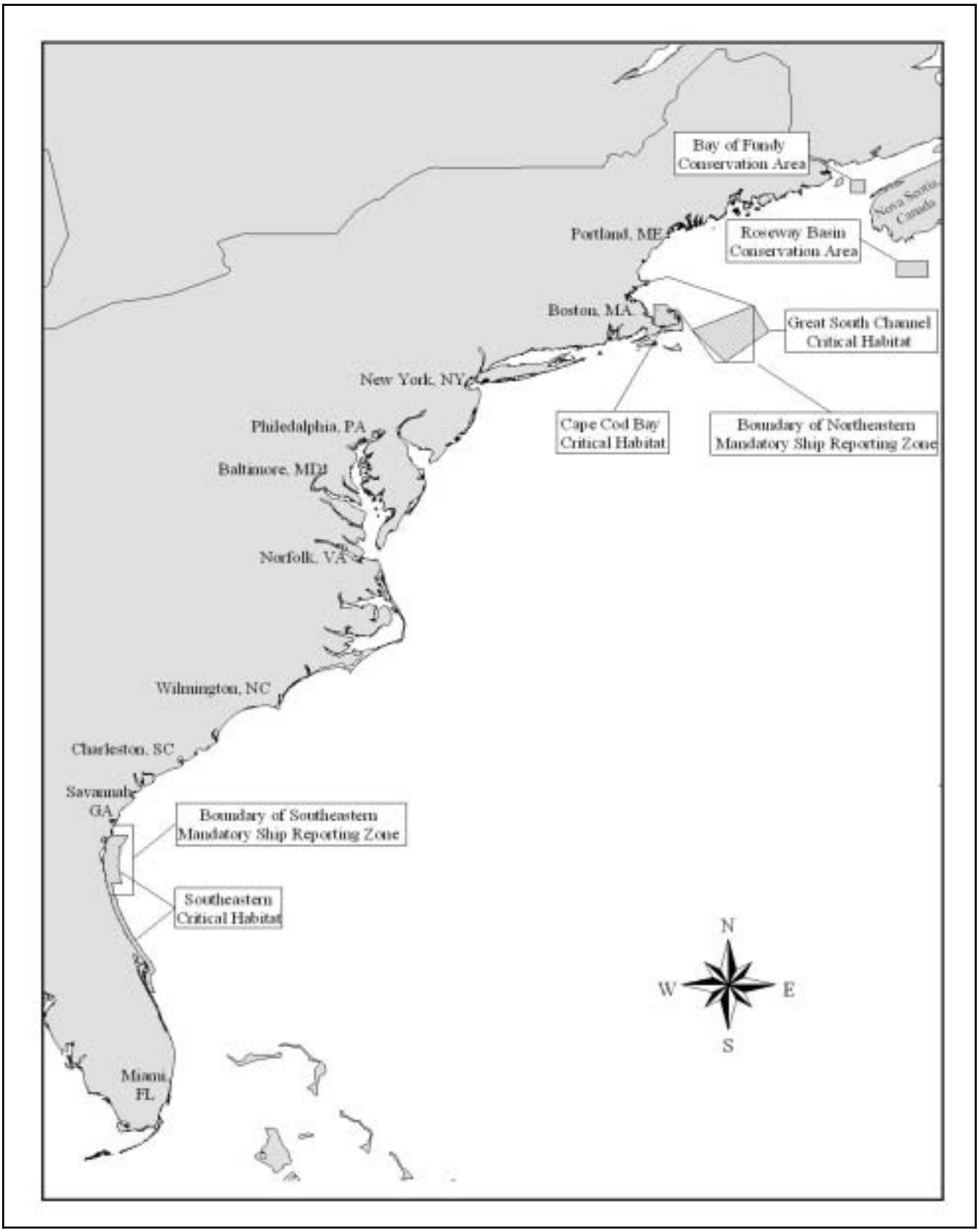
Bay of Fundy
Conservation Area
Nova Scotia
Canada
Portland, ME
Roseway Basin
Conservation Area
Boston, MA
Great South Channel
Critical Habitat
New York, NY
Philedalphia, PA
Cape Cod Bay
Critical Habitat
Boundary of Northeastern
Mandatory Ship Reporting Zone
Baltimore, MD
Norfolk, VA
Wilmington, NC
Charleston, SC
Savannah,
GA
Boundary of Southeastern
Mandatory Ship Reporting Zone
Southeastern
Critical Habitat
N
W
E
S
Miami,
FL

Figure 1. (Opposite page) Designated critical habitats and mandatory ship reporting zones for North Atlantic right whales (figure courtesy of Leslie Ward and Alex Smith, Florida Marine Research Institute).

well as humpback whales, on feeding grounds off New England. Periodic team meetings enable participating agencies and groups to review ongoing work, coordinate activities, and develop recommendations for action by the Service. In addition, the Service established the Atlantic Large Whale Take Reduction Team in 1996. The principal focus of this team has been to recommend actions to the Service to eliminate entanglement-related deaths and serious injuries of right whales. Established pursuant to requirements of the Marine Mammal Protection Act, the latter team includes representatives of federal and state agencies, relevant fisheries, environmental organizations, and the research community.

As discussed in previous annual reports, the Commission has participated on all three teams and has periodically reviewed the right whale recovery program to identify needed research and management actions. The Commission also has provided assistance in developing and carrying out specific recovery tasks. In 2000 the Marine Mammal Commission and its Committee of Scientific Advisors on Marine Mammals provided comments on the Service's fiscal year 2000 spending plan for work on right whales and reviewed right whale recovery activities during its 10–12 October 2000 annual meeting. In addition, the Commission's staff completed a review of available information on collisions between whales and ships. These and other matters concerning right whale conservation during 2000 are discussed in the next section.

Right Whale Mortalities and Injuries

Data on dead stranded right whales along the east coasts of Canada and the United States were first recorded in 1970. Since then, 46 dead right whales have been recorded, including one in 2000. About 40 percent of all documented carcasses (20 of 46) have shown signs of human interactions as the cause of death. Sixteen had injuries indicating that they were killed by collisions with ships, and four had evidence of entanglement in fishing gear. Two of the whales killed by ships were also entangled, suggesting that attached fishing gear may have restricted their movements and led to their being hit. Over the past ten years, since efforts to solicit and respond to reports of floating or stranded right whale carcasses were increased, half of all recorded deaths (11 of 22 carcasses) have had evidence of human causes—nine with ship strike injuries and three entanglements. The number of dead right whales not observed is almost certainly at least as great as the number documented.

The dead right whale observed in 2000 was found floating 40 miles (64 km) south of Block Island, Rhode Island, on 19 January. It was initially reported by a fisherman and subsequently videotaped by an aerial survey team sent to confirm the report. The carcass had fishing gear wrapped around its tail stock. From data in the right whale photo catalogue, the whale was identified as a three year old (whale #2701) last photographed on 12 September 1999 in the Bay of Fundy with no fishing gear attached. Bad weather prevented retrieval of the carcass. Although the attached fishing gear likely caused or contributed to the whale's death, the official cause of death was listed as unknown because the animal was not examined directly.

With the increased right whale survey efforts in recent years, the number of live right whales seen entangled in fishing gear also has increased. In 1999 six right whales were seen alive, but entangled — three in the Great South Channel and three in the Bay of Fundy. Four of these (whales #2753, #2710, #1158, and #2030) were known from the right whale photo catalogue. Most, but not all gear, was removed from the first three whales during rescue efforts or by the drag of telemetry buoys tied to the end of trailing gear to track the animals. During 2000 all three animals were resighted gear-free. Extensive efforts to disentangle the fourth (whale #2030), first seen entangled in May in the Great South Channel, were less successful. Although much of the gear was removed, a tightly wrapped loop cutting into the body could not be dislodged, and in October 1999 the animal was found dead off southern New Jersey with deep wounds cut into the body cavity by the attached line. The other two entangled whales were seen only once and photographs sufficient to identify the animals were not taken.

During 2000 at least five other entangled right whales were seen alive. The first (whale #1130) was

initially reported by a right whale aerial survey team on 1 March in Cape Cod Bay. It was an adult male with line and an attached buoy trailing from its left flipper. A disentanglement team from the Center for Coastal Studies was dispatched immediately, but was unable to remove the gear before dark. The whale was not resighted despite aerial searches over the following weeks and had not been seen again by the end of 2000.

In May aerial survey teams operating off Massachusetts documented two entangled right whales. One was an adult male (whale #1167) first seen on 8 May 40 miles (64 km) northeast of Cape Cod towing a red buoy at the end of 200 feet of line caught in the whale's mouth. The Center's disentanglement team was able to reach the whale and attach a telemetry buoy to track it, but because the whale did not appear to be badly entangled, it was decided not to attempt to remove the gear. In October, the animal was resighted in the Bay of Fundy with no gear attached. The second whale (#1720) was first seen on 31 May 80 (129 km) miles northeast of Cape Cod with line trailing from its mouth. The entanglement appeared to be minor, warranting monitoring but not intervention. It was last seen in June with the line still attached.

Figure 2. North Atlantic right whale found entangled in commercial fishing gear on 9 July 2000 in the Bay of Fundy and subsequently disentangled (photo courtesy of Center for Coastal Studies).

Two other entangled right whales were seen by researchers in the Bay of Fundy during the summer. On 9 July a juvenile of unknown sex (whale #2746, see Fig. 2) was found with line caught in its mouth and trailing three yellow buoys. During several rescue attempts, most, and possibly all, of the gear was removed. The whale was subsequently resighted free of gear. The other whale was an unidentified adult seen on 18 August trailing about 200 feet of line from its right pectoral fin. It was not resighted during 2000.

In addition to these entanglements, two other whales with rope or linear scars across their backs (whale #1301 and an animal not yet matched to a catalogued whale) were photographed in Cape Cod Bay by aerial survey teams. In both cases, the lines were not detected until the photos were examined closely several weeks later. Neither whale was trailing gear. The line on one whale (#1301) was first noticed in a photograph taken on 23 March. The whale was photographed again in April and October with the line still clearly visible. However, because there was no indication of additional abrasion on the later photos, it seems likely that the line is a scar from a previous entanglement rather than an attached rope. The line visible on the second animal, photographed on 7 April, also may be a scar.

Congressional Appropriations for Right Whale Recovery

Concerned about the species' plight, in September 1999 Congress provided a special $4.1 million appropriation to the National Marine Fisheries Service for work on right whales in Fiscal Year 2000. In appropriating those monies, Congress directed that they be spent in six areas: developing fishing gear modifications to reduce whale entanglement risks, early warning surveys and acoustic studies, reproductive research, habitat monitoring and population studies, tagging studies, and initiating a National Whale Conservation Fund. The Service was slow to develop a plan for allocating the appropriation; however, in mid-February 2000 it circulated a draft plan to the Commission and others for review. The draft included brief descriptions and funding estimates for 46 projects.

The Commission, in consultation with its Committee of Scientific Advisors, reviewed the draft plan and returned comments to the Service on 7 March 2000. It noted that the draft was a useful document for

seeking views on how the appropriation should be spent. As a matter of particular concern, however, the Commission noted that several proposed projects called for using the special allocation to pay the salaries of existing Service staff, obligations that presumably should have been covered in the Service's funding base. The Commission questioned whether this was consistent with Congressional intent and noted that such use of the funds could create serious long-term problems if the Service did not annually request and receive large special appropriations for right whale work, something that had not been included in past budget requests. The Commission therefore urged the Service to ensure that salaries of staff members needed to address its right whale recovery responsibilities are fully covered in the Service's future base funding requests.

With regard to project proposals, the Commission noted that most project descriptions were too brief to convey precisely what work was envisioned. Many projects also appeared to assume unstated levels of supplemental funding or support from other agencies and organizations. The Commission therefore recommended that the Service prepare and circulate a more complete plan after considering reviewers' comments.

The Commission expressed support for many of the proposed projects, including work to disentangle whales, develop fishing gear less likely to entangle whales, operate mandatory ship reporting systems to alert vessel operators of right whale protection needs in key habitats, encourage shipping companies to act in ways that would reduce risks of ship collisions, analyze data on ship traffic in right whale habitats, investigate right whale reproduction problems, and undertake telemetry studies using satellite-linked tags to track right whales. The Commission also suggested ways of reducing project costs and identified several projects and expenses that it believed were either of low priority or should be funded by sources other than the special appropriation (e.g., paying court fees for right whale–related lawsuits and studies of night vision optics to detect right whales). The Commission recommended that those savings be used to expand vessel support for right whale habitat assessment and monitoring studies, hire a full-time fishing gear specialist to work with the fishing industry on developing and testing gear designs less likely to entangle whales, and support satellite tracking studies for a second year.

As of the end of 2000 it appeared that all of the proposed projects for which the Commission expressed support had been funded. Several of its recommendations, however, were not addressed. In the time available to implement its spending plan, the Service was unable to develop and circulate a more detailed plan. Because of its budgeting practices, the Service also had to use a portion of the special appropriation to pay for salaries of existing staff. The Service also did not redirect any funding to pay for a second year of satellite tracking work.

Reflecting its continued concern for right whales, Congress passed an appropriation bill on 15 December 2000 that increased funding for right whale work in fiscal year 2001 to $5 million. The measure directs that tagging studies be made a priority. To help ensure that the funds are not diverted for other purposes or Service expenses, it also directed that $2.9 million be provided directly to the Northeast Consortium for a competitive grants program on right whales. The consortium, a nongovernmental group of universities and research organizations in New England, is to use this money to support projects to develop whale-friendly fishing gear, reduce conflicts between right whales and industries, tag and track whales, study acoustics, assess right whale habitats, and develop hydrodynamic models. The remaining $2.1 million is to be used by the Service to meet its responsibilities for implementing right whale recovery work, including aerial surveys and enforcement. The measure directs that no more than 30 percent of that amount be used for staff salaries. Noting delays in developing the fiscal year 2000 spending plan, it also directs the Service to provide the House Committee on Appropriations with a spending plan for fiscal year 2001 by 30 January 2001 and a five-year research and management plan for right whales by 31 July 2001.

Preliminary guidelines for the fiscal year 2001 right whale appropriation were set forth in a House Appropriations Committee report released in September 2000. Plans to address the guidelines were discussed during the Marine Mammal Commission's review of major right whale issues at its 10–12 October 2000 annual meeting. Based on those discussions, the Commission wrote to the Service on 17 November

2000 providing recommendations on this and other right whale recovery program needs. To help ensure that the available funds for fiscal year 2000 are spent efficiently, the Commission recommended that, if it had not already been done, the Service immediately initiate consultations with the Northeast Consortium to develop and agree on work appropriate for funding by the Service and the consortium. In its 26 December 2000 reply, the Service noted that it had begun consultations with the consortium, but that it could not direct how consortium funds should be spent.

Collisions between Ships and Right Whales

Most of the known human-related right whale deaths along the eastern United States and Canada (16 of 19 deaths since 1970) have been caused by collisions between large ships and whales. Actions by the Commission and other to reduce these risks are discussed below.

Early Warning Systems – As a first step to reduce ship strike risks for right whales, the Navy, the Coast Guard, the Army Corps of Engineers, and the New England Aquarium, in cooperation with the National Marine Fisheries Service, began an early warning system in the winter of 1993–1994 to advise ships transiting the winter calving grounds off Georgia and Florida where whales were located. The system relies on daily aerial surveys (weather permitting) over the core of the calving grounds from mid-December through March. Whale locations are immediately radioed to a sightings clearinghouse maintained by the Navy, which then relays the information to the Coast Guard, regional port officials, port pilots, Navy ships, and others to alert vessel operators. The Coast Guard provides the sighting information to vessels via broadcast notice to mariners, voice radio, and NAVTEX (a telex communication system onboard most large ships).

By making such information available, it is hoped that vessel operators will be more aware of right whale conservation needs and better able to avoid whales. Although several close approaches to whales by ships have been observed by aerial survey teams, no documented collisions have been reported in the core calving area since 1993 although one collision was documented off northern Georgia in 1996.

Over the years, the system has been refined and expanded. With funding from the National Marine Fisheries Service, periodic surveys also are flown outside the core survey area by the Florida Fish and Wildlife Conservation Commission and the Georgia Department of Natural Resources. Reports of opportunistic sightings by mariners and coastal residents also are encouraged and verified by survey teams. With new communications equipment and procedures, and Navy operation of the sightings clearinghouse, right whale sightings can now be broadcast to mariners within 10 to 15 minutes from the time they are made.

During the first five years of the program, surveys over the core calving area produced approximately 325 sightings of one or more right whales, with an average of about 35 whales identified per year. As a result, the surveys have been important for research purposes as well as for alerting mariners. In the past two winters, however, sightings dropped sharply to six in the winter of 1998–1999 and 12 in the winter of 1999–2000. No more than 10 individuals were identified in either year. In both years, area water temperatures were unusually warm, and in February 2000 the Service supported surveys off North Carolina and South Carolina to determine if whale migrations had terminated in cooler waters north of the traditional calving area. During seven surveys off the Carolinas in late January and early February, about 15 whales were seen, with only one unconfirmed calf sighting. Survey efforts for the calving area in the winter of 1999–2000 therefore produced the lowest calf count to date despite expanded search effort.

The Navy has several bases in Georgia and northeastern Florida and, for the past several years, the commander of the Navy's Atlantic fleet has issued directives that Navy ships transiting the right whale calving grounds during the calving season reduce speed when within 5 nmi of any right whale sighting location less than 12 hours old. The directive also requires Navy ships to avoid north-south transits of calving grounds and to stay at least 500 yards from any observed right whale. The directive was reissued for the 1999–2000 calving season. On 10 March the Commission wrote to the Navy noting that declining status of the right whale population made the directive, as well as Navy support for aerial surveys and the sightings clearinghouse, more important than ever. It therefore thanked the Navy for its continuing attention to right whales and commented that its efforts were a

noteworthy example of the Navy's attention to critical environmental protection needs.

In 1996 the Service, the Coast Guard, the Massachusetts Division of Fisheries, and the Center for Coastal Studies began similar programs to survey for right whales and alert ships of their locations in northern feeding areas— principally Cape Cod Bay and the Great South Channel. Because of the large expanse of feeding areas, the offshore location of some feeding areas, frequent periods of bad weather, and other reasons, the surveys of feeding areas are usually flown two days per week at most during late winter and spring and less frequently during other times of the year. Between January and September 2000 the northeast survey programs recorded more than 1,300 right whale sightings, including initial sightings of three entangled whales that served to mobilize disentanglement efforts mentioned earlier. The surveys also documented temporary feeding concentrations of whales north and east of the designated critical habitat area in the Great South Channel.

Outreach Efforts to Educate Mariners – Accompanying these whale sighting programs have been outreach efforts to inform mariners about right whales, whale collision risks, and precautionary needs. With assistance from the Marine Mammal Commission and other groups, various educational materials were prepared for the Service by the International Fund for Animal Welfare in 1998 and 1999. These include brochures, placards, videos, and additions to nautical publications, such as regional editions of the *United States Coast Pilot* and nautical charts. The Service also prepared magazine articles for professional mariners and information for port entry guides to east coast ports, Notices to Mariners, and *Sailing Directions* published by the National Imagery and Mapping Agency. In part, these materials advise mariners to be alert for the presence of right whales and right whale–related broadcasts in right whale habitats, to assume that whales will not act to avoid oncoming ships, and to exercise caution, including the maintenance of safe speed when within a few miles of a whale sighting location.

At the recommendation of the Commission, the Service also contracted for a study on ways to enlist the cooperation of shipping companies operating in right whale habitats. This effort has sought help in identifying and carrying out voluntary measures to reduce the risk of ships hitting right whales. Work on the project began in 1999 and continued during 2000. To date, regional workshops for officials of shipping companies and ports have been held at most major east coast ports to solicit comments and advice from the shipping community on ways to reduce risks to right whales. Based on those meetings, the contractor has developed a discussion draft report identifying possible management options, including voluntary and mandatory measures to restrict vessel speeds and routes in right whale habitats. That report and possible management measures are to be discussed during a workshop with shipping industry representatives in the spring of 2001, after which a report and recommendations will be provided to the Service.

Mandatory Ship Reporting Systems – The Service and the Coast Guard, with assistance from the Commission, also sought and received approval from the International Maritime Organization to establish mandatory ship reporting systems in the right whale calving grounds off Georgia and northeastern Florida and in feeding areas off Massachusetts (Fig. 1). The systems require that operators of commercial vessels greater than 300 gross tons contact a shore station for information on right whales upon entering both areas. Messages are automatically sent to ships by a satellite communications system, advising mariners of recent right whale sighting locations, the need for caution to avoid whales, and the availability of related advice in regional *Coast Pilots*. The ships also must provide information on intended destinations, routes, and speeds to help monitor and assess vessel traffic patterns through right whale habitats.

The two systems, which are funded and operated jointly by the Coast Guard and the National Marine Fisheries Service, went into effect on 1 July 1999. During their first year of operation, about 1,800 ships reported to the northeast system and 2,000 ships to the southeast system. At the end of 2000 data on ship routes and speeds reported by those vessels were being analyzed to assess traffic patterns through the areas.

Compilation of Data on Ship-Struck Whales – To date, identification of measures vessel operators might take to avoid collisions with whales has been constrained by a lack of information on circumstances and factors surrounding collision events (e.g., the type and speed of involved vessels, the behavior of whales ahead of oncoming ships, etc.). To help fill this gap,

and recognizing the limited data available on collisions with right whales, the Commission organized a study to compile data on collisions between motorized vessels and all species of large whales. The study, completed in 2000 (see Laist et al. 2001, Appendix C), reviewed historical collision records, recent whale stranding records, anecdotal accounts from vessels involved in collisions, and data on the numbers and speeds of ships over time.

Historical records suggest that ship strikes fatal to whales first occurred late in the 1800s when the speeds of the fastest ships of the day began to reach about 13 to 15 knots. Of the few early records that were found, several involved passenger liners and warships that were among the few vessels then able to travel at speeds greater than 15 knots. Collision records remained infrequent until about the 1950s and then increased between the 1950s and 1970s when the number of ships larger than 100 gross tons increased sharply and the speed of most vessels began to increase above 15 knots.

Stranding records indicate that several species of large whales are struck more frequently than previously thought. For example, between 1975 and 1996, one-third of all dead fin whales found along the U.S. east coast (31 of 92 whales) either were carried into port on the bows of ships or had massive injuries indicating that they had been struck by large vessels. One-quarter of all dead humpback whales (9 of 36 whales) found between Delaware and Cape Hatteras, North Carolina, also had injuries indicating collisions with large vessels.

Anecdotal descriptions were found for 58 collisions involving at least 10 whale species. The accounts indicate that all sizes and types of vessels may hit whales, ranging from small outboards to aircraft carriers. Most severe and lethal injuries, however, involved vessels 80 m or longer. The smallest vessel involved in a fatal collision was a 20-m high-speed ferry traveling at 45 knots. Among those accounts with information on whether or when whales were seen before the collision, more than 90 percent reported that the whale was not seen beforehand or seen too late to be avoided. There were few accounts with information on the behavior of whales before the collision; however, some suggested a last-second flight response by whales when ships approached to within a few tens of meters.

From information in the 58 accounts, it appeared that 23 collisions involved whales that were killed, 15 caused severe injuries (i.e., bleeding wounds, some of which may have been fatal), 8 involved minor injuries (wounds or behavior effects but no reports of bleeding), 2 had no apparent effects, and 10 had insufficient information to assess effects. Among accounts with lethal or severe injuries and data on vessel speed at the time of the collision, nearly 90 percent (25 of 28) involved ships moving at 14 knots or faster and none was moving at less than 10 knots. In almost all accounts involving minor injuries or no apparent effects, vessels were traveling at less than 10 knots or were small boats a few meters in length.

Because most whales hit by ships apparently are not seen beforehand or are seen too late to be avoided, the analysis concluded that collision avoidance strategies that depend on vessel operators to detect and avoid whales while moving at high speeds are unlikely to be effective for large vessels with limited maneuverability. Rather, where steps are needed to reduce collision risks, planning appears necessary to avoid or minimize travel distance through high-use whale habitats or to reduce vessel speed in waters where whales are likely to occur. Regarding the latter point, the analysis suggests that reducing vessel speed to below at least 14 knots would be needed to effectively reduce collision risks.

High-Speed Vessels – In recent years high-speed vessels capable of 30 knots or more have entered service in important right whale habitat. Although these principally include ferries and whale-watching boats, high-speed tankers and freighters also are possible in the foreseeable future. Because the speed and wake of high-speed vessels pose navigation hazards for other vessels, the Coast Guard published a notice in the *Federal Register* on 12 April 2000 asking for comments on whether regulations or other actions related to the operation of high-speed vessels are needed to enhance waterway safety. As indicated above, vessel speed appears to be a factor in collisions between whales and ships, and the Commission therefore wrote to the Coast Guard on 30 June 2000 providing preliminary results of the review of collisions between whales and ships.

In its letter, the Commission noted that six collision accounts compiled in that review (about 15 percent since 1975) involved high-speed vessels, and

that several of those collisions caused significant damage to the vessels, as well as some injuries and one death of humans. It therefore noted that high-speed vessels could pose risks to whales and, conversely, whales could pose navigation hazards for high-speed vessels. Because of the declining status of North Atlantic right whales and the high proportion of ship strikes among known causes of right whale mortality, the Commission expressed particular concern about the operation of such vessels in important right whale habitat. The Commission recommended that the Coast Guard expand the scope of its review to consider whale-related navigation hazards and impacts to whales, and that it consult with the National Marine Fisheries Service to determine whether additional vessel management measures are needed to reduce the impact of high-speed vessels, as well as conventional vessels, in important whale habitats.

A response to the Commission's letter was provided by a representative of the Coast Guard during the Commission's review of major right whale issues at its 10–12 October annual meeting and by letter of 24 October 2000. The Coast Guard advised that although it recognized potential hazards that high-speed vessels pose to whales, its authority to manage vessel traffic stems from the Ports and Waterways Safety Act. According to the Coast Guard, that Act authorizes it to establish measures to protect navigable waters and their resources from pollution emanating from vessels or from harm resulting from damage, destruction, or loss of vessels, and that it does not have authority to issue regulations to control vessel operation solely for the protection of living marine resources. Thus, the Coast Guard asserts that it cannot promulgate rules for vessel traffic routes or vessel speed to prevent high-speed vessels from hitting whales.

The Coast Guard also advised that its staff was developing guidelines for the operation of high-speed vessels that would highlight best practices that operators should follow when operating in waters frequented by marine mammals, particularly right whales. It noted that those guidelines would highlight existing National Marine Fisheries Service regulations to prevent ship strikes, such as the prohibition against approaching right whales closer than 500 yards.

St. Johns River Power Plant – In early July 2000 the Commission received an environmental impact statement from the Department of Energy on plans to repower an existing power plant on the St. Johns River, Florida, using technology designed to minimize air pollution. The new technology requires the delivery of limestone and coke to the plant by ships traveling up the St. Johns River. Although the ships would have to cross right whale calving grounds off the mouth of the St. Johns River, the statement did not identify the frequency of vessel trips to and from the power plant or consider the potential risk of ship collisions with right whales.

The Commission therefore wrote to the Department on 21 July 2000 noting that vessels servicing the plant could pose a risk to right whales and that results of the study noted earlier suggested that serious injuries to whales appear to be less likely when ships use speeds below 14 knots. The Commission recommended that the Department require that vessels servicing the plant during the winter right whale calving season limit their speed to below 14 knots when crossing the right whale calving grounds. The Commission also recommended that the Department consult with the National Marine Fisheries Service to assess the risks of project-related vessel traffic on North Atlantic right whales.

On 27 October 2000 the Department responded to the Commission's letter. It advised that vessels servicing the power plant would make about 50 deliveries per year, which was less than 2.5 percent of the 2,047 round trips made by large ocean-going vessels using the St. Johns River in 1999. It also noted that vessels servicing the plant were not expected to travel at more than 12 knots, and that it therefore had concluded that additional measures to protect North Atlantic right whales would not be needed. The Department also noted that it had contacted the National Marine Fisheries Service as recommended and that the Service had concurred with this assessment.

Vessel-Related Management Recommendations – During the Marine Mammal Commission's 10–12 October 2000 annual meeting, representatives of the Service and other involved groups described recent actions to reduce risks of ships hitting right whales. Based on that review, the Commission wrote to the Service on 17 November 2000 advising it of the results of a review of information on collisions between whales and ships. To help mariners determine appropriate actions to minimize the risk of hitting right whales, the

Commission recommended that the Service update advice in the *United States Coast Pilot*, messages sent to ships through the mandatory ship reporting systems, and other educational materials to note that data show that speeds below 14 knots are likely to reduce the risk of fatal or severe injuries to whales.

The Commission also recommended that the Service fund an economic analysis of alternative vessel management measures, including speed reductions, currently being developed under contract to the Service. Finally, the Commission recommended that the Service's Office of the General Counsel conduct a review of domestic and international authorities that could be used to implement speed and routing measures in right whale critical habitats.

The Service responded to the Commission's letter on 26 December noting that, although it made intuitive sense that slow-moving ships would result in fewer ship strikes, the Service believed it was premature to add new language on ship speed in mariner advisories and education materials and that it planned to forward the Commission's letter to the right whale implementation teams to seek their views. The letter also advised that the Service planned to provide funds during 2001 to carry out the recommended economic study. With regard to the legal analysis of potential speed and routing requirements, the Service advised that it would examine the need for such a review after work under the ongoing contract to develop vessel management options was completed.

Entanglement of Right Whales in Fishing Gear

A second source of human-related right whale mortality is entanglement in commercial fishing gear, principally gillnets and lines from lobster traps. Although fewer deaths have been documented from fishing gear than from ship collisions, additional undocumented fishery-related deaths seem likely. Eight right whales in the population's photo-identification catalogue, last seen with potentially fatal entanglements or related injuries, have not been resighted, either dead or alive.

Pursuant to provisions of the Marine Mammal Protection Act, the National Marine Fisheries Service convened an Atlantic Large Whale Take Reduction Team on 6 August 1996. The team, which includes representatives of relevant fisheries, federal and state agencies (including the Marine Mammal Commission), environmental organizations, and the research community, was charged with recommending a plan to the Service to reduce the incidental take of whales in gillnet and lobster fisheries along the U.S. Atlantic coast. Because of their extremely endangered status, right whales have been the primary focus.

The Act requires that incidental take levels be reduced to below a calculated potential biological removal (PBR) level for each affected large whale stock within six months of implementing a plan's measures. PBR is the number of marine mammals that can be removed from a stock (not including natural mortality) and still have assurance that it would be able to increase toward or remain at its optimum sustainable population. The PBR level for North Atlantic right whales was initially calculated as 0.4 whales per year but has since been set at zero.

After several meetings, the team recommended measures to the Service in February 1997. Based in part on those recommendations, the Service adopted interim final rules to implement a take reduction plan for Atlantic large whales on 22 July 1997. These were adopted with minor changes as final rules on 16 February 1999. To reduce entanglement risks, the plan relies primarily on seasonal fishing closures in designated right whale critical habitats, gear design requirements thought to reduce the likelihood of whales becoming entangled, research on new gear modifications to reduce entanglement risks, and support for teams of experts trained in disentangling whales. Disentanglement techniques have been developed by the Center for Coastal Studies in Provincetown, Massachusetts, which recently has been training other teams of researchers and officials. Disentanglement work is dangerous both for the people working to free whales and for the whales. Only teams authorized by the Service are allowed to perform this work.

As discussed in the previous annual report, the Commission believed that regulatory measures in the take reduction plan were too weak to offer much protection. Initial proposals for gear modifications were strongly opposed by the fishing industry because of the cost of modifying their gear and questions about their practicality and effectiveness. The Service therefore relaxed most of these restrictions to a point where few fishermen were required to make any gear alterations.

Seasonal fishery closures in right whale critical habitat also were weak. For example, during the

principal period of right whale occurrence in Cape Cod Bay (1 January to 15 May), the closures prohibited gillnet fishing, which had not previously occurred in that area or during that period, but permitted lobster fishing, which had occurred in that area and during that period, subject to certain gear modifications. Similarly, during the period of principal right whale occurrence in the Great South Channel (1 April to 30 June), the closures prohibited lobster fishing, which had not previously occurred in that area or during that period, but permitted gillnet fishing to continue in that portion of the area where it had previously occurred. By excluding preferred fishing areas inside designated critical habitats or allowing fishing to continue with some gear modifications, the Service allowed almost all fishing effort that had occurred in the past to continue and possibly expand. In view of the weak and untested gear requirements and the practical constraints on detecting and freeing all entangled whales, the Commission recommended on several occasions that the Service expand fishery closures to include all areas within designated right whale critical habitat during periods when whales were most abundant. Commission recommendations in this regard have not been adopted.

Entanglement reports during 1999 indicated that the take reduction plan had not reduced the incidental take of right whales to the level required by the Marine Mammal Protection Act. The Commission therefore wrote to the Service on 1 October repeating its recommendation that the Service close the gillnet fishing area left open within the Great South Channel critical habitat (i.e., the "sliver" area) before the spring of 2000 when right whale abundance in the area would again peak. The Service responded on 16 December 1999, noting that it was reviewing data on right whale occurrence in that area, that it planned to reconvene the Atlantic Large Whale Take Reduction Team early in 2000 to consider recommendations for further action, and that it was therefore deferring action in this regard.

Information obtained after the Commission's 1 October letter (i.e., the dead entangled right whale found late in October 1999 off New Jersey, the entangled carcass observed floating off Rhode Island in January 2000, and observations of at least five other entangled whales in 2000) clearly indicates that measures taken under the take reduction plan adopted by the Service in February 1999 have been inadequate. Responsive action by the Service, however, has been slow.

The Service reconvened its Atlantic Large Whale Take Reduction Team on 23–24 February 2000 to review the plan's provisions and recent right whale entanglement records. The team agreed to recommend that new gear modifications be required, including weak links on buoys, anchoring requirements with weak links in the float line at the center of each individual panel on gillnet strings, and restrictions on the number of buoys. Weak links were recommended on the theory that the pulling force of a whale would result in the release of buoys or net panels, which would limit the drag on entangled whales and improve their chances of freeing themselves. Restrictions on the number of buoys, achieved mainly by requiring multiple lobster traps rather than a single pot on each buoy, would reduce the number of vertical lines in the water column.

Because it was not known whether such gear modifications would effectively reduce entanglement, the team also reconsidered seasonal fishing closures during times and in areas where right whales are most abundant. These proposed closures were debated during several subsequent meetings in the spring of 2000. The team was unable to agree on any measures to expand seasonal closures within designated right whale critical habitat; however, it did agree in concept to a dynamic management system in which an area might be quickly closed on a short-term basis if concentrations of whales were observed to temporarily take up residence. For example, if a group of right whales was seen feeding in an area on two successive aerial surveys within a period of a few days, the Service would immediately close that area after the second sighting for some designated period (e.g., two weeks), or until subsequent surveys confirmed that whales had left the area. Criteria for operating such a scheme, such as determining when to close and reopen a temporary whale management area, were suggested, but it was left to the Service to develop details. It was recognized that such a system could be useful for gillnet fisheries, but would be of limited use for the lobster fishery because of the amount of time needed for lobster fishermen to remove traps.

Based on the team's recommendations, the Service decided to follow a two-step rulemaking process to strengthen its take reduction plan. First, it would

develop interim final rules for new gear modifications agreed to by the team. These would be published by the end of 2000. Second, by the summer of 2001, it would develop rules for possible closures. During the Marine Mammal Commission's review of right whale issues at its 10–12 October 2000 annual meeting, representatives of the Service reviewed agency plans.

Because of the species' desperate and worsening plight, the Commission strongly believes that a more aggressive approach is urgently needed, and that management actions must provide greater certainty that entanglement risks will be reduced. The Commission continues to believe that the best approach is to take immediate action to prevent the deployment of potentially hazardous fishing gear in designated right whale critical habitats when right whales are most abundant. The Commission therefore wrote to the Service on 17 November 2000, expressing support for the gear modification proposals developed by the Atlantic Large Whale Take Reduction Team. However, the Commission also recommended that, as part of the interim final rules to amend the take reduction plan, the Service also (1) prohibit either all lobster fishing or all lobster traps with vertical buoy lines in the Cape Cod Bay right whale critical habitat between January and mid-May, and (2) prohibit gillnet fishing throughout the Great South Channel right whale critical habitat in spring.

On 21 December 2000 the Service published interim final rules to implement the new gear modifications. The rules included no new closure provisions. Because the Service determined that it would be contrary to the public interest to delay implementation of the measures, the proposed rulemaking stage was bypassed and the interim final rules were scheduled to take effect on 22 January 2001.

The interim final rules expand existing gear modification provisions under the original take reduction plan adopted in February 1999. The new requirements include weak links for both lobster pot and gillnet buoys, weak links for individual gillnet panels, and restrictions on the number of buoys. The provisions create a complex system with different combinations of gear modifications required for different times of the year and different geographic areas. Seven management zones are established for lobster gear and four for gillnets. Depending on the time and area, weak links for buoys on inshore lobster pots must separate under strains of either 500 or 600 lbs, and buoys for larger offshore lobster pots must separate under a 3,780-lb strain. In all cases, weak links must separate leaving a knot-free end so that the line will slip more easily through whale baleen. Although not required, fishermen are encouraged also to use knot-free buoy lines. In most areas, inshore lobster pots must have at least two traps per buoy. Weak links for gillnet buoys and net panels must break under a strain of 1,100 lbs.

On 26 December 2000 the Service responded to the Commission's 17 November letter advising that the Commission's recommendations regarding closures were being considered. The Service noted that it had authority to close the gillnet fishing area within the Great South Channel critical habitat and expected to do so next spring if aerial surveys detected right whales in the area.

The National Whale Conservation Fund

The Commission's past reviews of the right whale recovery program have consistently concluded that funding necessary to accomplish important recovery tasks has not been sufficient. In December 1996 the Commission therefore wrote to the National Marine Fisheries Service recommending that steps be taken to develop a right whale conservation fund supported by industry fees or donations and nongovernmental contributions. Such a fund could supplement special Congressional appropriations for right whale work and expand the ability to address urgently needed tasks.

The Service expressed support for the idea and, in response to the Commission's recommendation, Senators Judd Gregg and Ted Stevens cosponsored a bill that was passed late in 1998 (P.L. 105-277). The bill directed the National Fish and Wildlife Foundation, in consultation with the Marine Mammal Commission and the National Oceanic and Atmospheric Administration, to establish a National Whale Conservation Fund. The purpose of the fund is to provide a means of soliciting voluntary contributions from industry, private foundations, and the general public "to support research, management activities, or educational programs that contribute to the protection, conservation or recovery of whale populations of the United States." In taking its action, Congress directed that the fund's scope consider needs for all large whales to broaden the base of potential donors and to address funding con-

straints affecting other species. Congress directed, however, that the fund give priority to the most endangered whale populations, including right whales.

Because no funds were appropriated to initiate fund-raising work and because neither the Foundation, the Commission, or the Service had money to contribute for this purpose, no progress was made on the fund in 1999. However, late in 1999 Congress directed that the Service provide $250,000 from its fiscal year 2000 right whale budget to the Foundation to begin work on building the new fund.

To plan the fund's development, the Commission convened several meetings involving representatives of the Foundation and the Service early in 2000 and provided advice to the Foundation on needed actions, including the formation of a governing council for the fund, development of marketing and fund-raising strategies, selection of a fund director, and other matters. The Service transferred the appropriated money, less a mandatory rescission imposed by Congress, to the Foundation early in 2000. The Commission, in consultation with the Foundation and the Service, wrote to prospective council members to provide background information on the fund and to advise them that an invitation to serve would be forthcoming from the Foundation.

Because of a change in leadership, the Foundation was unable to focus immediate action to develop the fund; however, late in 2000 the Foundation completed a work plan setting forth a schedule of actions to establish the fund, advertised for candidates to fill the position of fund manager, and drafted letters of invitation for membership on the fund's governing council. As of the end of 2000 it was expected that the letters to prospective council members would be sent early in 2001, and that a portion of the Congressional appropriation plus additional funds raised from other sources would be dispersed as an initial grant-making effort during 2001. Consistent with Congressional intent, the fund's initial grants are expected to focus on North Atlantic right whales.

North Atlantic Right Whale Recovery Plans

At the recommendation of the Marine Mammal Commission, the National Marine Fisheries Service developed a recovery plan for right whales that was adopted in 1991. Because that plan is now badly out of date, the Service has been developing a draft revision. A preliminary draft was provided to the Commission during its 10–12 October 2000 annual meeting. At that time the Service advised that the draft had not yet undergone a complete review within the Service, but that it would be provided to other parties involved in right whale recovery work to help ensure that it was as complete and useful as possible. Based on comments and further internal review, the Service plans to complete a final draft revision that will be made available for public comment.

In September 2000 Canada's Department of Fisheries and Oceans also completed a right whale recovery plan to help direct work in waters under its jurisdiction. The plan is modeled after the Service's right whale recovery plan, and a Canadian Right Whale Recovery Team has been established to oversee its implementation. Among other things, the plan calls for considering options to redirect existing vessel traffic through the Bay of Fundy to avoid important right whale habitat. It also calls for investigating new time-area fishery closures to prevent entanglements, improving regional right whale disentanglement capabilities, and assessing steps to prevent disturbance of right whales by whalewatchers and other vessel operators.

Right Whale Litigation

As discussed in previous annual reports, litigation has played an important role in prompting federal and state actions directed at avoiding the taking of right whales. During 2000 a new lawsuit was filed by the Humane Society of the United States against the Secretary of Commerce and other officials (*Humane Society of the United States* v. *Mineta*) seeking to compel the strengthening of regulations designed to reduce the taking of right whales incidental to commercial fishing operations.

In its complaint, filed in the U.S. District Court for the District of Massachusetts, the plaintiff alleges that the Commerce Department has violated the Endangered Species Act by, among other things, its failure to develop and implement plans for the conservation and survival of the North Atlantic right whale and for failing to ensure that the fisheries management program is not likely to jeopardize the species' continued existence. The complaint further argues that the defendants have violated the Marine Mammal Protection Act by failing to issue regulations

that effectively reduce the incidental take of North Atlantic right whales in commercial fishing operations. Among other things, the plaintiffs allege that the National Marine Fisheries Service has failed to close portions of the area designated as North Atlantic right whale critical habitat to gillnet and lobster fishing and allowed the use of high-risk types of fishing gear in critical habitat at known times of high use by right whales. The Service is also cited for failing to establish an adequate program of research and development to devise improved fishing methods and gear.

The plaintiff asked the court to compel the Service to issue emergency regulations mandating modifications in lobster and other fishing gear and restricting or completely closing fisheries in areas where right whales are known to aggregate. In addition, the plaintiff seeks to require the Service to develop performance standards to evaluate the effectiveness of its regulations relating to right whales, and to prohibit deployment of lobster gear using vertical lines in Cape Cod Bay. The complaint further asked the court to require the Service to convene a shipstrike take reduction team for the purpose of developing an effective take reduction plan that would meet the requirements of the law.

As of the end of 2000 no briefs had been filed or schedule set in this case.

North Pacific Right Whale *(Eubalaena japonica)*

The North Pacific right whale, once abundant over a large part of the North Pacific Ocean, is currently recognized as two populations: one on the western side of the North Pacific and the other on the eastern side. These populations have distinct catch and recovery histories and non-overlapping feeding grounds. The extent of possible exchange between the two populations is unknown, and nothing is known about where either of these populations breed and calve.

Both populations were severely depleted by 19th century whaling. French and American whalers began harvesting North Pacific right whales around 1835. Logbook data from American whalers show that large catches of right whales were taken in the Gulf of Alaska (which the whalers called the "Kodiak grounds") and in the southeastern Bering Sea (called the "Bristol Bay grounds"). By the late 1850s catch levels for right whales were in major decline on both the Kodiak and Bristol Bay grounds, and whalers had already moved into more northern Arctic waters to hunt the more valuable and more abundant bowhead whale. Between 1835 and the 1890s, the estimated catch of all North Pacific right whales likely exceeded 15,000 animals, with an additional unknown number of whales struck and killed but not retrieved.

Some North Pacific right whales continued to be taken opportunistically at the end of the nineteenth century and the start of the twentieth century, but mainly during transit to the bowhead whale hunting grounds in the Arctic. Modern whaling with steam catcher-boats and harpoon cannons began in the early part of the twentieth century, but land-based processing stations limited their hunting range. By the start of the twentieth century, the whalers had almost succeeded in exterminating the North Pacific right whale. This is evidenced by the low catch levels reported in the eastern North Pacific during the first three decades of the twentieth century, when fewer than 40 right whales were killed by shore-based operations in Alaska and British Columbia, Canada. During this period, some recovery of this depleted population must have occurred, and in 1935 many whaling nations adopted an international ban on hunting right whales. Japan and the Soviet Union, however, did not accept the measure and were not legally bound by its provisions. After World War II, Soviet and Japanese factory ships conducted whaling operations in the North Pacific.

In 1949 the Convention for the International Regulation of Whaling was concluded and subsequently signed by all major whaling nations, including Japan and the Soviet Union. The Convention extended the 1935 ban on hunting right whales worldwide although killing right whales for research purposes was allowed subject to unilateral authorization by any member nation. In the early 1960s pelagic whaling fleets from both Japan and the Soviet Union started to operate in the eastern Bering Sea and the Gulf of Alaska. Sightings data collected by their whaling operations and reported to the International Whaling Commission suggested that right whales numbered in the low hundreds of animals. Between 1961 and 1963 the Japanese pelagic whaling fleets operating under a special scientific permit killed nine right whales in the southeastern Bering Sea and the Gulf of Alaska.

Between 1963 and 1967 Soviet factory ships illegally killed 372 right whale in these same waters. This catch, however, was not reported and did not become public until 1999. Since 1968 no hunting has occurred on this population, and by the mid-1970s the Japanese and Soviet pelagic whaling operations moved to more southern parts of the North Pacific. Thus, few additional right whale sightings were reported. Little effort and few right whale sightings were made in the northeastern parts of the North Pacific in the 1980s.

During the 1990s infrequent right whale sightings continued to be reported, but the number of individuals seen remained small. In the late 1990s regular sightings of at least a few individuals were reported in the southeastern Bering Sea, and in 1998 the National Marine Fisheries Service initiated a long-term monitoring program in what was the old Bristol Bay whaling grounds. The whales using this area, which may number only a few dozen animals, are the remnants of the eastern North Pacific right whale population. During 1998, 1999, and 2000 the Service recorded sightings of 5, 6, and 13 whales, respectively, in the southeastern Bering Sea. In 2000 the total search effort in the region nearly doubled that of the previous two years. Thus, the sightings of 13 whales in 2000 (which included only seven distinctly identified individuals) does not indicate an increase in the number of whales in the region. The Service has also started a photographic and genetic catalogue of individual whales and some of the same photo-identified whales are been observed between years.

As whaling is not likely to occur anytime in the future in the eastern North Pacific, the fate of highly depleted North Pacific right whale populations will depend on impacts of other human activities on the whales and their habitat. Nothing is currently known about human interactions with eastern North Pacific right whales; however, as with the North Atlantic right whales (see earlier discussion), the most important problems are likely to include entanglement in fishing gear and ship strikes. Potential oil and gas development on or near their feeding grounds may also pose a significant risk in the North Pacific.

The eastern North Pacific right whale population is the most endangered and least known whale population in U.S. waters. These whales, however, are long-lived and have a long interval between calves. To better understand the status of this population and have a chance to save it, a long-term dedicated monitoring program is an essential first step.

Gray Whale (*Eschrichtius robustus*)

Gray whales are found only in the North Pacific Ocean, where they comprise two discrete stocks—the eastern (or California) stock and the western (or Asian) stock. The eastern North Pacific stock migrates seasonally between winter calving lagoons off Baja California, Mexico, and summer feeding grounds in the Bering and Chukchi Seas between Alaska and Russia. The western North Pacific stock migrates between winter calving areas along the coast of China and summer feeding grounds in the Okhotsk Sea mainly off the northeastern coast of Sakhalin Island, Russia.

Overexploitation by commercial whaling in the mid-1800s and early 1900s severely depleted both stocks. As a result, gray whales, along with right whales, were the first whale species afforded protection from commercial whaling under an international ban adopted by the League of Nations in the mid-1930s. The ban was subsequently extended by the 1946 International Convention for the Regulation of Whaling. Under these protective measures, eastern North Pacific gray whales made a substantial recovery although certain threats to the population and its habitat remain. The western stock, which was reduced to a much lower level, has not recovered, and its current population is estimated at 100 individuals.

In light of their precarious status, gray whales were listed as endangered throughout their range under the U.S. Endangered Species Conservation Act of 1969, the predecessor to the Endangered Species Act of 1973. Because of the eastern stock's recovery, it was removed from the endangered species list in June 1994, but the western stock remains listed as endangered.

The National Marine Fisheries Service is the lead federal agency responsible for the conservation of gray whales. Recent activities related to both the eastern North Pacific and western North Pacific stocks are discussed in the following sections.

The Eastern North Pacific Stock

The eastern stock of gray whales was thought to have been reduced to a few thousand animals when the ban on commercial whaling for gray whales first went

into effect. The National Marine Fisheries Service has surveyed this stock on its southward migration in 20 of the past 34 years as part of an effort to monitor its size and trend. Throughout this period, the population increased steadily. Based on results of the most recent survey, conducted in 1997–1998, the population currently is estimated to number 26,600 whales, a level thought to be within its optimum sustainable population range or perhaps just below it. Since 1994 the Service also has surveyed whales migrating northward to assess calf production. Results through 1998 indicate that calves have accounted for between 2.6 and 6.5 percent of the population. In 1999 this figure dropped to 1.6 percent and, based on preliminary estimates, declined further to 1 percent in 2000.

Gray Whale Strandings in 2000 – During 1999 a total of 273 gray whales stranded and died along the west coast of North America from Alaska to Mexico, compared with the previous record number of 87 deaths. The occurrences precipitated consultations between the National Marine Fisheries Service and the Working Group on Marine Mammal Unusual Mortality Events. To prepare for the possibility that high numbers of gray whale strandings would continue in 2000, the Commission wrote to the Service on 10 December 1999 recommending that steps be taken to complete a die-off response plan immediately. In 2000 a total of 355 dead gray whales was reported along the coasts of Mexico, the United States, and Canada. Information on the unusual number of gray whale strandings that have occurred during the two years and actions taken to investigate the cause are discussed in Chapter VI.

Five-Year Status Review – The eastern North Pacific stock of gray whales was removed from the Endangered Species Act list of endangered and threatened wildlife on 16 June 1994. To help ensure that such delisting actions are prudent, the Act requires that the responsible agency monitor a species' status for at least five years after it is removed from the list.

As discussed in the Commission's 1999 report, on 16–17 March 1999 the Service convened a workshop to review the results of its five-year research program as well as other information bearing on the status of eastern North Pacific gray whales. The results and findings of the workshop were summarized in an August 1999 report prepared by the Service.

With regard to the stock's status, participants concluded that the eastern North Pacific stock did not meet established criteria for listing as either threatened or endangered and that no action was warranted to relist it under the Act. Monitoring studies indicate that the stock continued to increase after it was delisted. When the stock was delisted in 1994, it was estimated to number 23,100 whales. Based on the most recent analysis of stock size, which was derived from counts along the California coast during the stock's southbound migration in the winter of 1997–1998, it is estimated to number 26,635 whales, with a 95 percent confidence interval ranging from 21,878 to 32,427. Modeling analyses indicate that the stock has increased at an average rate of about 2.5 percent per year since the late 1960s.

Workshop participants also recommended that monitoring studies be continued for another five-year period (i.e., 1999–2004), in part because the stock offers a unique opportunity to assess how a cetacean population responds to natural and anthropogenic influences as it approaches and attains its maximum carrying capacity level. The participants therefore identified and ranked priority research needs. In decreasing order of priority, they recommended that (1) annual surveys of whales migrating southward along the California coast be continued to monitor population size, (2) studies of gray whales and the effects of human activity and development in winter calving and nursing lagoons in Mexico be continued, (3) photogrammetry studies be undertaken to assess the condition of whales, (4) calf counts be continued at selected sites in California and Mexico, and (5) surveys be undertaken in the Bering and Chukchi Seas to examine the effects of environmental parameters, particularly climate warming, on whale foraging patterns.

During the Marine Mammal Commission's 19–21 October 1999 annual meeting, representatives of the Service provided information on the status of eastern North Pacific gray whales. Although noting that workshop participants had recommended that efforts to monitor this stock be continued for another five-year period, the Service advised the Commission that it had neither committed funds to do so nor had it made plans to continue cooperative work with Mexican officials to ensure that critical calving and nursing lagoons are not

degraded by development. In light of this information, the Commission wrote to the Service on 10 December 1999. Noting the importance of detecting any downturn in future population growth and the value of further population data for developing models to assess recovery patterns of other large whale populations, the Commission recommended that the Service provide funds to continue its gray whale monitoring program.

Specifically, the Commission recommended that the Service (1) continue counts of adults and calves and photogrammetry studies during northbound migrations for at least the next three years at a cost of $65,000–$75,000 per year, (2) conduct a population count during the southbound migration in 2001 at a cost of about $60,000, and (3) continue to assist Mexican scientists with their efforts to prevent degradation of critical calving and nursing lagoons in Baja California, Mexico.

Potential Threats to Calving and Nursing Lagoons – The eastern North Pacific gray whale population migrates southward to coastal waters along the western shore of Mexico's Baja California peninsula each winter. There, a series of coastal bays and lagoons (principally Magdalena Bay, Laguna San Ignacio, Ojo de Liebre, and Guerrero Negro) provide protected waters where pregnant females give birth and nurse their young before returning to northern feeding grounds. With the exception of Guerrero Negro, where a salt evaporation facility has been operating since the 1950s, the bays are largely undeveloped. In 1976 three of the coastal lagoons (San Ignacio, Ojo de Liebre, and Guerrero Negro) were designated by Mexico as the Whale Sanctuary of El Vizcaino. In 1988 they also were designated as the Vizcaino Biosphere Reserve, part of a United Nations system of internationally significant natural areas, and in 1993 they received further recognition and protection as a Natural World Heritage Site.

In the mid-1990s proposals were put forth for two development projects that could significantly affect the whales' use of two of the stock's most important calving lagoons. In one instance, a Japanese consortium proposed building a 2,000-ha tourist resort on Magdalena Bay. Plans were later deferred—possibly because of the economic recession in Japan—but may be revived at a later date. Another potential threat was a proposal, put forth in 1994 by Mitsubishi Corporation and the Mexican government, through a joint venture known as Exportadora de Sal, S.A. (ESSA), to construct a large salt evaporation facility on the shores of Laguna San Ignacio. The importance of the lagoon for gray whales and the potential effects of the proposal prompted a high level of concern in Mexico and internationally.

As initially proposed, this salt evaporation project would have involved constructing 116 square miles (300 sq km) of evaporating ponds along the lagoon's shoreline, building a 1.25-mile-long (2 km) pier for loading salt onto oceangoing ships, and installing pumps to siphon 6,000 gallons (22,710 liters) of seawater per second from the lagoon into the evaporation ponds. Barge traffic and noise from the facility could disrupt and displace calving and nursing whales, and spills of fuel, brine, or other chemicals could pose pollution risks.

Although inclusion of the lagoon in the Vizcaino Biosphere Reserve served to recognize the importance of the area's natural resources, including gray whales, the lagoon was within a reserve buffer zone where development consistent with the reserve's conservation objectives could proceed. In 1995 the Mexican environmental secretariat rejected the proposal on grounds that it was incompatible with objectives of the biological reserve. After initially appealing the finding, Mitsubishi and ESSA withdrew the proposal and announced plans to redesign the project.

Subsequently, ESSA contracted with independent scientists for an environmental impact assessment of the proposed project. In addition, the lower house of the Mexican Congress established a 12-member commission in 1998 to examine environmental impacts associated with both the existing salt evaporation facility at Guerrero Negro, which is also operated by Mitsubishi and ESSA, and the planned facility at Laguna San Ignacio.

The environmental assessment on the proposed project was completed early in 2000. It concluded that construction and operation of the facility would have no detrimental effects on gray whales. Specifically, it noted that construction of the channel between the pumping station and San Ignacio Lagoon would be carried out at times when gray whales are not present. The amount of water pumped from the lagoon (estimated at 0.2 percent of the amount entering the lagoon daily) would be so small as to have no effect on the water level or salinity of the lagoon. The proposed disposal system to pump brine back into the lagoon

would be operated only during periods when gray whales were not present, and vessels carrying salt from the pier (an estimated 10 trips per month) would travel at speeds of 2–3 knots, "greatly reducing the chances of any collisions between whales and ships."

On 3 March 2000 Mitsubishi Corporation, the Mexican government, and ESSA jointly announced that they were canceling the proposed saltworks project at San Ignacio Lagoon. Despite the fact that the environmental assessment concluded that the proposed saltworks would not adversely impact the lagoon, gray whales using the lagoon, or other plant and animal species, the consortium noted that there were other factors that must be considered. These included the impact of a project of this magnitude on the integrity of the area as well as public opposition to the project.

Subsistence Take of Gray Whales – Gray whales are taken for subsistence purposes by Native residents in both Russia and the United States. Between 1966 and 1991, an average of 177 gray whales was taken annually for this purpose, almost all in Russia. Between 1994 and 1998, the take of gray whales ranged from 42 to 122 whales. During that period only two gray whales were taken in the United States, both by Alaska Natives in 1995. The International Whaling Commission (IWC) is responsible for setting catch limits for aboriginal subsistence whaling. The current quota for gray whales, adopted in 1997, was established as a five-year block quota of 620 whales, with no more than 140 whales to be landed in any one year. Under a subsequent bilateral agreement between Russia and the United States, Russia agreed to limit its take to 135 whales and the United States agreed to limit its take to 5 whales. During 2000 Russian whalers took 113 whales. As discussed below, U.S. Natives took no whales in 2000.

In May 1995 the Makah Tribal Council of Washington State expressed an interest to the Departments of Commerce and State in renewing a hunt for gray whales. Whaling had been a traditional part of the tribe's way of life for more than 1,000 years until it ceased in the 1920s when gray whales became scarce as a result of depletion by commercial whalers. Citing its whaling rights under the 1855 Treaty of Neah Bay, the tribe asked that the federal agencies seek approval from the IWC for an annual ceremonial harvest of up to five gray whales. The agencies agreed, and a proposal to take five whales per year was put forward to the IWC at its 1996 meeting. The proposal raised questions about the purpose and need for the take, and at the tribe's request, it was withdrawn to develop additional background information.

A new proposal for an annual harvest of up to five whales, augmented with additional background information, was submitted to the IWC for consideration at its 1997 meeting. At that meeting, the IWC adopted a resolution proposed jointly by the U.S. and Russian delegations approving the above-mentioned five-year block quota and noting that "meat and products of such whales are to be used exclusively for local consumption by the aborigines whose traditional subsistence and cultural needs have been recognized." With regard to the gray whale quota, the Russian Federation agreed to take no more than 135 whales per year, leaving five whales available to be taken by Makah whalers. Although the U.S. delegation interpreted the resolution as recognition of the Makah's cultural and subsistence needs, some delegations questioned that interpretation and contended that the Makah were not entitled to hunt gray whales because their needs had not yet been demonstrated.

A lawsuit was subsequently filed against the Department of Commerce on 17 October 1997 by Rep. Jack Metcalf of Washington State and several environmental groups. The suit challenged the Department's actions to promote and authorize whaling by the Makah. A ruling in the case, issued on 21 September 1998 by the District Court for the Western District of Washington, granted the federal defendant's motion for summary judgment and cleared the way for Makah whaling to begin. The court found that the Makah Tribe had a cultural and subsistence need for whaling and that the Secretary of Commerce's approval of the quota did not violate the International Convention for the Regulation of Whaling, the Whaling Convention Act, or applicable regulations.

In 1998 the Makah Whaling Commission, established to govern whaling efforts by the tribe, adopted a management plan for the years 1998–2002. Among other things, the plan calls for issuing permits to tribal whalers, limiting the harvest to landings of no more than five gray whales per year, targeting only migrating adult whales not accompanied by a calf, using specified hunting methods, and using landed whales only for traditional handicrafts, consumption by local residents, and ceremonial purposes. A small number of gray

whales apparently remain throughout the summer to feed off western Washington where Makah whaling was to take place. To help prevent hunting of these few summer resident whales, the National Marine Fisheries Service wrote to the Makah Tribal Council on 6 March 1998 expressing its understanding that hunting would occur only from early November through the end of June or at other times when the Service and the tribe determined that gray whales were migrating.

Notwithstanding these actions, Makah whalers made no attempts to hunt gray whales during 1998. In the spring of 1999, however, Makah whalers put to sea in a cedar canoe accompanied by a motorized chase boat to renew the tribe's whaling tradition. From its initial announcement of an intent to resume a hunt for gray whales, the Makah's whaling plans have been the focus of sharp criticism and intense protest by people opposed to the killing of whales and concerned that the action could set a precedent for the resumption of other whaling. When the legal action noted earlier failed to block the tribe's plans, antiwhaling activists attempted to prevent the hunt by running boats between the tribe's whaling canoe and targeted whales. This prompted the arrest of several activists by the Coast Guard early in May 1999 at the start of the hunt. With a close Coast Guard vigil, however, the hunt continued. After one whale, struck a glancing blow by a harpoon, escaped alive in early May, Makah whalers succeeded in killing and landing a gray whale on 17 May 1999. That was the only whale landed by the Makah during the year.

Following the September 1998 ruling that cleared the way for the Makah whaling, plaintiffs in the lawsuit (*Metcalf* v. *Daley*) filed an appeal. On 9 June 2000 the Ninth Circuit Court of Appeals overturned one aspect of the district court decision. The circuit court ruled that the 1997 environmental assessment should have been completed before the Service and the Makah Tribe entered into a cooperative agreement. The court held that the timing of the environmental assessment, which was completed after the 1996 agreement was signed and before the 1997 meeting of the IWC, may have predisposed the preparers to find that the whaling proposal would not significantly affect the environment. As a result, on 11 August 2000 the Service rescinded its cooperative agreement with the Makah Tribe and subsequently set the 2000 gray whale quota at zero.

At the end of 2000 the Service was completing a new environmental assessment on issuing a quota to the Makah Tribe for the years 2001 and 2002. The assessment was expected to be available for comment early in January 2001.

The Western North Pacific Gray Whale Stock

As recently as the 1970s the western North Pacific or Asian gray whale was thought to have been extirpated by whaling activity. A small remnant population, however, is now known to have survived. Its range extends from the Okhotsk Sea to the South China Sea. Based on findings from an ongoing U.S.–Russia photo-identification project, the total population size is thought to be approximately 100 individuals. Because of the very small size of the surviving population and the possibility that fewer than 50 reproductive individuals may remain, The World Conservation Union (IUCN) listed the western gray whale as "critically endangered" in 2000.

Current threats to western gray whales include low-level mortality resulting from an undetermined level of poaching likely to be occurring in the northern Sea of Japan and the potential for incidental catches throughout most of their range, particularly in the extensive coastal net fisheries off southern China. Substantial nearshore industrialization and ship traffic throughout the population's migratory corridors also represent potential threats by increasing the likelihood of exposure to chemical pollution and ship strikes. Perhaps even more worrisome is current and planned offshore oil and gas development in the South China Sea and within 20 km of the population's only known feeding ground off the northeastern coast of Sakhalin Island in the Okhotsk Sea. Anthropogenic activities related to oil and gas exploration, including high-intensity geophysical seismic surveying, drilling operations, increased ship and air traffic, and oil spills, all pose potential threats to gray whales. For example, displacement of whales from critical feeding, migratory, and breeding habitat is possible due to disturbance from underwater industrial noise. Physical habitat damage from drilling and dredge operations, and possible impacts of oil and chemical spills on benthic prey communities also warrant concern.

In 1995 Russian and U.S. scientists initiated a cooperative research program off northeastern Sakhalin Island to monitor the population status of western gray whales. Funding for the program has

come largely from the oil and gas consortia involved in developing the region. Research findings to date have provided vital new information on the status of the western population and the nature and magnitude of ongoing threats to its survival. Based on research conducted through 2000, a total of 94 individual whales has been photo-identified. However, during the summer-autumn 2000 field season, only three previously unidentified noncalf whales were photographically captured, resulting in a 95 percent resighting rate from previous years. The low rate at which new individuals are now being identified suggests that a majority of the western gray whale population has been identified. The high level of annual return and seasonal site fidelity of identified whales to the Sakhalin study site shows that this region is the primary feeding area for the population.

Mothers with calves and pregnant females have been identified in the study area annually and are among the most frequently sighted individuals. Sixteen calves and 12 mothers have been observed on the feeding grounds between 1995 and 2000. Of the 13 calves identified between 1995 and 1999, eight (61.5 percent) have not been resighted after the year of their birth, and five (38.5 percent) have been observed in at least one additional year. If calf return rates correspond with calf survivorship, these findings suggest that calf mortality within the first year is high. Reproductive females, both lactating and pregnant, have especially high energetic demands, making it imperative that their feeding grounds continue to be capable of meeting their high metabolic requirements. The pronounced seasonal site fidelity and annual return of reproductive females to the study site, combined with their need for high-quality habitat, indicate that the waters off northeastern Sakhalin Island are critically important to the survival of this whale population.

In this regard, observations during 1999 and 2000 of unusually thin gray whales on these feeding grounds are of major concern. Although photo and video analyses have yet to be completed for data collected in 2000, approximately 20 to 25 whales were tentatively identified as being thin. Similar observations of fewer animals were documented in 1999. In addition, the overall distribution of whales on the feeding grounds during 1999–2000 appears to have shifted to the north compared with that observed between 1997 and 1998. Although the factors responsible for the changes in whale distribution and individual physical condition are currently unknown, the influence of offshore oil and gas activities cannot be ruled out.

Biopsy samples have been collected from 64 of the 94 individual whales identified to date. DNA comparisons indicate that eastern and western gray whales can be genetically differentiated at the population level. Based on differences in haplotypic frequencies, they appear to be geographically isolated population units. However, because population differentiation is based on statistical differences in haplotypic frequencies and associated haplotypic diversity indices, the origin of single individuals cannot be determined with certainty. Recent molecular analyses of whale meat samples purchased from a Japanese market in August and October 1999 showed that they were from a gray whale. Mitochondrial DNA sequences obtained from those samples were identical (the same haplotype) to those of a gray whale killed off western Hokkaido in May 1996 and were also identical to the most common haplotype found in both western and eastern gray whale populations. Based on the geographic location where the whale was found, the historical occurrence of gray whales in the Sea of Japan, and the freshness of the specimen, it was therefore concluded that this whale likely came from the western population. Without additional analyses, however, it is uncertain if the gray whale market samples are from the Hokkaido whale or another individual.

There is an urgent need to continue and expand long-term research and monitoring of the western gray whale population. Studies of this population between 1997 and 2000 were financed largely by an oil consortium, Sakhalin Energy Investment Company. Marathon Oil, the primary shareholder and operator of the offshore oil and gas field (Sakhalin II) in closest proximity to the western gray whale feeding grounds, transferred its interest in the Sakhalin II project to Shell Sakhalin Holdings B.V. (an affiliate of Royal Dutch/Shell, The Netherlands) at the end of 2000. As a result, future industry-based funding for continued studies on this endangered population now falls under the jurisdiction of Shell. If survival of western gray whales is to be ensured, wider international research collaboration in com-

bination with an adequate and stable funding base, effective protection measures, and cooperation between scientists, industry, and government officials are essential.

Gulf of Maine Harbor Porpoise (*Phocoena phocoena*)

Harbor porpoises live in coastal waters throughout cold and temperate regions of the Northern Hemisphere. About 1.5 m (5 ft) long when fully grown, harbor porpoises are among the smallest of all cetaceans. They also are among the shortest-lived cetaceans. Studies of harbor porpoises off the east coast of the United States and Canada suggest that few live longer than 10 years, and most survive only seven or eight years. Individuals become sexually mature at about three years of age, with most adult females bearing a single calf annually. Their diet is principally small schooling fish, such as herring and hake. Harbor porpoises are caught incidentally throughout their range in coastal gillnet fisheries targeting various finfish species. In many areas, so many are caught that local harbor porpoise abundance has been substantially reduced.

Harbor porpoises occur in relatively discrete populations whose ranges may overlap seasonally. In the western North Atlantic Ocean, there appear to be four local populations. The southernmost is the Gulf of Maine/Bay of Fundy harbor porpoise stock (hereafter called simply the Gulf of Maine stock). During summer, this population is restricted almost entirely to cold waters in the Gulf of Maine and the Bay of Fundy off New England and southeastern Canada. In fall and winter, its range expands as cold waters sweep south along the coast and, by late winter, Gulf of Maine harbor porpoises can be found over the continental shelf from the Gulf of Maine to Cape Hatteras, North Carolina. The other three western North Atlantic stocks are centered in the Gulf of St. Lawrence, along the east coast of Newfoundland, and off the west coast of Greenland in summer. The winter ranges of these other stocks are uncertain; however, recent genetic analyses of animals found off the eastern United States suggest that some individuals from one or more of these more northerly stocks also move south in winter to waters between New York and North Carolina.

For several decades, large numbers of harbor porpoises have been caught incidentally in gillnet fisheries in the Bay of Fundy and the Gulf of Maine. This bycatch began in the 1960s when Canadian fishermen in the Bay of Fundy first began using gillnets to catch groundfish (i.e., cod, flounder, and haddock). In the 1970s the use of gillnets spread to the U.S. waters in the Gulf of Maine. Although harbor porpoise bycatch in these fisheries was largely unrecorded and ignored before the mid-1980s, by the late 1980s studies of harbor porpoise biology and bycatch reports from some areas suggested that the number of porpoises being killed could be having a substantial effect on the regional population. In the early 1990s as stocks of groundfish were depleted, New England fishermen began using gillnets to catch monkfish and dogfish in addition to groundfish, and these fisheries also began taking harbor porpoises incidentally. To assess effects of these fisheries on the region's harbor porpoise population, the National Marine Fisheries Service began efforts to estimate the size of the harbor porpoise stock and the number of porpoises being caught.

To estimate the size of the Gulf of Maine stock, the Service conducted surveys in 1991, 1992, and 1995 during the summer when most of the stock is confined to the Gulf of Maine and the Bay of Fundy. Harbor porpoises are difficult to survey because of their small size, the short amount of time they spend at the surface to breath, year-to-year changes in distribution depending on local water temperature patterns, and other factors. As a result, the population estimates derived from survey data have had wide confidence intervals. To develop a best estimate, the Service pooled results of the first three surveys and calculated a Gulf of Maine population size of 54,000 porpoises with a 95 percent confidence interval of 41,300 to 71,400. Applying this estimate to a formula designed to calculate a stock's potential biological removal level (PBR), the Service calculated that 483 porpoises could be removed from a stock annually, in addition to natural mortality, and still have assurance that the stock would increase toward its optimum sustainable population level.

Table 2. Estimates of harbor porpoise bycatch in sink gillnet fisheries in the Bay of Fundy (Canada), New England (U.S.) and off the U.S. mid-Atlantic states, 1990-1999[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)	10	446	(294–894)	–	788
1999	270	(78-364)	<20	53	(3-98)	19	362

[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, December 16-17, 1997. National Marine Fisheries Service, Woods Hole, Massachusetts. Estimates for 1997, 1998, and 1999 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. Estimate for 1999 is 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 for 1997, 1998, and 1999 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.

During the summer of 1999 the Service conducted another Gulf of Maine harbor porpoise survey. Data analyses from that survey, completed in 2000, produced a new population estimate of 89,700 porpoises, with a 95 percent confidence interval of 53,400 to 150,900. Although the new estimate was significantly larger than the estimate from the 1991 survey, it was not statistically different from estimates based on the 1992 and 1995 surveys. Because of the increased area surveyed, the 1991 survey is not directly comparable with any of the previous surveys; thus, trends in population size since the early 1990s remain unknown. Because of these factors and the elapsed time between the 1991 and 1999 surveys, the recent results are not being pooled with earlier survey data. Based on the population estimate for 1999, the Service calculated a new PBR level of 747 porpoises per year.

To estimate bycatch levels, late in the 1980s the Service began placing observers on a sample of boats gillnet fishing for groundfish in the Gulf of Maine. Among other things, the observers collect data on the number of harbor porpoises and the amount of fish caught during observed gillnet hauls. From that data, they calculate regional harbor porpoise bycatch rates that can then be expanded into regional bycatch estimates based on records of total landings by the fishery. The Canada Department of Fisheries and Oceans began a similar program in 1993 for gillnet boats operating in the Bay of Fundy. Early in the 1990s the U.S. observer program was expanded to cover gillnet fisheries that had developed for monkfish and dogfish off New England. As these fisheries, as well as gillnet fisheries for shad, weakfish, bluefish, and rockfish developed south of New England, dead harbor porpoises with net marks

and attached net fragments began washing ashore between New York and North Carolina. The Service therefore expanded its observer program to monitor gillnet fisheries in those areas as well.

Results of harbor porpoise bycatch monitoring efforts through 1999 are shown in Table 2. Estimates for 2000 were not available as of the end of 2000; however, preliminary information through August suggested that, at least for New England fisheries, bycatch estimates for 2000 would be comparable with those of 1999. Estimates for the mid-Atlantic area were less certain because data on total fishing effort for the various regional gillnet fisheries were not yet available.

To various degrees, annual bycatch estimates have been incomplete because of a lack of observer effort among some gillnet fisheries that incidentally take harbor porpoises. For example, early in the 1990s no estimates were available for Canadian fisheries in the Bay of Fundy where hundreds of porpoises were then being taken. Even recent U.S. and Canadian estimates may not include all gillnet fisheries in which harbor porpoises are taken. In 1999, 38 dead harbor porpoises stranded along the U.S. east coast with net marks indicating that they died in gillnets. About half of those stranded during times and in areas along mid-Atlantic states where there had been almost no observer effort, and thus the fisheries responsible are largely unknown. Nevertheless, bycatch estimates strongly indicate that there has been a substantial decline in the number of porpoises caught in recent years. Whereas several thousand porpoises were caught annually early in the 1990s, estimates since 1998 have been in the mid- to low hundreds.

In part, this reduction is due to measures adopted specifically to reduce porpoise bycatch. Such measures were first implemented for gillnet fisheries in 1994 by Canada's Department of Fisheries and Oceans in the Bay of Fundy and by the National Marine Fisheries Service in the Gulf of Maine. For the waters off U.S. mid-Atlantic states, bycatch reduction measures were first implemented in 1999. Another perhaps equally important factor, however, has been the significant reduction in fishing effort brought about by the severe decline of groundfish stocks and increasingly stringent measures to reduce fishing effort implemented since the mid-1990s in both U.S. and Canadian waters. Restrictive fishing reduction measures also have been implemented over the past two years to manage overfished stocks of dogfish and monkfish.

Although recent bycatch estimates are below the currently estimated PBR level of 757 porpoises per year, bycatch reduction measures continue to require close attention. At least some stocks of groundfish off New England are showing signs of recovery, and future actions to relax fishery conservation measures put in place to protect fish stocks could increase fishing effort and thereby increase harbor porpoise bycatch. In addition, amendments to the Marine Mammal Protection Act adopted in 1994 establish a goal of reducing all marine mammal bycatch, including harbor porpoises, to insignificant levels approaching zero by April 2001. Accordingly, as discussed further later in this section, the National Marine Fisheries Service, commercial gillnet fishermen, environmental groups, and other concerned parties have continued to focus attention on research and management needs to further reduce the bycatch of harbor porpoises in gillnets.

Harbor Porpoise Management Actions Prior to 1999

The effort to reduce harbor porpoise bycatch has been a highly charged issue for gillnetters along the east coast and for conservationists. Early in the 1990s there was no apparent way to prevent the incidental catch of harbor porpoises in gillnets other than seasonally closing areas where harbor porpoises were caught. Because fishery managers at that time were attempting, to the extent possible, to control overfishing of groundfish stocks by means other than seasonal closures (e.g., catch limits and limits on days at sea), gillnetters feared that closures to prevent harbor porpoise bycatch, on top of measures to conserve fish stocks, would effectively shut down the fisheries.

Because of this and similar issues involving other fisheries and other marine mammals in U.S. waters, Congress amended the Marine Mammal Protection Act in 1994 to establish a new approach for managing the incidental take of marine mammals in U.S. fisheries (see also Chapter IV). The amendments require the National Marine Fisheries Service to prepare and periodically update stock assessment

reports for each marine mammal stock in U.S. waters. Among other things, each report must include an estimate of stock abundance, mortality due to commercial fishing and other human-related factors, and a potential biological removal (PBR) level. The latter is calculated using a formula designed to provide an estimate of the number of animals that could be removed from a stock each year, not including natural mortality, and still have assurance that the stock would increase toward or remain at its optimum sustainable population level.

For stocks listed as endangered or threatened under the Endangered Species Act, or whose incidental take levels exceed their calculated PBR level, the 1994 amendments require the Service to convene a take reduction team to prepare a recommended take reduction plan. Take reduction teams are to include representatives of involved fisheries, environmental groups, marine mammal scientists, and government agencies. Take reduction plans are required to include measures that will reduce incidental take levels to below the PBR level within six months of implementation and, further, to reduce bycatch to insignificant levels approaching zero by April 2001. Pursuant to the amendments, the Service must circulate the teams' recommended plans, with any changes it believes necessary, for public review and then adopt a final plan promptly.

Because harbor porpoise incidental take levels were several times higher than the PBR level calculated from initial population surveys, the Service convened a Gulf of Maine Harbor Porpoise Take Reduction Team in February 1996 to develop a take reduction plan for New England gillnet fisheries. Because information on fisheries and bycatch levels south of New England lagged behind that for the Gulf of Maine, the Service deferred efforts to develop mitigation measures for the mid-Atlantic region until February 1997 when it established a separate team to address gillnet fisheries between New York and North Carolina. A Marine Mammal Commission representative has participated on the Gulf of Maine team since its inception in 1996 and, late in 2000, was also asked to join the mid-Atlantic team.

To explore new ways of preventing harbor porpoises from being caught in gillnets, the Service funded studies by New England gillnetters and scientists in 1994 and 1997 to test the effectiveness of acoustic deterrent devices called pingers. Pingers, the size of soda cans, are devices that emit intermittent sound pulses at frequencies audible to harbor porpoises. The experiments demonstrated that, by attaching pingers to bridles between individual net panels, porpoise bycatch could be reduced by as much as 90 percent. (Gillnets used in New England fisheries are usually composed of 10 or more net panels strung together with bridles.) Based on the results of the experiment, the Gulf of Maine team developed take reduction measures for New England waters that focused on establishing two types of time-area fishing closures: (1) management areas in which all gillnet fishing would be prohibited in seasons of porpoise abundance, and (2) areas in which fishing would be prohibited seasonally except for fishing with pinger-equipped nets.

Despite their usefulness in reducing porpoise bycatch, pingers have several drawbacks. At a cost of about $50 per pinger, the expense of outfitting gillnet vessels could exceed $30,000 depending on the number of nets fished. Pingers on nets can hang up or snag, thus complicating the process of setting and retrieving nets. Pingers also require periodic maintenance to replace batteries. Also, pinger sounds may be audible to seals, which can learn to associate fish caught in nets with pinger sounds. As a result, seals may be attracted to nets with pingers and take or damage caught fish. Ensonification of fishing grounds by pingers also could cause harbor porpoises, and perhaps other cetaceans, to avoid habitat important to their survival.

Because of these and other concerns, the Mid-Atlantic Harbor Porpoise Take Reduction Team sought to develop a bycatch reduction strategy that did not involve pingers. Data from initial observations of gillnet fisheries south of New England suggested that harbor porpoise bycatch rates differed between segments of the fishery depending on gear and fishing characteristics, such as twine diameter, mesh size, tie-downs (i.e., lines connecting float and lead lines to limit the vertical height of nets), soak time (i.e., the time nets are left in the water to fish),and the number and length of nets. The mid-Atlantic team therefore developed take reduction measures that relied on establishing gear standards that had low harbor porpoise bycatch rates based on observer data. As in New England, some time-area

fishing closures also were developed for the mid-Atlantic region.

The Gulf of Maine team submitted a recommended plan to the Service in August 1996 and the mid-Atlantic team did so in August 1997. The Service was slow to act on the teams' submissions and, because of the Service's delays in meeting statutory timeframes for adopting a take reduction plan and taking certain other actions, the Humane Society of the United States filed a lawsuit against the Service in August 1998. Among other things, the suit sought action by the Service to complete and adopt the plan, which it did in December 1998.

The Gulf of Maine Harbor Porpoise Take Reduction Plan implemented in December 1998 includes regulatory and nonregulatory measures for gillnet fisheries off both New England and the mid-Atlantic states. The regulatory measures were implemented under authority of the Marine Mammal Protection Act. For the New England area, six time-area management zones are established in which gillnet fishing is either completely prohibited or permitted only if gillnets are equipped with pingers (see Fig. 3).

Regulatory measures for waters between New York and North Carolina established three time-area management zones (see Fig 3) in which gillnet fishing is either closed seasonally or where deployed gillnets must conform with certain specified characteristics. The mid-Atlantic closures contain no exceptions to allow fishing with pingers. The regulations also set forth specific gear requirements (e.g., twine size, float line length, limits on the number and size of nets, and tie-downs) that must be used when and where fishing is allowed.

Other provisions in the Service's final plan included the following: a requirement that New England fishermen wishing to fish in closed areas with pingers receive training in pinger use and a certificate demonstrating that they have completed a training course; continuing the fishery observer program; conducting periodic porpoise abundance surveys; undertaking enforcement efforts; continuing to convene take reduction teams to recommend further action under the plan; and conducting other research, such as studies of the effects of pingers on harbor porpoise distribution and other components of the ecosystem.

In adopting its plan, the Service recognized that these measures alone would not be sufficient to reduce bycatch to below the calculated PBR level within six months, as required. However, when added to other fishery closures being implemented at that time pursuant to recommendations by the New England Fishery Management Council to rebuild severely overfished groundfish stocks, the Service predicted that the combined effect would reduce porpoise bycatch to below the PBR level.

Throughout the 1990s, the Marine Mammal Commission and its Committee of Scientific Advisors has provided recommendations and assistance to the National Marine Fisheries Service to help evaluate the effectiveness of pingers and develop an effective take reduction program. For a discussion of these efforts, see the Commission's previous annual reports.

Harbor Porpoise Management Actions in 1999 and 2000

Although take reduction measures for the New England and mid-Atlantic regions were merged into a single plan adopted in December 1998, the Service has decided to retain separate take reduction teams for the two regions. This was done because of the different management approaches in each region and because the Service believed that a single team representing all the involved fisheries and areas would be too large to act effectively.

As noted in the previous annual report, the Service reconvened the Gulf of Maine team on 14–15 December 1999 to consider further actions needed to reach the plan's established goals. Although a final estimate of the 1999 harbor porpoise bycatch was not available at the time of the meeting, preliminary information suggested that bycatch levels had been reduced to levels approaching, if not below, the stock's PBR level. At the same time the team met, however, the New England Fishery Management Council was considering possible changes to the New England groundfish closures that could result in increased harbor porpoise bycatch during the 2000 fishing seasons.

Because analyses of 1999 bycatch levels were not yet available to evaluate the extent to which 1999 fishery closures recommended by the Council had

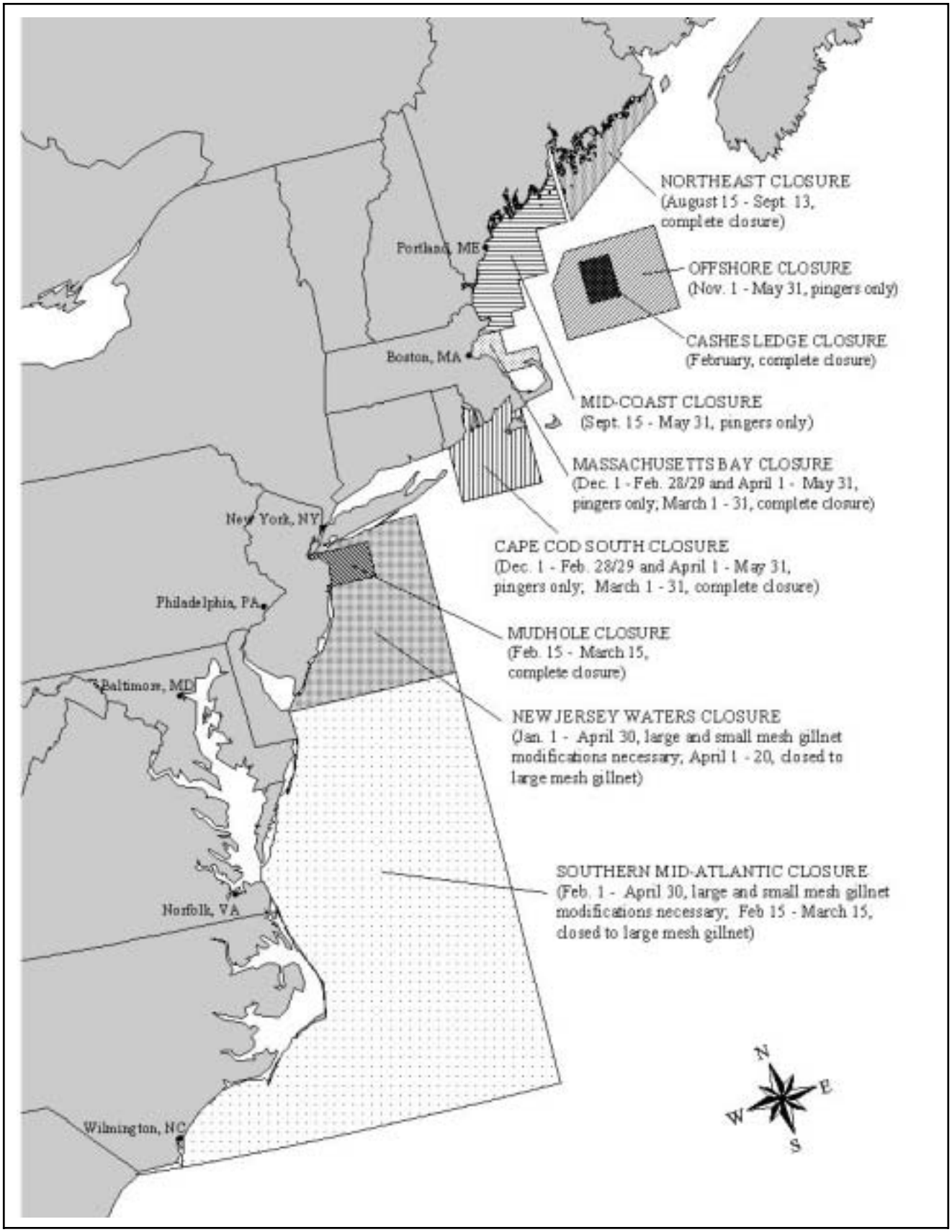
NORTHEAST CLOSURE
(August 15 - Sept. 13, complete closure)
OFFSHORE CLOSURE
(Nov. 1 - May 31, pingers only)
CASHES LEDGE CLOSURE
(February, complete closure)
MID-COAST CLOSURE
(Sept. 15 - May 31, pingers only)
MASSACHUSETTS BAY CLOSURE
(Dec. 1 - Feb. 28/29 and April 1 - May 31, pingers only; March 1 - 31, complete closure)
CAPE COD SOUTH CLOSURE
(Dec. 1 - Feb. 28/29 and April 1 - May 31, pingers only; March 1 - 31, complete closure)
MUDHOLE CLOSURE
(Feb. 15 - March 15, complete closure)
NEW JERSEY WATERS CLOSURE
(Jan. 1 - April 30, large and small mesh gillnet modifications necessary, April 1 - 20, closed to large mesh gillnet)
SOUTHERN MID-ATLANTIC CLOSURE
(Feb. 1 - April 30, large and small mesh gillnet modifications necessary; Feb 15 - March 15, closed to large mesh gillnet)
Portland, ME
Boston, MA
New York, NY
Philadelphia, PA
Baltimore, MD
Norfolk, VA
Wilmington, NC
N
E
S
W

Figure 3. (Opposite page) Time-area management zones under the Gulf of Maine Harbor Porpoise Take Reduction Plan (figure courtesy of Caroline Good, National Marine Fisheries Service).

contributed to the reduced harbor porpoise bycatch, and also because the Council had not yet decided what changes to propose for 2000 to conserve groundfish, the team was unable to recommend changes to the harbor porpoise take reduction plan to compensate for any possible bycatch increase. The team therefore recommended that the Service review any closure changes proposed by the Council to ensure that they would not inadvertently increase harbor porpoise bycatch levels in 2000. The Council subsequently recommended an expansion of the system of closures for 2000 that was adopted by the Service and that was likely to further reduce harbor porpoise bycatch.

The Service also advised the Gulf of Maine team that it had developed hydrophones for use by the Coast Guard in enforcing pinger requirements at sea, but that they had not been used. The Coast Guard apparently was unwilling to check deployed nets unless a Service enforcement agent was on board its vessel, and the Service was unwilling to assign its enforcement agents for this purpose. As a result there was almost no at-sea enforcement of pinger requirements during 1999. The team therefore recommended that the Service develop an enforcement plan in cooperation with the Coast Guard to ensure that pinger requirements were met. The team also recommended that fishery observers randomly test pingers on nets to help assess the proportion of pingers not functioning properly, and that they also test pingers adjacent to any observed harbor porpoise takes to see if the pingers were working properly.

Some New England fishermen have reported increased levels of seal predation when using pingers, which emit sounds over a broad frequency range. To examine ways of reducing such predation, the team recommended that the Service authorize experimental fishing with pingers that emit only high-frequency sounds (i.e., above 45 kHz), believed to be audible to porpoises but not to seals.

The Service reconvened the Mid-Atlantic Take Reduction Team on 13–14 January 2000. Final analyses of 1999 bycatch levels were not available for that meeting either. However, in view of preliminary information indicating that the bycatch level might be below the PBR level and a lack of new information on the effectiveness of adopted gear standards, the mid-Atlantic team recommended no changes to the regulations. It did, however, recommend that waters in Delaware Bay be excluded from the regulations to be consistent with a similar exclusion in place for Chesapeake Bay and other inland waters. The Service advised the team that some regional gillnetters had been refusing to take observers, even though required to do so. The team therefore recommended that the Service take steps to increase compliance, including education programs to clarify statutory requirements. Other team recommendations included steps to encourage gillnetters to pursue technological alternatives (e.g., pingers and reflective nets, see later in this section) to reduce harbor porpoise bycatch and to evaluate the extent to which harbor porpoises are caught by recreational gillnetters not covered under the plan.

After the meetings of the two teams, the Service completed analyses of the 1999 population survey and prepared a report presenting a new population estimate of 89,700 porpoises. The Service also completed an estimate of 1999 bycatch levels. Based on this new information, a draft revised Gulf of Maine harbor porpoise stock assessment report was prepared in November 2000, proposing a new PBR level of 757 porpoises a year. After an opportunity for public review, the report is expected to be finalized in 2001. Also during 2000 the Service continued its observer program in both the New England and mid-Atlantic regions and developed a preliminary analysis of bycatch levels for the first eight months of 2000.

Service scientists also conducted an analysis of the effectiveness of measures in the harbor porpoise take reduction plan by comparing bycatch rates before plan implementation with those observed in 1999. This analysis revealed that most of the reduction in bycatch during winter 1999 was attributable to a lack of fishing effort because of closures during the months of January through May in two areas off New England that previously had high bycatch levels: the mid-coast area (i.e., waters around an area called Jeffreys Ledge off the coasts of northern Massachusetts, New Hampshire, and

southern Maine) and Massachusetts Bay. Although some of the closures in place in these areas between January and May were ones adopted by the Service at the recommendation of the New England Fishery Management Council to protect harbor porpoises, others were to protect groundfish stocks. Even when these areas were open to fishing with nets equipped with pingers, there was very little fishing.

The analysis also found that all of the harbor porpoises caught in those two areas in 1999 occurred in the fall (i.e., during September and October) in nets equipped with pingers. Comparing bycatch rates observed in the two areas over a six-year period before pingers were used (0.05 porpoise per haul) with rates observed in 1999 in nets equipped with pingers (0.03 porpoise per haul), the analysis revealed that bycatch levels declined by 40 percent —a much smaller reduction than the 90 percent reduction obtained in the 1994 and 1997 experiments.

During the Marine Mammal Commission's 10–12 October 2000 annual meeting, representatives of the Service reported on these findings and the status of harbor porpoise take reduction efforts. Based on that information, the Commission wrote to the Service on 17 November 2000. The Commission noted that new information on the size of the Gulf of Maine harbor porpoise population and recent bycatch levels suggested that bycatch levels now pose less of a threat than was thought in the past. However, the Commission noted that the New England Fishery Management Council would again be considering actions to reconfigure fishery closures that were not part of the harbor porpoise take reduction plan but that had contributed to recent reductions in harbor porpoise bycatch.

The Commission therefore recommended that the Service (1) estimate possible increases in harbor porpoise bycatch that might result from any changes proposed by the Council to fishery management plan provisions, and (2) concurrent with any action to adopt such changes, the Service adopt compensatory bycatch reduction measures under the harbor porpoise take reduction plan. As a related matter, the Commission expressed its understanding that the take reduction teams would be reconvened soon to address the need for further reducing bycatch to insignificant levels approaching zero by the end of April 2001, as required by the Marine Mammal Protection Act.

As of the end of 2000 the Commission had not yet received a reply from the Service; however, late in 2000, the Service reconvened both take reduction teams to review new information and to consider further action. The mid-Atlantic team met on 28–30 November and the Gulf of Maine team met on 12–13 December. At both meetings, Service representatives reminded team members that 1994 amendments to the Marine Mammal Protection Act had directed that fishery-related bycatch of marine mammals be reduced to "insignificant levels approaching a zero mortality and serious injury rate" by the end of April 2001. The Service has not yet determined how to define this standard; however, based on preliminary work on this issue, Service representatives advised the team that, for planning purposes, they should consider this goal to be satisfied if bycatch were reduced to a level of no more than 10 percent of the stock's PBR level (i.e., about 76 porpoises per year).

Both teams were provided preliminary results of tests using a new approach to reduce harbor porpoise bycatch—reflective netting. Reflective nets are nylon nets filled with material (e.g., barium sulfate or iron oxide) that increases the reflection of acoustic signals to make them easier for harbor porpoises to detect. The tests, conducted in 1998 and 2000 by Canadian gillnetters fishing for groundfish in the Bay of Fundy, were part of a collaborative effort between gear specialists who had developed the net, Canadian gillnetters, Canada's Department of Fisheries and Oceans, and the National Marine Fisheries Service.

Although the tests did not follow a strict scientific protocol, the results suggest that reflective nets could reduce harbor porpoise bycatch by as much as 80 percent, a level that approaches the reduction achieved with pingers during the 1994 and 1997 pinger experiments (i.e., a 90 percent decrease in bycatch rates). From a combination of 1998 and 2000 data, 12 harbor porpoises were caught in 439 sets of conventional nets, but no harbor porpoises were caught in 231 sets of reflective nets. Although groundfish catch rates in reflective nets were slightly lower than those in conventional nets, and the effectiveness of conventional nets in catching other species fished in U.S. waters had not yet been tested, both teams considered the results to be promising. Believing that reflective nets could contribute greatly to achieving required take reduction goals without the

operational costs and difficulties associated with pingers, both teams drafted recommendations urging the Service to immediately sup-port a rigorous scientific experiment to test the effectiveness of reflective nets in catching fish and reducing harbor porpoise bycatch in U.S. waters.

At Gulf of Maine team meetings in both 1999 and 2000 members were advised that observer data documented a high proportion of illegal fishing in closed areas where fishing without pingers was prohibited. On 22 percent of observed trips to areas where pingers were required, fishing nets had no pingers and on many other trips, nets had an inadequate number of pingers. The team also was advised that there had been almost no at-sea enforcement of pinger requirements during the 2000 fishing seasons because the Service had not yet worked out arrangements with the Coast Guard to check for operating pingers at sea. The Service also advised that it had not yet manufactured devices that observers could use to check whether pingers were functioning properly although it hoped to complete their manufacture soon. Training in use of the new devices took place in December 2000 and they will be used by observers as soon as they become available.

This was the second year in a row in which there was almost no enforcement of pinger requirements at sea even though enforcement was a recognized need in the Service's adopted plan and the team had strongly recommended action to address this matter at its 1999 meeting. Extremely disturbed by the Service's inability to address this aspect of the plan, the team again drafted a strong recommendation that the Service make at-sea enforcement a top priority, that it direct the resources and personnel necessary to develop an effective enforcement program in cooperation with the Coast Guard and state enforcement agencies, and that it report back to the team on the number of enforcement actions taken annually. The team also drafted recommendations to increase penalties for noncompliance with take reduction plan regulations and to establish an annual certification requirement for any fishermen wishing to fish within areas where pingers are required. The team also again recommended that the Service take steps to have observers check for functioning pingers on a random set of gillnets and adjacent to any caught harbor porpoises.

The Gulf of Maine team also drafted recommendations regarding the possible expansion of the closure areas south of Cape Cod and the preparation of a proposal by the Service for identifying key fishing closures now implemented under fishery management plans that contribute to achieving harbor porpoise take reduction goals and integrating them into the Harbor Porpoise Take Reduction Plan. The latter action is needed to ensure that measures contributing to the maintenance of low harbor porpoise bycatch levels are not repealed when they are no longer needed to conserve fish stocks.

During the mid-Atlantic team's meeting, the Service noted that previous problems in getting gillnetters to take observers had diminished, but that, as in New England, there had been almost no at-sea enforcement. The team therefore developed recommendations urging greater attention to enforcement. Because no action had been taken on the team's 1999 recommendation to exempt waters in Delaware Bay from the regulations, the team again drafted a recommendation that the Service take action to do so.

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Bottlenose Dolphin (*Tursiops truncatus*)

Bottlenose dolphins are distributed in coastal waters throughout the world's temperate and tropical regions. In some areas, they also occur offshore over deeper pelagic waters. They are the most common cetacean along the U.S. southeastern and Gulf of Mexico coasts and, together with other species such as manatees and right whales, may be significantly affected by pollution, fisheries, oil and gas development, and other human activities. Bottlenose dolphins are the most common cetacean maintained in captivity for public display and scientific research.

At its 10–12 October 2000 annual meeting in St. Petersburg, Florida, the Commission devoted particular attention to research and management issues pertaining to bottlenose dolphins in the waters off the southeastern United States, including coastal areas of both the Atlantic Ocean and the Gulf of Mexico. Although

putative stocks of bottlenose dolphins in these areas appear to be in better shape than some other marine mammal subspecies or species (e.g., Hawaiian monk seal, California sea otter, northern right whale, Florida manatee), the conservation of bottlenose dolphins also requires attention. Coastal dolphins are exposed to a variety of human-associated risks, such as commercial fishing, offshore oil and gas development, and recreational activities. Dolphin stocks have been affected by several major die-offs in the southeastern United States, and the effects of those die-offs, either alone or in concert with other mortality factors, remain unclear. The coastal migratory stock of dolphins has been designated as depleted, but neither a conservation plan nor a take reduction plan has been adopted to direct recovery efforts. Last, bottlenose dolphins may be a good indicator species for studying the levels and effects of environmental toxins.

For these reasons, the Commission examined a number of issues related to bottlenose dolphins at its meeting. Among other things, the Commission examined (1) research related to identification of stock structure, (2) research on other topics, including the effects of human activities on dolphins and their environment, (3) development of commercial ventures offering inadvisable or illegal interactions with wild dolphins, (4) inadequate or ineffective enforcement of regulations pertaining to such activities, and (5) the development of a long-awaited conservation plan and appointment of a take reduction team. During the meeting, scientists and managers with the National Marine Fisheries Service reviewed recent research findings and future research and management plans.

Bottlenose Dolphin Research Needs

Determination of stock structure is one of the most pressing needs for research and management of bottlenose dolphins off the U.S. Atlantic and Gulf of Mexico coasts. Although stock structure is poorly understood at present, such information is essential to assess stock abundance, trends, and interactions with fisheries or other human activities. Along the U.S. Atlantic and Gulf coasts in the last 15 years, at least five unusual mortality events have occurred, the largest of which involved more than 700 dolphins stranded on beaches from New Jersey to Florida. Lacking sufficient information on stock structure, managers and scientists cannot determine the number of stocks affected, the nature and severity of impacts to each stock, or the time required for each stock to recover to a healthy state. Considerable numbers of bottlenose dolphins also are killed incidentally in commercial fisheries, and the impact of such incidental killing is difficult to assess without sufficient information on stock structure. Such information is also necessary for assessment of the potential impacts of oil and gas development in the marine environment, recreational boating, or other human activities that may adversely affect these stocks and their essential habitat.

On 18 December 1998 the Commission wrote to the National Marine Fisheries Service about the importance of assessing stock structure. In its letter the Commission noted that several reasonably discrete population stocks may occur in U.S. Gulf and Atlantic waters: (1) a nearshore east coast population that migrates annually between summering areas north of Cape Hatteras, North Carolina, and wintering areas off Georgia and northern Florida; (2) year-round resident populations in places such as Sarasota Bay; (3) populations that occur in deep waters off both the Atlantic and Gulf states; and (4) intermixing resident and migratory populations that overlap seasonally in places such as the Indian and Banana Rivers in east-central Florida. Nevertheless, considerable uncertainty exists about stock structure, including the putative coastal migratory stock that was declared depleted following the 1987–1988 die-off along the Atlantic coast. Important questions remain about the number, location, and size of resident stocks, the number of migratory stocks, and the degree to which migratory and resident stocks intermix.

Therefore, in its 18 December 1998 letter to the Service, the Commission reiterated a recommendation resulting from a December 1996 program review at the Southeast Fisheries Science Center that the Service identify and initiate long-term longitudinal studies using mark/resight methods or radiotelemetry technology to determine the geographic distribution and discreteness of possibly separate populations. Research plans developed by the Service's Southeast Fisheries Science Center in the late 1970s and early 1980s had called for establishing long-term mark/

resighting programs in Sarasota Bay, Mississippi Sound, and the Indian and Banana Rivers. Pilot studies were initiated in each of these areas, but only the Sarasota Bay program was continued.

To investigate stock structure, the Service established in 1997 a coordinated research program using genetics, photo-identification, and telemetry. Initial work has focused along the Atlantic coast because this region includes the coastal migratory stock designated as depleted and because of high levels of incidental take documented in gillnet fisheries in the area. Although multiple stocks have been identified, additional studies of stock structure, abundance, degree of mixing, and seasonal movements are needed.

Such work also is needed in the Gulf of Mexico, where stock structure is even less clear and the Service recognizes about three dozen separate stocks of bottlenose dolphins. This large number of stocks creates a significant management challenge. 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. A brief report of that meeting was provided to the Commission at its annual meeting. Service personnel 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.

Several small to moderate dolphin mortality events have occurred in the Gulf over the past decade, including one in the Florida panhandle in 2000 (see Chapter VII). Suspected causes of these events have varied and include red tides, morbillivirus, and exposure to cold weather. Dolphins in at least some parts of the Gulf may also be especially vulnerable to disease or environmental stresses because of exposure to high levels of anthropogenic toxins. Other human activities that affect dolphins in the Gulf to at least some extent are commercial and recreational fishing, oil and gas development, high levels of boat traffic, and underwater noise. Further, environmental con-ditions in the Gulf appear to be declining, as suggested by an extensive "dead zone" in the western Gulf and ecological problems associated with eutrophication due to runoff from agricultural areas.

In its 18 December 1998 letter to the Service (discussed earlier), the Commission recommended that the Service consult with the Environmental Protection Agency, the Minerals Management Service, and relevant coastal state agencies to determine whether everything necessary was being done to assess the sources, levels, and effects of anthropogenic contaminants present in bottlenose dolphins in waters off the U.S. Atlantic and Gulf states. In its 12 December 2000 letter to the Service, 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 October 1998 workshop on marine mammals and persistent ocean contaminants (see Appendix B) and a 1998 report from the International Whaling Commission's Scientific Committee have recommended a multifaceted research approach (combining behavioral observations, life history research, ecological assessment, health monitoring, and toxicology) using index populations of marine mammals, including bottlenose dolphins. As of the end of 2000 the Service has indicated that funding will be made available during 2001 for studies of the effects of toxins on the Sarasota Bay dolphin population.

Bottlenose Dolphins and Tourism

In recent years, commercial ventures that encourage close and sometimes illegal interactions between humans and dolphins have proliferated in the southeastern United States (also discussed in Chapter IX). These ventures offer members of the public a variety of experiences from dolphin watching to swimming with wild dolphins. In some cases, such activities have been interpreted to constitute harassment, whereas in others the legal status is less clear. The feeding of free-ranging dolphins, an activity explicitly prohibited under established regulations, also has occurred and 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 and is available from the Commission (see Appendix B). The study divided dolphins into four behavioral types: (1) solitary but sociable with humans, (2) food-provisioned, (3) habituated to humans, and (4) not habituated to humans. 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 of 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 grave 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 reach the public. In this regard, 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 developed by the Service should be consistent with those promulgated by the Fish and Wildlife Service for species under its charge.

Enforcement

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 enforcement 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 the Fish and Wildlife Service and the Florida Division of Law Enforcement to increase their enforcement capabilities. Finally, the letter recommended that the Service should seek to develop a coordinated enforcement strategy involving all three agencies in Florida. A reply had not been received as of 31 December 2000.

Conservation Plan and Take Reduction Team

As described in previous annual reports, the Commission has repeatedly recommended that the National Marine Fisheries Service develop and implement a bottlenose dolphin conservation plan. During the Commission's November 1998 annual meeting in Portland, Maine, representatives of the Service advised the Commission that it had contracted with three scientists to prepare a conservation plan for bottlenose dolphins. The Commission understood that a draft conservation plan would be completed and circulated for comment during the first half of 1999. At the end of 1999 the Commission was advised that a draft conservation plan had been completed and forwarded to the Southeast Fisheries Science Center for con-sideration. The plan has not yet been circulated for review outside the Service and, at the Commission's October 2000 annual meeting, the Service stated that the draft plan would soon be distributed to the Commission and other agencies for comments. The Commission's 12 December letter again urged the Service to move forward expeditiously to complete and adopt a bottlenose dolphin conservation plan. At the end of December 2000 the Commission had not received the draft plan.

Finally, at the Commission's 2000 annual meeting, the Service stated that it would soon form a take reduction team to address the issue of incidental taking

of bottlenose dolphins in commercial fisheries in mid-Atlantic states. A take reduction team would complement the conservation plan described earlier and provide important guidance to managers and conservationists. In its 12 December 2000 letter to the Service, the Commission encouraged the Service to move forward rapidly with the creation of this team and indicated that the Commission would be pleased to participate on the team or otherwise assist. A bottlenose dolphin take reduction team had not been appointed as of 31 December 2000.

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 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 warmer coastal areas or the offshore pack ice. For management purposes, five stocks are recognized in U.S. waters. The distinction is based on the stocks' 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 in recent years. Compared with sightings in the 1970s and 1980s, animals now are rarely seen in offshore waters or the lower reaches of the inlet. During midsummer, the stock is concentrated in a few groups in the upper reaches of the inlet around river mouths. Their distribution becomes more dispersed as winter approaches.

Aerial surveys of beluga whales in Cook Inlet have been conducted by the National Marine Fisheries Service annually in June or July since 1994. Data from those surveys indicate that the Cook Inlet beluga whale 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 just four years. The 1999 surveys yielded an abundance estimate of 357 (CV = 0.20), 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 when combined with the results of a second survey, also conducted in June, the 2000 estimate was 435 whales. The coefficient of variation around this estimate (0.23) again was rather large, owing in large part to the significant variation between results from surveys on two different days. It is likely that the increase in the abundance estimate for the stock between 1999 and 2000 is the result of interannual variation in the counts, rather than substantial growth in the population.

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. Among other things, each assessment is to include an estimate of 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 potential biological removal level calculated for the Cook Inlet population of beluga whales in the 1998 stock assessment, which used a recovery factor of 1.0, was 14 animals.

The Alaska Regional Scientific Review Group, appointed by the Service to provide advice on the status of Alaska marine mammal stocks, met in late 1998 to evaluate information on the Cook Inlet beluga whale

stock. The group recommended that the Service use the 1998 population size point estimate of 347 animals and, to reflect the depleted status of the stock, a recovery factor of 0.5 when making future potential biological removal calculations. The group met again in April 1999 to further evaluate available Cook Inlet beluga whale population data 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, the Alaska Regional 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 1999 stock assessment report for Cook Inlet beluga whales used a recovery factor of 0.5. This resulted in a revised potential biological removal level of 2.7 whales per year.

In the draft stock assessment for 2000, the Service again did not adopt the 0.1 recovery factor recommended by the Scientific Review Group. Rather, recognizing that the stock had been proposed to be designated as depleted under the Marine Mammal Protection Act and considering the Service's pending review of two petitions to list the stock as endangered under the Endangered Species Act, the Service lowered the recovery factor to 0.3. Using this value and the minimum population estimate of 303 for 1999, the Service calculated a potential biological removal level of 1.8 whales for this stock.

Native Subsistence Harvest

Section 101(b) of the Marine Mammal Protection Act allows Alaska Natives to take marine mammals for subsistence or handicraft purposes provided 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 estimated subsistence harvest of Cook Inlet beluga whales averaged about 15 animals per year between 1990 and 1994 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. However, this figure almost certainly underestimates the take because it does not take into account all animals that were struck and lost and may not include beluga whales taken from the Cook Inlet stock by Native hunters who reside outside the Cook Inlet region. 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 72 whales were taken in 1995, including 22 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. As discussed below, no beluga whales were reported to have been taken during the 1999 and 2000 hunting seasons.

The imprecision of the estimates of the level of subsistence taking 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. As noted in the previous annual report, 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, no landing of a beluga whale subject to the regulations has been reported.

Management Issues

Beluga whale muktuk has been sold through commercial outlets in Anchorage 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 National Marine Fisheries Service's interpretation of the Marine

Mammal Protection Act, Anchorage is considered to be a Native village. Muktuk is the skin and blubber from the whale and is a popular Native food. Because of the demand for muktuk, beluga whales taken near Anchorage have 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.

Before the 1999 beluga whale hunting season, there was no effective mechanism for establishing limits on the Native subsistence take from the Cook Inlet stock. The National Marine Fisheries Service had worked with Alaska Natives, particularly the Cook Inlet Marine Mammal Council, to develop a co-management agreement under section 119 of the Marine Mammal Protection Act, which, among other things, would have established mutually acceptable harvest limits for the Cook Inlet stock. However, a number of contributing factors made setting such harvest limits particularly difficult. Cook Inlet is a large area that includes many communities. The Alaska Native population that hunts whales from this stock includes individuals from local villages as well as people who move into the region from elsewhere in Alaska. Beluga whale hunters who have moved into the area from elsewhere may not be members of local tribes and consequently may not be members of the Cook Inlet Marine Mammal Council or other tribally authorized groups. As such, they likely would not be subject to any co-management agreement entered into by the Council or a tribal group. Cook Inlet beluga whales also may be hunted legally by Alaska Natives living in other parts of the state, who likewise would probably not be covered by any co-management agreement.

Ultimately, the greatest impediment to effective co-management lies in the inability of the parties to enforce the provisions of an agreement. Although amendments to the Marine Mammal Protection Act enacted in 1994 provide explicitly for co-management agreements, they do not, as currently interpreted by the National Marine Fisheries Service, convey additional authority to the Service or Native organizations to enforce such agreements. Thus, despite agreement by the Service, the Alaska Beluga Whale Committee, and the Cook Inlet Marine Mammal Council that the commercial sale of beluga whales should be prohibited and hunting curtailed, by the end of 1998 it was apparent that additional measures were needed. Designating the stock as depleted under the Marine Mammal Protection Act or listing it as threatened or endangered under the Endangered Species Act would enable the Service to regulate the harvest, provided that certain findings were made. Alternatively, new legislation would be needed to authorize harvest regulation.

Beluga Whale Status Review

Concern over the small and decreasing number of beluga whales in Cook Inlet and the apparent overharvesting prompted the Service to publish in the 19 November 1998 *Federal Register* a notice of intent to review the status of Cook Inlet beluga whales. The purpose of the review was to determine whether the Cook Inlet stock warranted designation as depleted under the Marine Mammal Protection Act or listing as endangered or threatened under the Endangered Species Act. The review was also intended to elicit information on the stock's distribution, abundance, population dynamics, food habits, and health, as well as the effects of the Native subsistence harvest and other anthropogenic impacts on the population.

As discussed in the previous annual report, the Commission provided comments to the Service on 22 January 1999. The Commission noted that the unsustainable harvest by Alaska Natives was a major factor in the decline of the population and further noted that the preferred approach for addressing the overharvest should be a cooperative one in which the Native community and the Service share responsibility for conserving the Cook Inlet beluga whale population. The Commission recommended that the Service also pursue other alternatives should it prove impossible to implement an enforceable co-management regime that would effectively limit the number of Cook Inlet beluga whales that could be taken. These included adoption of regulations to restrict the harvest or enactment of legislation to impose such limits.

In light of the drastic decline of the Cook Inlet beluga population and the continuing threat of overharvest, the Commission believed that the population warranted protection under the Endangered Species Act and recommended that the Service use emergency procedures to list the stock as endangered or threatened. Because such a listing would be effective for

only 240 days, the Commission recommended that the Service promptly publish a proposed rule to list the stock under normal procedures on a permanent basis.

The prohibitions on taking that apply to endangered or threatened species by virtue of listing cannot, by themselves, limit harvest levels as long as the whales are taken by Alaska Natives for subsistence purposes and the take is not done in a wasteful manner. Therefore, the Commission further recommended that the Service initiate rulemaking under section 10(e) of the Endangered Species Act and/or section 101(b) of the Marine Mammal Protection Act to limit the allowable Native take from the Cook Inlet beluga whale population. Acknowledging that there may be impediments preventing the Service from quickly establishing regulatory limits on the Native harvest, the Commission noted that, as a more timely alternative, the Service should pursue a legislative solution that would provide the necessary level of protection to this stock, at least on an interim basis.

This latter approach ultimately was followed with enactment on 21 May 1999 of section 3022 of Public Law 106-31, the 1999 Emergency Supplemental Appropriations Act. The provision, enacted as a free-standing amendment, specified that, until 1 October 2000, the taking of a beluga whale from the Cook Inlet stock would be lawful only if it occurred pursuant to a cooperative agreement between the Service and Alaska Native organizations. It was believed that, by allowing the Service to limit the taking of Cook Inlet beluga whales for the next 16 months, there would be sufficient time for the agency either (1) to conclude a comprehensive co-management agreement with Native hunters or (2) to 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.

Proposal to List Beluga Whales as Depleted

As part of its status review of the Cook Inlet beluga whale, the National Marine Fisheries Service held a workshop in March 1999. The review confirmed that Cook Inlet beluga whales are geographically and genetically isolated from other beluga whale stocks; that the stock's abundance had declined by nearly 50 percent between 1994 and 1998; that the population had declined to an estimated 347 whales; and that the potential biological removal level established for this stock should be no more than three whales. The Service provided a draft report based on results of the scientific review to the Commission early in July 1999, seeking the Commission's concurrence that designation of the stock as depleted under the Marine Mammal Protection Act was warranted. The Commission responded on 23 July 1999, recom-mending that the Service promptly complete and publish a proposed rule under section 115(a) of the Marine Mammal Protection Act to designate the Cook Inlet beluga whale population as depleted or, alter-natively, publish a proposed rule to list the population as threatened or endangered under the Endangered Species Act. On 19 October 1999 the Service pub-lished a proposed rule in the *Federal Register* to desig-nate the Cook Inlet beluga whale stock as depleted.

On 21 December 1999 the Commission provided comments on the proposed rule and on related information on the Cook Inlet beluga whale stock received during the Commission's 1999 annual meeting. Although the threat of overharvesting by Alaska Natives for subsistence and related commercial purposes had been eased in the short term by the statutory provision enacted in May 1999, the Commission noted that there was no adequate mechanism in place to govern the Cook Inlet beluga whale harvest after 1 October 2000 when the amendment would cease to have effect.

In its letter of 21 December 1999 the Commission identified three approaches available to the Service to ensure that beluga whale harvests in Cook Inlet would not exceed sustainable levels after the amendment lapsed. They were (1) concluding a cooperative management agreement or series of agreements covering all Native hunters that hunt belugas in the Cook Inlet area that would ensure that sustainable harvest levels are not exceeded; (2) promulgating regulations under section 101(b) of the Marine Mammal Protection Act to impose limits on the numbers of Cook Inlet beluga whales that could be taken for subsistence purposes; and (3) securing a long-term legislative solution to prevent overharvesting and allow the stock to recover to its optimum sustainable population level. The Commission suggested that the Service pursue all three alternatives. In addition, the Commission recommended that the Service (1) publish a final depletion finding as quickly as possible; (2) give

high priority to ensuring that an adequate management mechanism is in place by 1 October 2000 to govern the harvest; (3) apprise Congress of the current situation regarding Cook Inlet beluga whales, actions being taken by the Service and others to address the situation, and the possible need for additional remedial legislation; and (4) publish a proposed rule to list the Cook Inlet beluga whale stock as either endangered or threatened under the Endangered Species Act.

The Service responded on 4 April 2000, indicating that it was working with a variety of groups to halt the decline and promote the recovery of the stock. It noted that the results of the 1999 survey of Cook Inlet beluga whales had produced an abundance estimate similar to that for 1998, suggesting that limiting the harvest may be sufficient to reverse recent declines. The Service also highlighted several actions under way to conserve the stock. These included plans to publish a final rule on a depletion finding promptly after the close of the comment period, background work in anticipation of adopting regulations limiting Native taking by 1 October 2000, and efforts to develop an effective co-management agreement with Alaska Native organizations. The Service also advised that it planned to brief Congress on the status of the population in anticipation of the possible need for an extension of the applicable provision of Public Law 106-31, that it would publish a finding with respect to listing the stock under the Endangered Species Act, and that an environmental impact statement would be prepared to evaluate the factors that may be affecting the beluga stock and identify available recovery actions.

As recommended by the Commission and the vast majority of the 800 people and organizations that submitted comments on the proposed depletion rule, the National Marine Fisheries Service published a final rule in the *Federal Register* on 31 May 2000 desig-nating the Cook Inlet stock of beluga whales as depleted under the Marine Mammal Protection Act. In taking this action, as it has with other cetacean species, the Service specified that it considered 60 percent of carrying capacity to be the stock's maximum net productivity level (the lower bound of the optimum sustainable population range for the stock). That is, if the stock had declined to less than 60 percent of its carrying capacity, it would be considered depleted. In this case, a reliable estimate of carrying capacity (i.e., historical abundance before the decline) was not available. Based on the limited surveys that had been conducted before 1994, when the Service instituted its current survey program, and anecdotal information provided by experienced Alaska Native hunters living in the Cook Inlet area, the Service believed that the historical abundance of the beluga whale population in that area exceeded 1,000 animals. If carrying capacity were greater than 1,000 beluga whales, the stock clearly would be depleted. Even if one were to use the abundance estimate from the 1994 survey as the best indication of carrying capacity, the statistical analyses performed by the Service indicated that there was a 71 percent probability that the stock had declined by 40 percent between 1994 and 1998. Inasmuch as the Cook Inlet stock of beluga whales had been hunted for subsistence throughout the 1980s and early 1990s and likely had already been significantly reduced by 1994, the Service believed that there was strong evidence to conclude that the stock was below its optimum sustainable population and therefore depleted.

Proposal to List Beluga Whales as Endangered

As noted above, the Commission, beginning in January 1999, has recommended that the Cook Inlet beluga whale stock also be listed under the Endangered Species Act. In this regard, two petitions seeking to have the stock listed as endangered were submitted to the National Marine Fisheries Service in March 1999. On 9 April 1999 the Service published a notice announcing their receipt along with a finding that each of the petitions presented substantial information indicating that listing may be warranted. Under the Endangered Species Act, the Service is to make a finding within 12 months of receiving a listing petition as to whether listing is warranted or not. When the Service failed to meet that deadline, one of the groups of petitioners filed suit in U.S. district court on 8 May 2000 (*Cook Inlet Beluga Whale et al.* v. *Daley*), seeking to compel issuance of the required finding.

The Service published a notice of determination on 22 June 2000, finding that listing under the Endangered Species Act was not warranted at that time. The Service reviewed possible threats to the population, including fishery interactions; oil spills and contact with other pollutants and contaminants; killer whale predation; disturbance from oil and gas explor-

ation and development, shipping, airport operations, and other human activities; and prey depletion, and concluded that, with the exception of taking by subsistence hunters, none of these factors was likely having an adverse impact on the stock. As for subsistence hunting, the Service concluded that the problem was being addressed sufficiently by limitations imposed by Public Law 106-31 and by regulations that the Service planned to propose pursuant to the depletion designation under the Marine Mammal Protection Act. Thus, it believed that the stock was no longer in danger of extinction or likely to become so in the foreseeable future. As for the possible threat posed by the population having been reduced to a small size, an analysis prepared by Service scientists concluded that a stock with at least 300 individuals and a positive intrinsic growth rate was unlikely to go extinct due to stochastic events.

Dissatisfied with the Service's reasoning, plaintiffs in the aforementioned lawsuit amended their complaint in September 2000 to challenge the Service's decision not to proceed with a listing proposal. They contended that the Service had acted arbitrarily and capriciously in finding that listing was not warranted and that it had failed to use the best available scientific and commercial data in making its decision, as required under the Endangered Species Act.

In response to that challenge, the City of Anchorage, the Kenai Peninsula Borough, the Matanuska-Susitna Borough, the Alaska Oil and Gas Association, and the Resource Development Council for Alaska all filed to intervene in the case, claiming that their interests would be adversely affected if the Service's decision not to list the Cook Inlet stock of beluga whales was set aside. As of the end of 2000 the court had yet to rule on the motions to intervene.

Co-Management Agreement for 2000

As noted earlier, enactment of Public Law 106-31 prohibited until 1 October 2000 any taking of a Cook Inlet beluga whale by Alaska Natives unless authorized by a cooperative agreement between the National Marine Fisheries Service and an Alaska Native organization. In an effort to provide an opportunity for Natives in the Cook Inlet area to meet their subsistence needs and to continue their hunting customs, traditions, and culture, while promoting the recovery of the beluga whale stock, the Service entered into a co-management agreement with the Cook Inlet Marine Mammal Council on 3 June 2000. Under that agreement, the parties agreed to authorize one strike of a beluga whale during 2000, with that strike allocated to the Native village of Tyonek. The agreement also included specific provisions under which the hunt would be conducted to increase the likelihood that the whale would be successfully landed, minimize the impact on the beluga whale population, and prevent commercial use of the whale's parts. Although Tyonek was allowed to take one whale during 2000, the authorized strike was not used.

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, at which an administrative law judge develops the record of the proceeding and 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 publish and make available to the public any recommendations provided to the Service by the Marine Mammal Commission that relate to the regulations.

In anticipation of publishing a proposed rule to regulate the Cook Inlet beluga whale hunt, and to satisfy the consultation requirement of section 103(a) of the Marine Mammal Protection Act, the Service wrote to the Commission on 10 July 2000. The Service provided a partial draft proposed rule and solicited any additional Commission advice before publication. The Commission responded by letter of 31 July 2000.

In general, the Commission strongly supported the proposal to establish harvest limitations, concluding that such an action was essential to conserve the depleted beluga whale stock. The Com-mission believed, however, that certain aspects of the draft rule needed to be strengthened or clarified. In this regard,

the Commission recommended that a provision be added to define the geographic area to which the regulations would apply. The Commission also suggested that the Service specify the particulars of the harvest regime more completely, rather than deferring most elements until the adoption of a cooperative agreement after regulations are in place. The Commission further recommended that the Service consider revising a proposed prohibition on the sale of parts and edible portions from Cook Inlet beluga whales to prohibit other quasi-commercial transactions, such as barter, and address the sale of meat from other beluga whale stocks, which, if not also regulated, could create enforcement difficulties.

The Commission supported the proposal to prohibit the taking of calves or adult whales with calves, but believed that a definition of what constitutes a calf should be provided. In addition, the Commission took issue with the Service's statement suggesting that any strike quota established under the regulations could be revised periodically through notice-and-comment rulemaking. The Commission expressed the view that formal rulemaking procedures needed to be followed, not only when establishing any such limitations, but when amending those limits as well. The draft rule would have established a harvest season beginning on 1 July and ending on 31 July of each year. The rationale given for the opening date was the need to defer hunting until the end of the calving season. The Commission noted, however, that no rationale had been provided for the proposed closing date.

Development of a Proposed Rule – After considering the Commission's comments and advice, the Service published a proposed rule on 4 October 2000. At approximately the same time, the Service issued a draft environmental impact statement reviewing federal actions associated with the management and recovery of Cook Inlet beluga whales. The preferred alternative identified in the statement was the issuance of regulations to establish an annual strike limit of two beluga whales until the Cook Inlet stock is no longer depleted. This alternative was reflected in the proposed rule. The Service believed that allowing two strikes per year would meet the dual objectives of providing an opportunity for a traditional subsistence harvest while not significantly delaying the recovery of the stock. The Service estimated that a take of two whales per year would enable the stock to recover to the lower bound of its optimum sustainable population range within 25 years, as compared with a recovery time of 22 years under a no-harvest scenario. Despite the advice it had received from the Commission, the Service reiterated its view that the proposed strike limit could be adjusted periodically, if necessary, without undergoing formal rulemaking procedures.

As with the earlier draft, the proposed rule would defer several specifics of the harvest to be worked out through co-management agreements between the Service and Native hunters. Other elements, however, were revised. As recommended by the Commission, the proposed rule delineated the geographic range of the Cook Inlet beluga whale stock. Under the proposed rule, the stock was defined as any beluga whale occurring in the Gulf of Alaska north of 58°N latitude. The starting date for the hunting season was moved to 15 July, and a closing date was dropped. The proposed prohibition on taking adult belugas with calves was expanded to clarify that the prohibition applied not only to those with newborn calves but also to those with older, yet still maternally dependent calves. The prohibition on taking calves, however, apparently would apply only to newborn calves.

With respect to commercial activities, the Service proposed prohibiting the sale of any products or foodstuffs from Cook Inlet beluga whales. The proposed rule also indicated that the formal hearing in this matter had been scheduled for 5 December 2000 and indicated that interested parties were required to file a notice of intent to participate by 1 November.

Preparations for a Formal Hearing – On 1 November 2000 the Commission filed its notice of intent to participate as a party in the formal rulemaking hearing. The Commission indicated that it intended to file direct testimony from one witness, who was an expert in environmental statistics and risk analysis modeling for endangered animal populations and a former member of the Commission's Committee of Scientific Advisors on Marine Mammals. The Commission noted that its witness's testimony would address issues related to the population model being put forward by the Service, the population dynamics of the Cook Inlet stock of beluga whales, and the proposed harvest limits. Comments and Commission positions

with respect to other issues related to the rulemaking were included in the 1 November letter.

Although reserving comment on the proposed two-strike annual quota, the Commission noted that the proposed rule and related materials were silent as to how the allowable strikes would be allocated to Native hunters, other than to provide that any such hunting would be authorized pursuant to a cooperative agreement between the Service and an Alaska Native organization. Although from a purely biological perspective, it does not matter who is authorized to take beluga whales under the proposed strike limit, the Commission is not limited to considering biological impacts when formulating its recommendations. Rather, the Marine Mammal Protection Act directs the Commission to recommend those measures it deems desirable to further "the protection of the Indians, Eskimos, and Aleuts whose livelihood may be adversely affected by actions taken pursuant to [the] Act." In furtherance of this duty, the Commission stated that it was imperative that the Service develop a method for allocating the limited number of strikes that is fair to all hunters. In the Commission's view, it was not sufficient merely to provide that strikes would be allocated to those Alaska Native organizations with which a cooperative agreement is negotiated. Rather, the Service, as part of the rulemaking, needed to set forth the factors that it would use in making allocation decisions and solicit comment thereon.

As it had in its previous comments, the Commission again questioned whether section 101(b) of the Marine Mammal Protection Act provided flexibility for the Service periodically to review the effects of any harvest on the Cook Inlet beluga whale population and, as appropriate, adjust the number of allowable annual strikes through notice-and-comment rulemaking. In the Commission's view, any regulation required to be adopted through formal rulemaking can only be amended using formal procedures. Because of the difficulty and expense associated with periodic adjustments to a fixed harvest limit by formal rulemaking, the Commission stated its intent to promote consideration of more flexible regulatory alternatives.

The Commission also commented on the proposed prohibition on the sale of products from Cook Inlet beluga whales. The Commission expressed the view that this prohibition, although well intentioned, was too restrictive in some respects and not strict enough in others. As discussed in the draft environ-mental impact statement, some Alaska Natives have used bone, teeth, and perhaps other parts of beluga whales to create traditional handicrafts. In the Commission's opinion, there is no reason that the continued use of nonedible byproducts in the creation and sale of traditional Native handicrafts from beluga whales otherwise taken in accordance with the regu-lations should be proscribed. The Commission also expressed concern that the proposed prohibition would only apply to one party in any transaction involving Cook Inlet beluga whales. The Commission therefore recommended that the proposed rule be expanded to prohibit not only the sale of edible portions of Cook Inlet beluga whales, but the purchase of such items as well. To facilitate enforcement, the Commission further recommended that the regulations also prohibit attempts to sell or purchase edible portions. The Com-mission also identified a potential similarity-of-appearance problem that would warrant an expansion of the proposed prohibition on sales. Inasmuch as some muktuk from beluga whales taken in areas other than Cook Inlet has apparently been sold in the Anchorage area, the Commission suggested that, unless there is a quick, easy, reliable, and cost-effective way of differentiating between edible portions from Cook Inlet beluga whales and those from other stocks, the Service needed to consider expanding the proposed prohibition to include sales of all edible portions of beluga whales within Anchorage or throughout the Cook Inlet area.

Over the past several years, the hunting efficiency for beluga whales in Cook Inlet has been quite low. The Service, in its draft environmental impact statement, suggested that the ratio of landed to struck-but-lost whales may be one, or even two, whales lost for each one landed. The Commission therefore encouraged the Service, as part of the rulemaking, to consider ways in which hunting efficiency might be increased. Possible measures identified by the Commission included (1) requiring hunters to use har-

poons, that, according to the draft statement, aid in retrieval, but are not always used; (2) requiring hunters to tag struck whales to aid in relocation, should the animal be lost; and (3) placing restrictions on when and where beluga whales may be hunted so as to avoid areas of high turbidity, strong currents, or times of large tidal fluctuations that may contribute to failure to land a struck whale.

A second measure of harvest efficiency is the extent to which landed whales are fully used. The draft statement noted that the type and quantity of edible portions retained from landed beluga whales vary depending on the customs and practices of the hunter. Although believing that Native customs and traditional use patterns should be respected to the extent possible when promulgating the regulations, the Commission nevertheless thought that the Service should explore alternatives that would facilitate the sharing of edible portions of beluga whales not used in the harvesting village with residents of other villages.

The Commission also expressed support for the provision in the proposed rule that would prohibit hunting before 15 July as a means to minimize the possibility of taking pregnant females and the proposed prohibition on the taking of "newborn calves, or adult whales with older, maternally dependent calves." With respect to the latter prohibition, however, the Commission indicated that there was a need for the Service to clarify whether the prohibition was intended to cover all maternally dependent calves, not just newborns. This was the stated intent in the preamble, but it was not reflected in the proposed regulatory language itself. The Commission also recommended that the Service provide additional guidance to hunters to allow them to differentiate between calves that legally may be taken and those that may not.

Commission Testimony – As noted earlier, the Commission's witness filed direct testimony to be considered during the rulemaking hearing. The testimony expressed the view that there were three primary problems with the harvest quota being proposed by the Service. It noted that (1) there was appreciable uncertainty in the key variables forming the substantive basis of the proposed rule, (2) the analysis of the proposal in the draft environmental impact statement did not take sufficient account of that uncertainty, and (3) the proposed rule was not sufficiently precautionary in light of the uncertainty.

The Commission noted that, although there was a range of plausible values for each of the key variables (current and historic population sizes, harvest-related mortality, the lower bound of the optimum sustainable population range for beluga whales, and the stock's maximum growth rate), the Service had used point estimates in its population modeling. In using fixed values for these uncertain parameters, the Service's calculations of the delay in time-to-recovery under different harvest scenarios could be under- or over-estimates. Thus, it was not apparent that the proposed harvest levels would meet the Service's stated goal of not delaying recovery time of the population to the lower bound of the optimum sustainable population range by greater than 10 percent.

As noted in the Commission's testimony, the preferred method for developing appropriate harvest limits would be a Monte Carlo analysis, a statistical tool for taking account of such uncertainty. Such an analysis would represent the uncertain variables with probability distributions and compute the probability distribution of predicted outcomes. Using this approach, decisionmakers could judge the proposed harvest levels relative to the probability of achieving an identified outcome (e.g., no more than a certain percentage delay in recovery time).

The testimony also noted that the proposal to allow no more than two strikes per year was a vast improvement over the unregulated harvest of the recent past. Nevertheless, based on the Service's failure to consider uncertainty in its analysis, it concluded that there was an unacceptably high risk that the delay in recovery time for the stock would exceed the level identified by the Service as being acceptable. In light of the very small size of the Cook Inlet beluga whale stock and its steep decline in abundance over the past several years, the testimony concluded that it would be prudent to adopt a rule that initially would be more protective than that proposed by the Service, and that harvest limitations should be relaxed only after additional data derived from continued monitoring of the population demonstrated that the population could withstand such taking.

The Formal Rulemaking Hearing – The formal hearing required by the Marine Mammal Protection Act

was held in Anchorage, Alaska, on 5–8 December 2000. In addition to the National Marine Fisheries Service and the Marine Mammal Commission, the Village of Tyonek, the Cook Inlet Treaty Tribes, Trustees for Alaska (representing the Center for Marine Conservation), the Alaska Oil and Gas Association, and Joel and Debra Blatchford (repre-senting their interests as individual subsistence hunters) participated as parties. The Municipality of Anchorage, Kenai Peninsula Borough, and Matanuska-Susitna Borough had initially indicated their intent to participate collectively in the hearing but later with-drew because their primary focus was on issues related to the possible listing of the Cook Inlet beluga whale stock under the Endangered Species Act rather than those related to subsistence hunting.

At the hearing, parties were provided the opportunity to present supplementary direct testimony, to cross-examine other parties' witnesses, and to offer rebuttal testimony. The transcript of the hearing, along with written submissions, forms the record upon which the administrative law judge presiding at the hearing is to base a recommended decision. The Commission's proposal for a harvest regime, driven by a likelihood of meeting specific recovery criteria that could be modified to reflect the observed growth of the population, was generally received favorably by the other parties. The Commission believed that such a regime, although more conservative than the Service's proposal in the early years, might enable strike limits to be increased as the stock recovers.

Rather than relying on posthearing briefs to elucidate the positions of the parties, the judge encouraged the parties to work cooperatively to arrive at compromise solutions. To the extent that accept-able compromises could be reached, the parties could agree to them through stipulations. At the conclusion of the hearing the parties met to consider a more flexible harvest regime along the lines recommended by the Commission. Recognizing that the data necessary to conclusively measure current populations trends would likely not be available for four to six years, the parties tentatively agreed to an interim quota of six beluga whales over the next four years. It was also agreed that the Service would convene a meeting of agency and other scientists to design a longer-term, flexible management regime based on achieving a yet-to-be-specified delay in recovery time criteria. Although progress was made toward developing a proposal for the alternative regime, no final agreement was reached.

Pressure to complete the rulemaking in time to have regulations in place before the 2001 hunting season was eased by enactment of Public Law 106-553 on 21 December 2000. Section 627 of that law reinstated on a permanent basis the prohibition on hunting Cook Inlet beluga whales unless authorized by a cooperative agreement between the National Marine Fisheries Service and an Alaska Native organization. Despite enactment of this provision, the Service intends to complete the rulemaking as a more comprehensive approach that takes into account the views of diverse constituencies in establishing allowable harvest limits.

Hawaiian Monk Seal (*Monachus schauinslandi*)

The Hawaiian monk seal is the most endangered seal in U.S. waters. The species is one of three in the genus *Monachus*. The Caribbean monk seal is now considered extinct. The Mediterranean monk seal probably numbers 300 to 500 animals and is on the verge of extinction. The Hawaiian monk seal, numbering about 1,300 to 1,400 animals, also is in danger of extinction, but has a better chance of long-term survival.

Certain primitive features indicate that the Hawaiian monk seal may have evolved as long ago as 15 million years. Where the species evolved is unknown, but currently these seals are found only in the Hawaiian archipelago (Fig. 4). Within the archipelago, monk seals apparently were extirpated from the main Hawaiian Islands soon after the arrival of the first human settlers 2,000 years ago. Thus, their present-day distribution is confined largely to the remote Northwestern Hawaiian Islands, a chain of small islands and atolls stretching more than 2,000 km to the northwest of the main Hawaiian Islands. Even at these remote locations, monk seals have been subjected to a variety of natural and human-related impacts that have contributed to their current endangered state. In the 1800s they were killed by sealers, explorers, and ship-

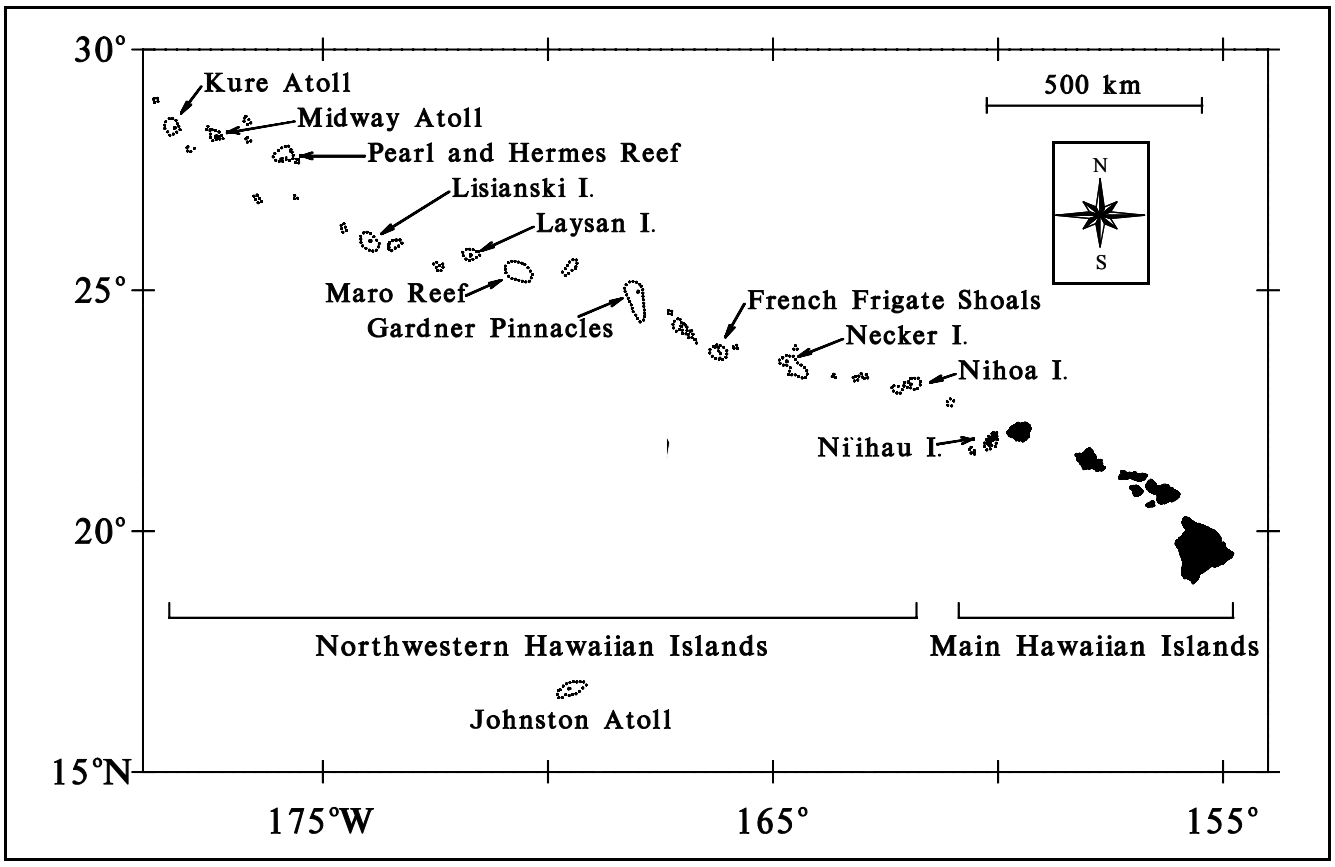

Figure 4. The Hawaiian Archipelago. The Northwestern Hawaiian Islands provide pupping beaches for all major breeding colonies of Hawaiian monk seals.

wrecked sailors for skins, oil, and food. In the 1900s they suffered more from disturbance and loss of habitat due to an increasing human presence.

Historical records of early expeditions to the Northwestern Hawaiian Islands indicate that by 1900 Hawaiian monk seals may have been extirpated at two or possibly three sites (Laysan Island, Midway Atoll, and French Frigate Shoals) in the chain. Some recovery must have occurred by the 1950s although abundance and trends before that time are poorly known. The first range-wide count was conducted in the 1950s, well after the species' distribution had been reduced to its current range. The count provided an index of total population size rather than a population estimate, because it did not include seals at sea during the count. Generally, about one-third of the seals are on land during a typical count. By the 1970s the abundance of Hawaiian monk seals had declined considerably (Fig. 5) and in 1976 the species was listed as endangered under the Endangered Species Act. Subsequent counts indicate that the total population declined by about 60 percent from the mid-1950s to the early 1990s, but has remained at about the same low level since (Fig. 5). The decline appears to have leveled off in the 1990s.

During the past four decades the six existing colonies have exhibited varying demographic trends. Numbers declined at Kure Atoll, Midway Atoll, Pearl and Hermes Reef, Lisianski Island, and Laysan Island. In contrast, the colony at French Frigate Shoals grew perhaps as much as four- to sixfold during this period, and by the mid-1980s approximately half of the total population occurred at that site. Since the late 1980s, however, this colony has declined sharply in numbers, and it is expected to continue declining in the near future due to a lack of recruitment of young animals into the breeding age groups (described later).

Site-Specific Status and Trends

A review of the status and trends of the existing colonies is necessary to understand the past decline of the Hawaiian monk seal and the challenge of promoting recovery of the species in the future.

French Frigate Shoals – Based on its abundance, the colony of Hawaiian monk seals at French Frigate Shoals has dominated trends for the species over the past several decades. The oscillation in abundance at this site (Fig. 6) is likely due to a combination of factors. The growth observed from the late 1950s to the 1980s probably occurred as a result of decreased human disturbance at French Frigate Shoals. Military operations in the late 1930s and 1940s must have had a considerable effect on the local seal colony, both through disturbance and the loss of seal haul-out areas to human activities, and possibly through the incidental injury or killing of seals. Since the late 1950s human activities have been reduced considerably, which has lessened the impact on the seals and allowed a period of local growth and recovery. By the mid- to late 1980s, however, the number of seals at this atoll may have reached the environmental carrying capacity. Since the late 1980s the French Frigate Shoals colony has declined by 60 percent or more due to poor survival of pups and juveniles, slow growth and maturation of survivors, and low reproductive success of mature females. Important known sources of juvenile mortality include food limitation or starvation, shark predation, and adult male aggression. Slow growth and maturation, as well as low reproductive success, are also consistent with food limitation. Thus, the existing evidence suggests that the growing colony of seals may have reached the environmental carrying capacity by depleting food resources at the atoll and nearby banks where they feed.

At the same time, however, the environmental carrying capacity itself may have declined. Climate studies indicate the occurrence of decadal-scale shifts in North Pacific oceanographic and atmospheric conditions, which may have decreased productivity in the 1980s and 1990s and, subsequently, reduced prey availability for higher-level predators such as the Hawaiian monk seal. In effect, the demands of a growing colony may have overshot a waning food supply, exacerbating the demographic problems described earlier.

This scenario may have been further complicated in the late 1970s and 1980s by development of the Northwestern Hawaiian Islands lobster fishery. The fishery took its largest catches in the early 1980s and focused its effort at banks within the foraging range of monk seals from French Frigate Shoals. The fishery reduced considerably the standing biomass of lobster and may well have seriously reduced the available biomass of octopus,

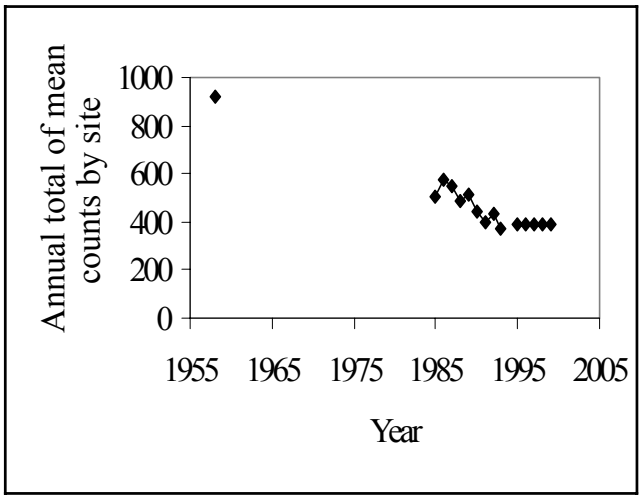

Figure 5. Combined annual mean beach counts for all major Hawaiian monk seal breeding colonies, 1958–2000.

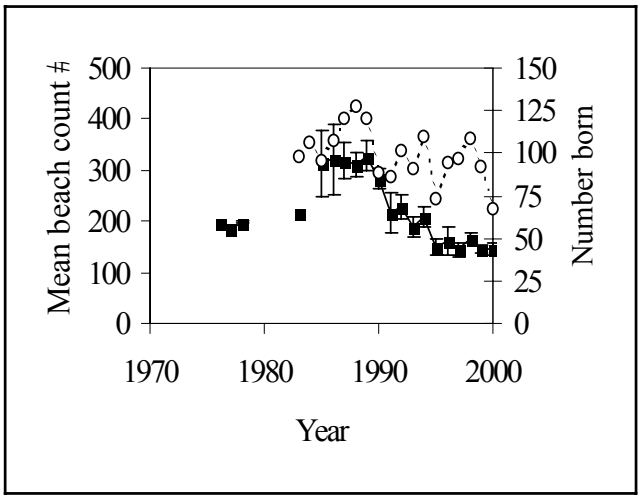

Figure 6. Annual mean beach counts (filled squares) and pups born (open circles) at French Frigate Shoals.

which is taken as bycatch. Both lobster and octopus are known prey of Hawaiian monk seals, and the fishery may thereby have contributed to the seals' nutritional limitation.

Finally, the decline of this colony also has been exacerbated by shark predation and adult male aggression. Sharks are known to attack monk seals of all sizes and are a particular threat to pups and juveniles. In recent years tiger and Galápagos sharks have frequented the nearshore waters off several main pupping islets at French Frigate Shoals. These sharks are known to have killed some pups and are suspected to have killed others. In 1999 a total of 92 pups was born, of which 25 are believed to have died from shark predation. Aggressive adult males also have contributed to pup mortality at this site. In 1991 and in 1998 adult males were removed from this colony after they were observed harassing and, in some cases, killing pups.

All of these factors together have not only reduced the French Frigate Shoals colony by more than 60 percent over the last decade but have also destabilized its age structure. Due to extremely low survival of pups and juveniles, few young females have reached maturity at this site in recent years and few are expected to do so in the next 5 to 10 years. Thus, the reproductive potential of the colony has been diminished considerably. In 2000 the number of births recorded dropped to 67, approximately half the annual number in the mid-1980s. The number of seals will probably continue to decline in the near future.

The National Marine Fisheries Service has conducted extensive research at the site. With the assistance of Sea Life Park, the Fish and Wildlife Service, the Coast Guard, and the Navy, the Service also carried out several captive care and relocation programs in an effort to salvage the reproductive potential being lost. These programs were intended to return emaciated pups and juveniles to good health and condition, protect them from sharks and aggressive adult males, and (in the majority of cases) relocate them to areas where availability of prey would be adequate to support normal growth, maturation, and reproduction. A number of pups were relocated to Kure Atoll and successfully bolstered recovery of that colony. In the early 1990s relocation efforts were redirected to Midway Atoll, but after several unsuccessful efforts at that site, the release site for young animals in captive care was changed back to Kure Atoll. In 1995, however, 12 pups taken from French Frigate Shoals contracted an eye disease that precluded their release. Although these seals have since been transferred to another captive facility, this ailment and, more generally, the potential for disease transmission between colonies have emphasized the need for caution in future relocation efforts. As discussed below, the variability of juvenile survival as observed at this site and earlier at Kure Atoll and the need to prevent the loss of the species' reproductive potential will likely be important considerations for monk seal research and recovery efforts for some time to come.

Laysan Island – By the late 1800s the Hawaiian monk seal colony on Laysan Island was virtually, if not totally, extirpated. Few seals were seen on the island, probably because they had been killed for food or disturbed by feather collectors and guano miners. Schauinsland, the scientist who initially described the species, failed to see a single living seal during a three-month visit to the island in 1896. Other visitors recorded a similar absence of seals. However, the colony must have recovered to some degree by the 1950s and 1960s, when counts revealed between 200 and 300 seals on the beach. Thereafter, the counts declined erratically to a low point in 1990. Since 1990 the colony has shown a slow increase in both the mean annual count and the number of pups born (Fig. 7).

In 1978 the decline of the Laysan Island population was accelerated by a die-off of at least 50 seals. Poisoning by ciguatoxin (a naturally occurring biotoxin) was suspected, but the cause remains unknown. The remainder of the decline also has not been explained. Military activities took place on Laysan Island during the period of decline, but the nature of those activities and their potential effect on monk seals have not been described. Research activities conducted since the late 1970s suggest that at least the later part of the decline might have been due to increased mortality of adult females and juveniles by mobbing or male aggression. The term "mobbing" is used to describe incidents where multiple males attempt to mount and mate with a

single female (or in some cases a juvenile animal of either sex) at the same time. During mating, which occurs in the water, a male bites the female's back to help him attain and maintain his position. When repeated by multiple males, such bites can cause severe and even lethal wounds. Evidence of mobbing has been observed at several sites but has been best studied at Laysan Island. Between 1984 and 1992 mobbing was a factor in 45 of the 63 monk seal deaths (70 percent) confirmed at this site.

Mobbing is thought to result, at least in part, from an imbalance in the adult sex ratio. Data from the late 1970s and early 1980s suggest that the adult sex ratio in the colony was heavily skewed with as many as 2.5 to 3 males for each female. In effect, the "functional" sex ratio may have been even more extreme. During the species' prolonged reproductive season, females with pups are antagonistic to adult males and are generally unavailable for mating. Estrus for the remaining females is relatively asynchronous (although estrus is not always a factor in mobbing), and the result is a functionally skewed sex ratio with multiple males vying for the mating rights with relatively few available females. To the extent that mobbing increases female mortality, it also creates a feedback loop: a skewed sex ratio increases the likelihood of mobbing, and mobbing-related mortality further reduces the number of females, further skewing the sex ratio. Studies conducted at Laysan Island since the early 1980s indicate, however, that the sex ratio of adult animals has been steadily changing from one skewed toward males to one approaching parity or slightly biased toward adult females.

In 1984 nine adult males were relocated from Laysan Island to Johnston Atoll and in 1994 a total of 22 males was relocated to the main Hawaiian Islands to facilitate this transition and reduce the incidence of male aggression. None of the males returned to Laysan Island, and data collected after the 1994 relocation revealed a significant reduction in injuries and mortality resulting from such aggression. In 1999 and 2000 the adult sex ratio was 0.9:1.0 (M:F). Nevertheless, in 1999 mobbing or single-male aggression resulted in five injuries and two deaths, indicating that such aggression still may occur with lethal consequences. In 2000 only a single nonlethal injury was attributed to male aggression. The recovery team has recommended that individuals males exhibiting excessively aggressive behavior be removed from Laysan and Lisianski Island (described later), as was done at Laysan Island in 1994 and at French Frigate Shoals in 1991 and 1998.

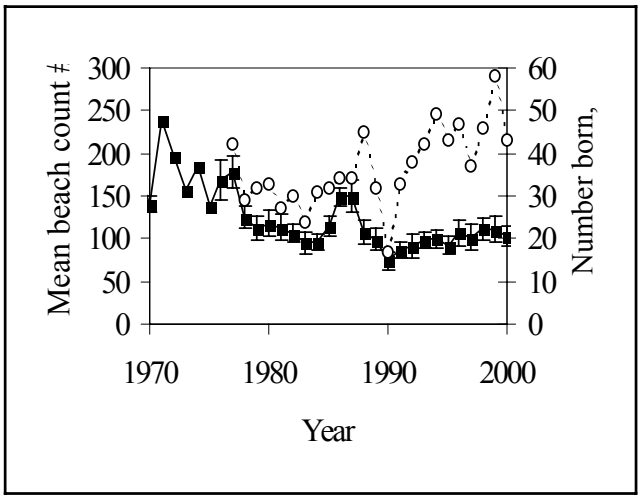

Figure 7. Annual mean beach counts (filled squares) and pups born (open circles) at Laysan Island.

At present the Laysan colony seems poised for continued recovery. The number of pups born annually (Fig. 7) has increased, albeit variably, over the past decade. A total of 58 pups was born at Laysan Island in 1999, the largest number of births recorded since intensive monitoring began in the late 1970s. In 2000 the number of pups born was 43. Unfortunately, the increase in number of pups born in 1999 was offset somewhat by a decrease in pup and juvenile survival. Due to its small size, recovery of this colony will likely occur slowly. However, in the absence of excessive mortality due to mobbing and male aggression, recovery can reasonably be expected to continue in the near future.

Lisianski Island – From the late 1950s to the 1980s the monk seal colony at Lisianski Island exhibited a decline similar to that observed at Laysan Island. In contrast to the colony at Laysan Island, counts at Lisianski Island have continued to decline slowly (Fig. 8). The number of pups born has increased slowly since 1991, but juvenile mortality has increased. At least two problems are known to

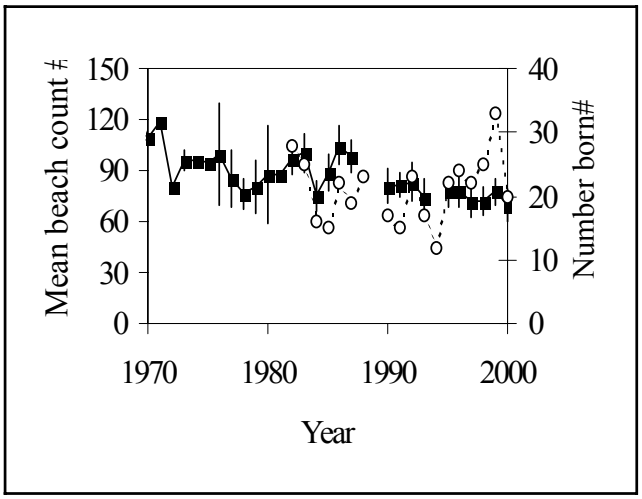

Figure 8. Annual mean beach counts (filled squares) and pups born (open circles) at Lisianski Island.

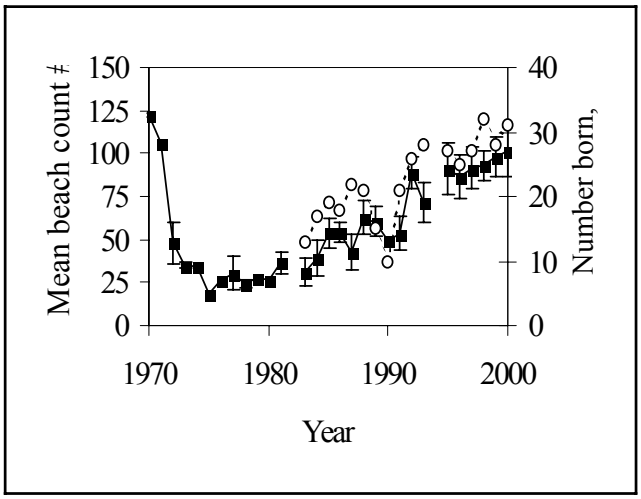

Figure 9. Annual mean beach counts (filled squares) and pups born (open circles) at Pearl and Hermes Reef.

be impeding recovery at the site: male aggression and entanglement in marine debris. In the late 1970s and early 1980s the colony at Lisianski may have contained as many as three adult males per adult female. This imbalance has been correcting itself over the past two decades, but has not yet reached parity. In 2000 the adult sex ratio was 1.6:1.0 (M:F). The imbalance is observed in the older adults (>18 years of age), and parity should be reached when these older animals die and are replaced by younger cohorts. Still, in 1999 a total of 10 observed injuries was attributed to single-male aggression or mobbing, indicating that male aggression may impede the colony's recovery. In 2000 this number declined to 4. Because studies at Lisianski Island have not been as consistent as those at Laysan Island, the significance of male aggression at this site is less well known.

Entanglement in marine debris is a serious problem at all sites, but has been particularly serious at Lisianski Island. Historically, researchers have found greater deposition of debris and more entanglement of seals at Lisianski Island than at any other site in the Northwestern Hawaiian Islands. In 1999 seven seals were observed entangled at this site; three escaped independently and four were released by the researchers. In contrast to past trends, no entangled seals were observed as this site in 2000.

An unknown number of entangled seals are unable to return to the island where they might be observed and freed. In 1999 a cooperative effort removed debris from three sites, including Lisianski Island, to reduce the damage done to coral reefs and the threat to wildlife, including monk seals (see later in this section and Chapter VII). The continued removal of debris from this site, as well as other sites in the chain, remains a high priority. Because both entanglement and male aggression may contribute significantly to increased mortality at this site, recovery of this colony will remain uncertain until the incidence of both is understood and management actions have been taken to mitigate the impacts.

Pearl and Hermes Reef – The colony of Hawaiian monk seals at Pearl and Hermes Reef declined from the late 1950s to the mid-1970s, but has been recovering gradually since then (Fig. 9). In the 1950s the local abundance of seals was probably depleted by military excursions from Midway Atoll. Such activities no longer occur and this colony is now largely free from human disturbance. Male aggression and mobbing appear to be rare at Pearl and Hermes Reef, survival rates of young animals appear to be good, and the age structure is stable and poised for further growth in the future (i.e., the colony has a high proportion of young animals that are reaching maturity and beginning to contribute to

the productivity of the colony). Monk seals tagged at Pearl and Hermes Reef are frequently sighted at Midway and Kure Atolls, and appear to contribute to the growth of those colonies, particularly at Midway Atoll. In the recent past, recovery at these three western sites has partially offset the decline at French Frigate Shoals.

In October 1999 this atoll was partially cleared of debris by the cooperative effort mentioned earlier. Nevertheless, entanglement in marine debris continues to be a threat to recovery of this colony. In 2000 two entangled seals were observed and successfully disentangled by field personnel.

In June 2000 the longline fishing vessel *Swordman I* ran aground near Pearl and Hermes Reef, spilling an estimated 2,200 gallons of diesel fuel. It also had additional fuel and oil on board, holds full of eventually rotting fish and bait, and large amounts of line and fishing gear that could have been lost to the sea if not cleaned up. Researchers from the monk seal program were conducting studies at Pearl and Hermes Reef and rescued crew members from the *Swordman I.* A natural resource assessment crew from the Fish and Wildlife was on the scene one week later. The vessel was eventually pulled from the reef and sunk in deep water. The assessment crew estimated that damage to the reef and its inhabitants was minimal. Although no effects on Hawaiian monk seals were documented at the atoll, such incidents pose a serious threat to local ecosystems and their inhabitants, including monk seals.

Midway Atoll – The colony of Hawaiian monk seals at Midway Atoll probably has been affected more by human activity and disturbance than any other colony. The atoll was visited on multiple occasions in the 1800s, and by the end of the century the local colony of monk seals had been extirpated. The atoll was permanently settled in the early 1900s and, in spite of the human presence, some recovery of the monk seal colony occurred in the early 1900s. The seals were exposed to considerable disturbance during World War II and the postwar period, but as many as 60 animals were still observed at the atoll in the mid-1950s. By the early 1960s, however, the colony had all but disappeared a second time. Since then, the colony has been slow to recover, and the first real signs of recovery were not apparent until the early 1990s after the Navy drastically curtailed its activities on Midway.

Data collected over the past decade indicate that recovery continues as a consequence of reproduction by seals at the atoll, immigration from Kure Atoll and Pearl and Hermes Reef, and protection associated with the 1996 transfer of ownership of the atoll to the Fish and Wildlife Service. In 2000 a total of 14 pups was born, the most recorded at this site since the first counts were conducted in the 1950s. The mean beach count in 2000 was a little over 25 animals (Fig. 10).

The Navy operated an air station at Midway Atoll until 1996 when it was closed and the atoll was relinquished to the Fish and Wildlife Service. To maintain the atoll's runway, the Service contracted with a commercial company interested in using the atoll as a refueling point and emergency runway for aircraft traveling between the United States and Asia. To subsidize operation of the runway, the company established an ecotourism center on Sand Island, the largest of the atoll's islands. The venture provides an opportunity for tourists to observe monk seals, seabirds, and other marine life in the wild, and thus serves as an opportunity to educate the public about the Hawaiian monk seal.

At the same time, ecotourism has raised concern about the potential for disturbance of the

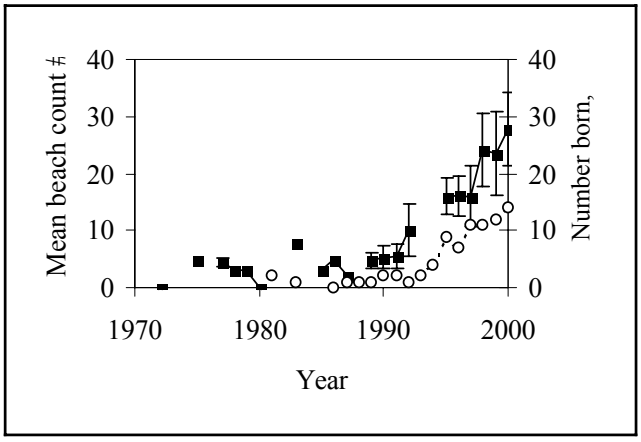

Figure 10. Annual mean beach counts (filled squares) and pups born (open circles) at Midway Atoll.

vitally important seal colony at Midway Atoll. Through the late 1990s, cooperative efforts by the Fish and Wildlife Service, the National Marine Fisheries Service, and the Hawaii Wildlife Fund have sought to prevent disturbance of seals through a management plan, educational programs, and monitoring of human-seal interactions. Trends in seal counts and numbers of pups born suggest that disturbance has been managed so as not to preclude recovery. Nevertheless, monitoring and prevention of disturbance are essential to ensure that recovery continues. The potential for disturbance may increase if enforcement and education efforts are not maintained, if more visitors are allowed at the atoll, or if visitors and residents change or increase their activities in ways that disturb seals, either on land or in the water.

The establishment of Midway as a tourist destination also may increase human visitation to nearby sites (i.e., Kure Atoll and Pearl and Hermes Reef) or to sites intermediate between Midway and the main Hawaiian Islands (i.e., French Frigate Shoals and Laysan and Lisianski Islands). Careful monitoring and precautionary management are therefore essential to ensure that all human activities are compatible with the full recovery of the Midway colony of Hawaiian monk seals and colonies at neighboring sites.

Kure Atoll – The colony of Hawaiian monk seals at Kure Atoll also has a long history of human disturbance. The U.S. Coast Guard established a loran station at this site early in the 1960s. The activities of Coast Guard personnel and their dogs led to considerable disturbance of seals until the Coast Guard adopted more stringent rules designed to avoid disturbance of seals. The atoll's monk seal colony also experienced an imbalanced adult sex ratio, with evidence of mobbing and adult male aggression and poor juvenile survival. The combined effects of human activities, male aggression, and shark predation led to a severe decline of this colony to a level where, in 1986, only a single pup was born. Recovery programs initiated by the National Marine Fisheries Service and modification of Coast Guard rules and regulations reversed the decline and allowed the colony to begin rebuilding. Since the mid-1980s the colony has grown steadily,

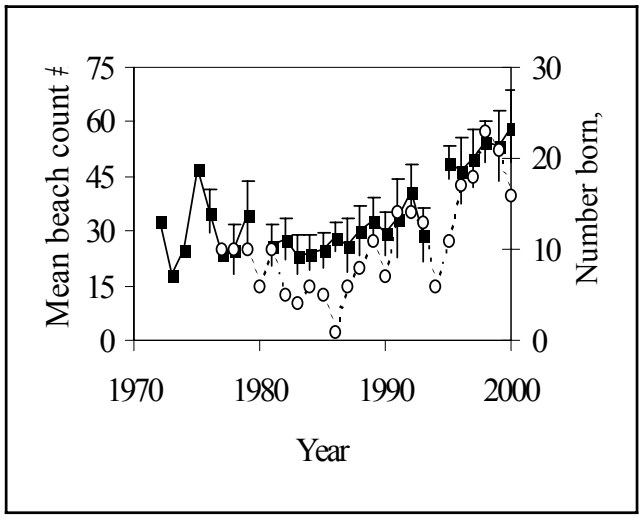

Figure 11. Annual mean beach counts (filled squares) and pups born (open circles) at Kure Atoll.

and in 2000 the mean beach count was 59 animals and 16 pups were born (Fig. 11). The Coast Guard closed its station in 1992 and the atoll is currently uninhabited. Unlike the remainder of the Northwestern Hawaiian Islands, Kure Atoll is owned and managed by the State of Hawaii. To date the state's major management activities at the atoll have involved conservation efforts to return the atoll to its natural state.

In October 1998 the *Paradise Queen II* (a lobster fishing vessel) ran aground on the eastern edge of Kure Atoll. Debris from the wreck was dispersed throughout portions of the atoll including Green Island, the main island in the atoll. Among other things, the debris included lobster traps and extensive amounts of line. In 1999 and 2000 some of the traps were recovered and some line was collected and burned. In 1999 and 2000 a total of three seals was found entangled in debris, one in a white plastic ring of unknown origin, one in a large net fragment, and one in an eel trap cone. Although no seals were known to have become entangled in the debris from the *Paradise Queen II*, the debris posed a significant risk of such entanglement. Field researchers cleaned the debris from beaches during the summer, but debris has continued to wash ashore. As of the end of 2000 the hull was still grounded, and debris in the water and on the beaches continues

to pose a threat of entanglement to seals and other wildlife.

Population-Wide Status and Trends

As indicated earlier, the status and trends of individual Hawaiian monk seal colonies present a mixed picture. The most obvious overall trend over the past four decades is one of declining beach counts. Although the counts indicate that the decline was halted in the 1990s, poor pup and juvenile survival remains a serious problem impeding population recovery. This poor survival has effectively created an aging population. That is, the proportion of adults in the population has grown over recent years, while the proportion of juveniles and subadults has declined. As a consequence, pup production has remained relatively high, but recruitment of breeding animals into the population has decreased. Because of this shift, pup production may decrease in the near future as productive adult females are lost to the population through aging and mortality and are not replaced by maturing females. This pattern was observed at Kure Atoll, where pup production declined from about 30 pups per year in the early 1960s to a single pup in 1986. The same pattern appears to be occurring at French Frigate Shoals, where recruitment has been poor for a decade and pup production is expected to drop considerably in the near future. Because of the numerical importance of the French Frigate Shoals colony, these changes will strongly influence the dynamics of the whole population.

On the other hand, positive growth is occurring at Pearl and Hermes Reef, Kure Atoll, Midway Atoll, and Laysan Island. The colony at Lisianski Island also has shown a recent increase in the number of births. The far-western colonies, in particular, have relatively high proportions of young seals and, with good recruitment into the breeding age classes, one can reasonably expect continued growth at these sites in the future. Thus, the status and trends of the whole population will be determined by the balance between positive growth at the more western colonies and the decline at French Frigate Shoals. The need for growth to offset expected losses at French Frigate Shoals underscores the importance of careful, precautionary management of the western colonies.

Hawaiian Monk Seal Research and Management Activities

The National Marine Fisheries Service is the lead agency responsible for recovery and conservation of the Hawaiian monk seal. The Service conducts or oversees most of the research and management activities on the species and its efforts in this regard are guided, in part, by the Hawaiian Monk Seal Recovery Plan and Recovery Team. The team annually reviews research and management plans and makes recommendations to the director of the Service's Southwest Region. Additional recommendations are provided by the Marine Mammal Commission based on periodic reviews of the Hawaiian monk seal recovery program. The Service works closely with the Fish and Wildlife Service, which manages most of the terrestrial habitat in the Northwestern Hawaiian Islands, and with the Western Pacific Regional Fishery Management Council, which oversees management of commercial fisheries that may affect the Hawaiian monk seal. The Service also works closely with Sea Life Park, the Waikiki Aquarium, and Sea World to conduct captive care and research programs, and with the State of Hawaii, which manages Kure Atoll. The Coast Guard, the Navy, and the Air Force have provided important logistic support for past research and recovery efforts, and the Army Corps of Engineers has been involved in efforts to rebuild the Tern Island seawall. Important management and recovery issues are discussed below.

Loss of reproductive potential at French Frigate Shoals – Probably the single most obvious factor currently impeding the recovery of the Hawaiian monk seal is the loss of reproductive potential at French Frigate Shoals. Since the late 1980s pup and juvenile survival rates have plummeted at that site due to nutritional stress, adult male aggression, and shark predation. Declines in the number of breeding adults due to low recruitment over the past decade will lead to a marked drop in pup production in the near future. The severity of

the drop will depend in part on the longevity of adult females currently in the colony and in part on the length of time that pup and juvenile survival remains low. If adult females are long-lived and survival of young animals improves in the near future, the drop in productivity may be relatively small. On the other hand, if the number of adult females decreases sooner, and if recent improvements in juvenile survival are not sustained, then the French Frigate Shoals colony could experience a severe collapse.

The population trend observed at Kure Atoll in the past and now being observed at French Frigate Shoals creates a challenge for managers who must interrupt the pattern and prevent the loss of reproductive potential through programs to protect or salvage young seals. Captive care and relocation programs and removal of adult males have already been implemented with a considerable degree of success. However, important problems or obstacles to program implementation also have been identified, including the difficulty of conducting remote captive care efforts at Midway Atoll in 1992 and 1993, the occurrence of an unknown and undiagnosed eye disease that precluded the relocation of 12 captive pups from French Frigate Shoals, the initial (and later refuted) evidence of exposure to morbillivirus in several wild seals that temporarily halted relocation efforts, and the more general need to evaluate potential diseases in donor and recipient populations. Continued efforts to resolve these problems are essential to allow a more precautionary, responsive management approach in the future.

Tern Island – Since the early 1980s research and management activities for the French Frigate Shoals colony have depended heavily on access to the runway and the old Coast Guard station on Tern Island, one of the islands in the atoll. In 1942 Tern Island was enlarged approximately threefold to provide a runway for military operations. This involved construction of a sheet-metal seawall and backfilling with material dredged from the surrounding reef and various military debris. In recent years, the seawall has fallen into serious disrepair. Sections have collapsed or corroded, leaving the island exposed to wave action and creating entrapment hazards for monk seals, turtles, seabirds, and other marine life. Erosion threatens to wash out the runway and buildings on the island, and could expose buried waste materials. These materials may be contaminated with toxic chemicals, such as polychlorinated biphenyls (PCBs) that were recently discovered in high concentrations in some marine life around Tern Island. Because Tern Island is the primary base for research and management activities at French Frigate Shoals, its loss would severely compromise future efforts to protect Hawaiian monk seals and other species (e.g., the threatened green sea turtle) at the atoll.

As noted in past annual reports, the Commission has strongly recommended that the Fish and Wildlife Service and other agencies take steps to replace the seawall as quickly as possible. In 1993 the Service contracted with the Army Corps of Engineers to develop detailed construction plans for a new seawall. Although designs were completed in 1995, the Service was unable to obtain funding for construction at that time. By mid-1997 the foundations of island buildings were in imminent danger due to erosion, and the Army Corps of Engineers was contracted to make emergency repairs. In 1999 the Service received $1 million as an initial investment for the new seawall, with additional funding expected in the following years. Additional money was provided in fiscal years 2000 and 2001, and at the end of 2000 a total of about $10 million had been appropriated for construction. Because of further erosion of the island since the initial construction plan was prepared, the Fish and Wildlife Service contracted with the Army Corps of Engineers to update the plan. To move ahead with the project, the Service entered into discussions with the Army Corps of Engineers and the Navy to secure help in overseeing contract work. As of the end of 2000 it was hoped that construction of the seawall might begin in 2002.

Marine Debris – Marine debris, particularly lines and nets discarded or lost by commercial fishermen, is a serious problem that threatens monk seals and their habitat on land and at sea. More than 200 seals have been found entangled since the mid-1980s, and in recent years the number found entangled has been increasing. Although a record high number of 25 seals were found entangled in 1999, the number declined to only 5 in 2000, one of

the lowest counts since 1985 when records were first kept (Fig, 12). Overall, these results indicate a rate of entanglement that is higher than for any other pinniped. Most assessments of the effects of debris have been based on observations from land, which fail to detect effects at sea. Thus, entanglement rates recorded to date almost certainly underrepresent the total impact. Still, the minimum estimates available for the amount of debris and the number of entangled seals are sufficient to demonstrate that monk seal entanglements have contributed to the population decline and continue to threaten its long-term conservation. Due to the small size of monk seal colonies and the low total abundance of all colonies combined, the species can ill afford the entanglement-related losses of even a few individuals.

Collection of debris and disentanglement of monk seals are routine tasks for seasonal research personnel, but, for the most part, such efforts are limited to the beaches of the six main reproductive sites. The occurrence of entangled seals and the amount of debris deposited do not appear to be equally distributed over these sites, and certain areas (e.g., Lisianski Island) require more vigilant efforts to clean up debris and free entangled seals.

Recently, cleanup efforts have been extended to some coral reefs and the nearshore waters around emergent lands in the Northwestern Hawaiian Islands. These efforts have been directed at assessing the total amount of debris and the rate of deposition, and removing the debris. A cooperative multiagency reef cleanup was organized in 1998 with participation of a number of federal, state, military, civic, and private agencies and organizations. The effort is intended not only to protect coral reef ecosystems and their inhabitants, but also to raise local, national, and international awareness and concern about the impacts of such debris. Initial phases of the effort were aimed at assessing the extent of the problem and developing methods for removal. Actual cleanup efforts have been initiated and large amounts of debris were removed from the waters around Lisianski Island, Pearl and Hermes Reef, and Midway Atoll in 1999. Nonetheless, many areas have not been cleaned, and debris continues to accumulate. As of the end of 2000 additional work is being planned, and the multiagency effort is expected to continue for some time.

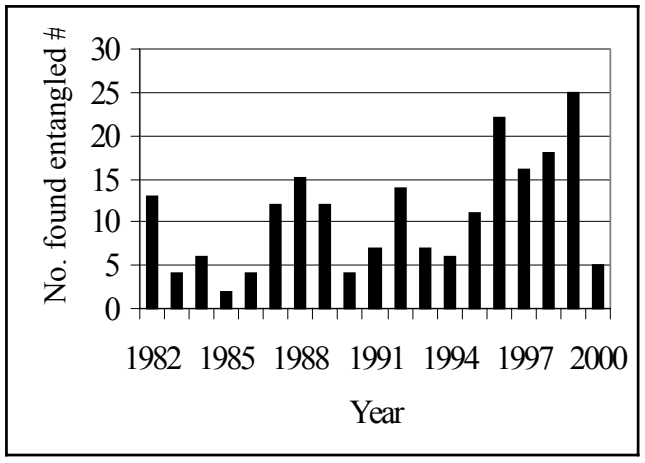

Figure 12. Number of Hawaiian monk seals found entangled annually, 1982–2000.

Interactions with Fisheries – Hawaiian monk seals may interact with or be affected by at least five fisheries. In the Hawaiian archipelago, recreational fishing occurs primarily around the main Hawaiian Islands. Recreational fishing occurred at Kure Atoll when the atoll was occupied by the Coast Guard and currently occurs around Midway Atoll as part of the ecotourism venture described earlier. Outings from Midway Atoll occasionally include visits to Kure Atoll and Pearl and Hermes Reef. Reported interactions between monk seals and recreational fishing primarily involve seals taking hooked fish from fishing gear and sometimes becoming hooked themselves. Hooks may become embedded in the seal's mouth, esophagus, or stomach with negligible to lethal consequences. In addition, the occurrence of fishing activity may cause seals to abandon certain foraging sites due to disturbance.

Monk seals also may be affected indirectly by coral fisheries. Harvests of precious corals from deep banks in the Northwestern Hawaiian Islands can effectively remove or destroy the coral bed ecosystems where seals forage. Deepwater coral beds provide habitat for certain monk seal prey species, such as eels. Seals are known to dive to depths of at least 500 meters, and coral fisheries

within this range may reduce the value of coral beds as habitat for potential monk seal prey.

Swordfish and other large marine fish are taken with longline gear in the North Pacific. The longline fishery expanded fourfold in the late 1980s and early 1990s, leading to direct interactions between monk seals and fishing gear in areas near the Northwestern Hawaiian Islands. Seals were found with embedded longline hooks and with unusual head injuries that suggested that they may have been bludgeoned. The National Marine Fisheries Service and the Western Pacific Regional Fishery Management Council responded in 1991 by establishing a protected species zone extending 50 nmi out from the Northwestern Hawaiian Islands and the corridors connecting those islands. Since the creation of the protected species zone, no additional interactions have been reported.

Monk seals interact directly with the Northwestern Hawaiian Islands bottomfish fishery. Seals may be attracted to fishing vessels, where they may either remove fish from hooks during gear recovery or consume discarded fish. Some discards (e.g., kahala and eels) may contain relatively high levels of ciguatoxins and may therefore pose a health threat to the seals. Because monk seals may consume some of these species naturally, the extent of this threat is unknown. Similarly, the extent to which the species taken by the fishery as targeted prey or bycatch overlap with the natural seal diet is unknown. The fact that the seals take fish from hooks and fish discarded overboard suggests that these fish species may be part of the seals' natural diet, but the fishery also targets large fish that may be uncommon prey for monk seals. Finally, on occasion seals also have been hooked, with unknown but potentially lethal consequences.

A brief bottomfish fishery for sharks was conducted by a single vessel in 1999 in the vicinity of French Frigate Shoals and Gardner Pinnacles. Using longline gear weighted to sink to the bottom, the fishery posed a serious threat to Hawaiian monk seals attracted to bait or to small sharks caught on the line. On 23 November 1999 the Marine Mammal Commission wrote to the National Marine Fisheries Service, noting that this fishery was being conducted without a fishery management plan and that monk seals could be hooked or entangled in longline gear. Therefore, the Commission recom-mended that the Service prohibit longline fishing for sharks within 50 nmi of the Northwestern Hawaiian Islands, pending the development of a fishery management plan. The Commission also recom-mended that no new fisheries be initiated within 50 nmi of the islands until an applicable fishery management plan has been prepared and reviewed for potential impacts on Hawaiian monk seals pursuant to section 7 of the Endangered Species Act. On 10 February 2000 the Service responded that the Commission recommendations would be considered by the Western Pacific Regional Fishery Manage-ment Council, and that the Council had already taken actions that would prohibit the use of any longline gear, including bottom longline gear, to take sharks near monk seal breeding sites. The shark fishery was not continued in 2000.

Monk seals also have interacted directly and indirectly with the Northwestern Hawaiian Islands lobster fishery. The only known mortality due to direct interactions resulted from entanglement of a seal in the bridle line of a lobster pot in 1986. Seals have been known to consume discarded lobsters or lobster parts, although discarding of lobsters is no longer permitted under current regulations. Finally, seals are potentially in danger of entanglement in deployed gear or lost traps. However, indirect interactions (i.e., competition for lobster) may be far more significant if monk seals and the fishery both exploit the same resource and use of the resource by one reduces the availability to the other. The fishery targets two species of lobster (i.e., spiny lobster and slipper lobster) and operates primarily at Nihoa and Necker Islands, Gardner Pinnacles, and Maro Reef, all known to be foraging areas for monk seals from Nihoa and Necker Islands, French Frigate Shoals, and Laysan Island. Monk seals are known to eat lobster. Thus, the fishery and the seals use the same resource.

The management strategy for the lobster fishery assumes that the lobster stocks are not overfished unless the spawning biomass is less than 20 percent of the expected level in the absence of fishing. Thus, this strategy assumes that an 80 percent reduction of a potentially important monk seal prey item does not

have a significant effect on monk seals and that lobsters are a prey item of negligible importance to monk seals. However, the importance of lobster in the monk seal diet cannot yet be described with any measure of confidence. The importance of lobster as a monk seal prey is difficult to evaluate because consumption rates may vary by season (e.g., they may be more important during the lobster molting period) or by monk seal size class (e.g., they may be more important to juveniles that are less adept foragers), and because monk seals may consume a diverse assemblage of prey, confounding analytical techniques to quantitatively assess the importance of any single prey type. Also, the assessment of the importance of lobster to monk seals is severely confounded by the fact that the availability of lobsters has already been reduced by as much as 80 percent by fishing. At the recommendation of the Commission, the Service is working with independent scientists to assess the importance of lobster in the diet of monk seals based on fatty acid analyses. The analyses are not yet complete.

For the past decade, the Marine Mammal Commission has repeatedly urged a more precautionary approach to the management of the lobster fishery. In the previous annual report, the Commission noted that it had written to the National Marine Fisheries Service on 23 November 1999, reiterating its past recommendations that the Service prohibit lobster fishing at all major monk seal breeding atolls until such time as information is sufficient to assess (1) the relative importance of lobsters and other monk seal prey species taken by fisheries in the diet of different age and sex classes of Hawaiian monk seals, and (2) the effects of lobster fishing on the availability of important monk seal prey resources. The Service responded on 10 February 2000, indicating that it would work with the Western Pacific Regional Fishery Management Council to address the Commission's recommendations and that it was considering expansion of areas closed to the lobster fishery as part of an effort to establish marine protected areas.

However, in 2000 new information came to the Commission's attention regarding the status of the lobster fishery. Specifically, the Hawaiian Monk Seal Recovery Team had met on 6–7 December 1999 and recommended that the Service close the Northwestern Hawaiian Islands lobster fishery for a minimum of three years to allow time for the region's depleted lobster stock to recover and to assess appropriate catch quotas. In a 22 February 2000 letter to the Service, the Commission supported the recovery team's recommendation and also recommended that the fishery not be reopened until available information is sufficient to assure that resumption of the fishery will not impede monk seal recovery. The Commission listed the minimum information required as (1) the relative importance of lobsters and other species taken as bycatch in lobster traps in the diets of different age and sex groups of monk seals at different colonies, (2) the locations where different age and sex classes of monk seals feed, (3) the abundance and likely carrying capacity levels of principal monk seal prey species in preferred monk seal foraging areas, and (4) the effects of lobster fishing on stocks of lobsters and other monk seal prey species taken as bycatch.

On 28 April 2000 the Service proposed in the *Federal Register* to close the Northwestern Hawaiian Islands lobster fishery in 2000 due to concerns about the status of the lobster stocks. The proposed rule also noted that the Service might conduct an experimental fishing program during the closure. During May 2000 the Commission sent three letters to the Service (11 May, 12 May, and 15 May) supporting the Service's plan to close the fishery for 2000, but also recommending that the Service refrain from authorizing any experimental fishery. The Commission stated that if the Service was to continue with plans for the experimental fishery, then it should provide (1) a substantive review of existing data and analyses, (2) analyses of data gaps and critical information, (3) proposed designs and protocols, (4) alternative methods for collecting data, and (5) assessment of the potential effects of the experimental fishery on monk seal prey resources. In addition, the Commission requested that, if the Service was planning to conduct an experimental fishery, it immediately provide the Commission with a draft research protocol for its review. The Commission also reminded the Service that if it was planning to conduct the experimental fishery, then it must also meet its consultation and review responsibilities

under the Endangered Species Act and the National Environmental Policy Act. The Commission did not receive a response from the Service by early June 2000 and, because the lobster fishery usually starts in July, the Commission reiterated its request to the Service for a draft research protocol in a 9 June 2000 letter to the Service.

On 26 June 2000 the Service published in the *Federal Register* a notice closing the 2000 Northwestern Hawaiian Islands lobster fishery. The notice stated that the rationale for the closure was based on concerns for the status of the lobster stocks and the potential for overfishing the stocks. In its responses to public comments on the closure, the Service stated that it was preparing a lobster research plan and that it intended to consult with the Western Pacific Regional Fishery Management Council before the implementation of an experimental fishery program. In a 9 October 2000 letter the Service informed the Commission that it was tentatively planning an experimental lobster fishery for the spring of 2001. With that letter, the Service also provided a document entitled "Guidance on Issues Associated with the NWHI Lobster Fishery," in which the Service reviewed briefly the methods for estimating exploitable lobster populations, described the shortcomings of those methods, and presented a "NWHI 3-Year Lobster Research and Monitoring Plan: 2000–2002" with a rationale for the plan. The Commission replied in a 12 December 2000 letter in which it commended the Service for closing the fishery and commented on the plan for the experimental fishery. The Commission (1) noted that the plan was already somewhat out of date, (2) requested confirmation that the fishery would be catch and release only, (3) pointed out that the Service's assumption that mortality of released lobsters would be minimal was inconsistent with previous observations and with the rationale for previous measures to require full retention of the commercial catch, (4) recommended that investigation of the mortality rate of released lobsters be included in the research protocol, (5) noted that an underestimate of such mortality could result in overestimation of stock size, (6) noted that the plan failed to take into account the effects of monk seal foraging on lobster stocks, and (7) encouraged the Service to consider the effects of monk seal predation when evaluating lobster recruitment, status and trends, and maximum sustainable yields.

Management of the bottomfish and lobster fisheries and their potential effects on Hawaiian monk seals also have been the subject of a lawsuit in the U.S. District Court for the District of Hawaii. On 26 January 2000 Greenpeace Foundation, the Center for Biological Diversity, and the Turtle Island Restoration Network sued the National Marine Fisheries Service, claiming that the implementation of the lobster and bottomfish fisheries in the Northwestern Hawaiian Islands violates the Administrative Procedures Act, the Endangered Species Act, and the National Environmental Policy Act. Among other things, the plaintiffs requested a permanent injunction on the lobster and bottomfish fisheries until the Service complies with the appropriate statutes and regulations. As the lawsuit was being considered, the Service closed the lobster fishery, citing concerns about the collapse of the Northwestern Hawaiian Islands lobster stocks.

On 15 November 2000 the court concurred that past consultation on the Crustacean Fishery Management Plan (under which the lobster fishery is implemented) violates section 7(a)(2) of the Endangered Species Act and the Administrative Procedures Act. The court did not concur that the evidence was sufficient to conclude that the implementation of the lobster fishery violated section 9 of the Endangered Species Act, but admonished the Service for taking the position that it was not guilty because it is not aware of any data that confirm such a violation. The court granted the plaintiffs' motion for an injunction on the Crustacean Fishery Management Plan until a biological opinion and an environmental impact statement have been completed and issued. The court concurred with the plaintiffs that the bottomfish fishery is conducted in violation of section 9 of the Endangered Species Act because it results in the taking of monk seals. The court determined that it did not have sufficient information to rule on the plaintiffs' motion for a

permanent injunction against the Bottomfish Fishery Management Plan and that it would conduct an evidentiary hearing to gather such information.

Main Hawaiian Islands – Although Hawaiian monk seals are relatively rare in the main Hawaiian Islands, sightings at some locations and the numbers of births appear to have been increasing over the past decade. Increased reproduction at and recolonization of the main islands could significantly improve prospects for long-term conservation of the species by establishing a larger, more widespread metapopulation.

The development of monk seal colonies in the main islands is not without risks. The primary human-related risks to individual seals in the water would be from interactions with fisheries and watercraft. As noted above, seals may become hooked in the process of taking caught fish, and they may be caught and drowned in fishing nets. Seals also have been observed with wounds indicative of propeller strikes. Beach habitats pose risks from disturbance by humans and domestic, feral, and introduced animal species. Terrestrial animals also may serve as vectors for diseases to which monk seals have not yet been exposed. Transmission of such diseases from the main Hawaiian Islands to the species' core population in the Northwestern Hawaiian Islands could have severe consequences.

Any risk-benefit analysis of colonization may well be moot because the issue of recolonization of the main Hawaiian Islands is likely to be settled by the seals themselves. A small colony appears to be established at Niihau Island and, over time, seals from this colony may disperse to other islands. A few seals are regularly seen at Kauai, Molokai, and other main Hawaiian Islands and pups are born occasionally, so the process of recolonization may already be occurring. Perhaps the most important question is whether management authorities are prepared for recolonization of the main islands and can ensure that the seals are protected and the public, including the fishing industry, is well educated about the seals and requirements for their protection. Examples of the need for such protection include incidents where females have pupped on beaches popular with the public. Such cases require considerable monitoring and management to ensure the safety of females and their pups. Existing research and management resources have been stretched thinly in the past, and protection of a growing monk seal presence in the main Hawaiian Islands would require a significant increase in funding for managers responsible for protection of these seals.

Funding – The majority of funds for research and recovery of the Hawaiian monk seal has generally been allocated to the Marine Mammal Research Program of the Honolulu Laboratory, National Marine Fisheries Service. Research programs include an extensive and essential field research effort to assess colony status and trends, composition or age structure, reproduction, survival and sources of injury and mortality, health and condition, rates of entanglement, prey species, foraging patterns, and behavior. In addition, researchers at the field sites remove debris from beaches, disentangle animals, and report illegal activities near the islands (e.g., unpermitted visitation to the islands, fishing in closed areas). These annual activities are central to the recovery effort because they provide basic information necessary to monitor each colony, identify impediments to recovery, and evaluate management efforts. In addition to these basic research tasks, other studies conducted at the major breeding sites provide greater insight into specific recovery issues (e.g., studies of at-sea habitat use and behavior, the effects of disturbance, male aggression, and shark predation).

In the 1980s Congress earmarked approximately $300,000 to $500,000 annually for the Hawaiian monk seal program. In 1995 the Service began reprogram-ming money from other parts of its budget to bring the total amount available for the monk seal program to about $1.1 million. For 1996 to 1998, annual funding was about $1.3 million, including about $500,000 earmarked funds each year. In 1999 the budget was increased to just under $1.5 million. In 2000 the Service requested an additional $2.0 million in base funding and six additional employees for monk seal work. With this amount, plus funding in its base from fiscal year 1999 and the congressionally earmarked funds, available support seemed sufficient to meet the requirements of research and recovery efforts.

However, the final funding for fiscal year 2000 was short of this expectation: about $1,944,000 base funding plus $150,000 emergency funding for foraging studies (about $2.1 million total). In addition, $107,500 was provided for removal of debris from the Northwestern Hawaiian Islands. For 2001 the budget is expected to be about $2.0 million.

Recovery Planning – Hawaiian monk seal research and recovery activities are based largely on the Hawaiian Monk Seal Recovery Plan and recommendations provided by the Hawaiian Monk Seal Recovery Team. The recovery team was formed at the urging of the Marine Mammal Commission and has played an active role in the direction of the program for more than a decade. Recovery team meetings generally have been held in early December of each year so that the team can review results from the previous year's work and provide recommendations that can be incorporated into plans for the upcoming year. Because field camps start operations as early as March of each year, holding team meetings later than December may preclude timely implementation of the team's recommendations.

For 2000, as in past years, the team scheduled its annual meeting for early December. Due to scheduling conflicts, the Service later requested and the team agreed to postpone the meeting to mid-December. In November 2000, acting unilaterally, the Service rescheduled the meeting for 26–27 March 2001. Both the recovery team and the Marine Mammal Commission wrote to the Service expressing concern about the late date of the meeting. The Service cited staff workload as the reason for the postponement, but the recovery team and the Commission remain concerned that the late timing of the meeting will preclude meaningful recommendations for program activities in 2001.

Coral Reef Ecosystem Reserve

In June 1998 President Clinton signed Executive Order 13089, which established a coral reef task force and directed all federal agencies with coral reef-related responsibilities to develop a strategy for coral reef protection. On 7 July 2000 the Departments of the Interior and Commerce invited participation in planning efforts for conservation and management of the coral reef ecosystem of the Northwestern Hawaiian Islands. In a 28 July 2000 letter to the Departments of the Interior and Commerce, the Marine Mammal Commission reviewed the status of the Hawaiian monk seal, its interactions with commercial fisheries, and the importance of protecting these coral reef ecosystems for monk seals and other endangered and threatened marine species. Specifically, the Commission recommended that the Secretaries of Commerce and the Interior jointly propose that the President set aside all waters and federally owned bottom lands off the Northwestern Hawaiian Islands out to a distance of 50 nmi either as part of the Fish and Wildlife Service's Hawaiian Islands and Midway Islands National Wildlife Refuges or as a new national monument to be managed by the Fish and Wildlife Service. The Commission also recom-mended that a five-year moratorium be imposed on all commercial fishing within the 50-nmi boundary pending (1) assessment of the status of the area's target and nontarget fish stocks potentially affected by commercial fisheries, and (2) development of precautionary fishery management measures, including a system of no-take areas, that will ensure protection of Hawaiian monk seals and other significant wildlife species.

In December 2000 President Clinton signed Executive Order 13178 establishing the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. The establishment of the reserve, with its accompanying protection and conservation measures, was intended to "ensure the comprehensive, strong, and lasting protection of the coral reef ecosystem and related marine resources and species (resources) of the Northwestern Hawaiian Islands." The reserve shall include "sub-merged lands and waters of the Northwestern Hawaiian Islands, extending approximately 1,200 nautical miles (nm) long and 100nm wide." It will be adjacent to and seaward of the marine boundaries of the State of Hawaii and region's national wildlife refuges. The Department of Commerce will assume primary responsibility for management of the reserve and will begin the process to designate the reserve as a national marine sanctuary. The reserve will be managed under the National Marine Sanctuaries Act

in accordance with eight principles emphasizing a conservative, precautionary management approach. The Secretary of Commerce, in consultation with the Secretary of the Interior and the Governor of Hawaii, will develop an operations plan to guide management and will establish a council to provide advice and recommendations on the reserve operations plan and the designation and management of the sanctuary. Pursuant to the executive order, a representative of the Marine Mammal Commission will serve on the council as a nonvoting member. Protection and conservation measures will be applied throughout the reserve and will include restrictions on commercial and recreational fishing and prohibitions of a suite of other activities including exploring, developing, or producing oil, gas, or minerals; anchoring on coral; drilling, dredging, and otherwise altering the seabed; discharging or depositing material; and removing, moving, taking, harvesting, or damaging living or non-living resources.

Restrictions on commercial fishing in the reserve will include caps on the number of permits (for each fishery type) and the aggregate level of catch and effort (for each fishery type), a ban on permits for any type of fishing not authorized by permit in the preceding year, and a prohibition on changing the type of fishing gear used by permit holders. With some exceptions for the bottomfish fishery, commercial fishing will also be prohibited in 15 preservation areas designated within the reserve. Restrictions on recreational fishing will prohibit increases in take, effort, or species targeted, and changes in gear types.

The 15 preservation areas to be established will extend from the seaward boundaries of state-managed areas and the Midway Atoll National Wildlife Refuge to a mean depth of 100 fathoms around the major islands, atolls, and banks of the Northwestern Hawaiian Islands. Bottomfishing will be allowed to limited depths around eight of these preservation areas. Additional protective measures will be applied to the reserve preservation areas.

The Commission strongly supports the establishment of the reserve and its designation as a national marine sanctuary to protect the coral reef ecosystems of the Northwestern Hawaiian Islands. The reserve is expected to contribute significantly to the conservation of the Hawaiian monk seal. It will provide important protection for the monk seal habitat, reduce the potential for direct and indirect interactions of seals with commercial and recreational fisheries, and preclude development that is inconsistent with the natural state and character of the coral reef ecosystems.

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Steller Sea Lion (*Eumetopias jubatus*)

The Steller sea lion is the only member of the genus *Eumetopias* and is the largest member of the family Otariidae, which includes sea lions and fur seals. Its distribution extends along the rim of the North Pacific from the Channel Islands in southern California to Hokkaido, Japan, and north into the Bering Sea and Sea of Okhotsk. Historically, its center of abundance has been in the Aleutian Islands and Gulf of Alaska (Fig. 13), where nearly three-quarters of all Steller sea lions in U.S. territory have hauled out and pupped. Steller sea lions haul out on land to mate, bear their young, nurse, avoid predators, and rest. The location of rookeries (i.e., sites where reproductive activities occur) are probably chosen on the basis of proximity to food sources, protection from both 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 sea lions return to the site of their birth for reproduction. The various rookeries and haul-outs are therefore considered a “metapopulation” (i.e., a popu-lation of populations) with limited exchange between population sites.

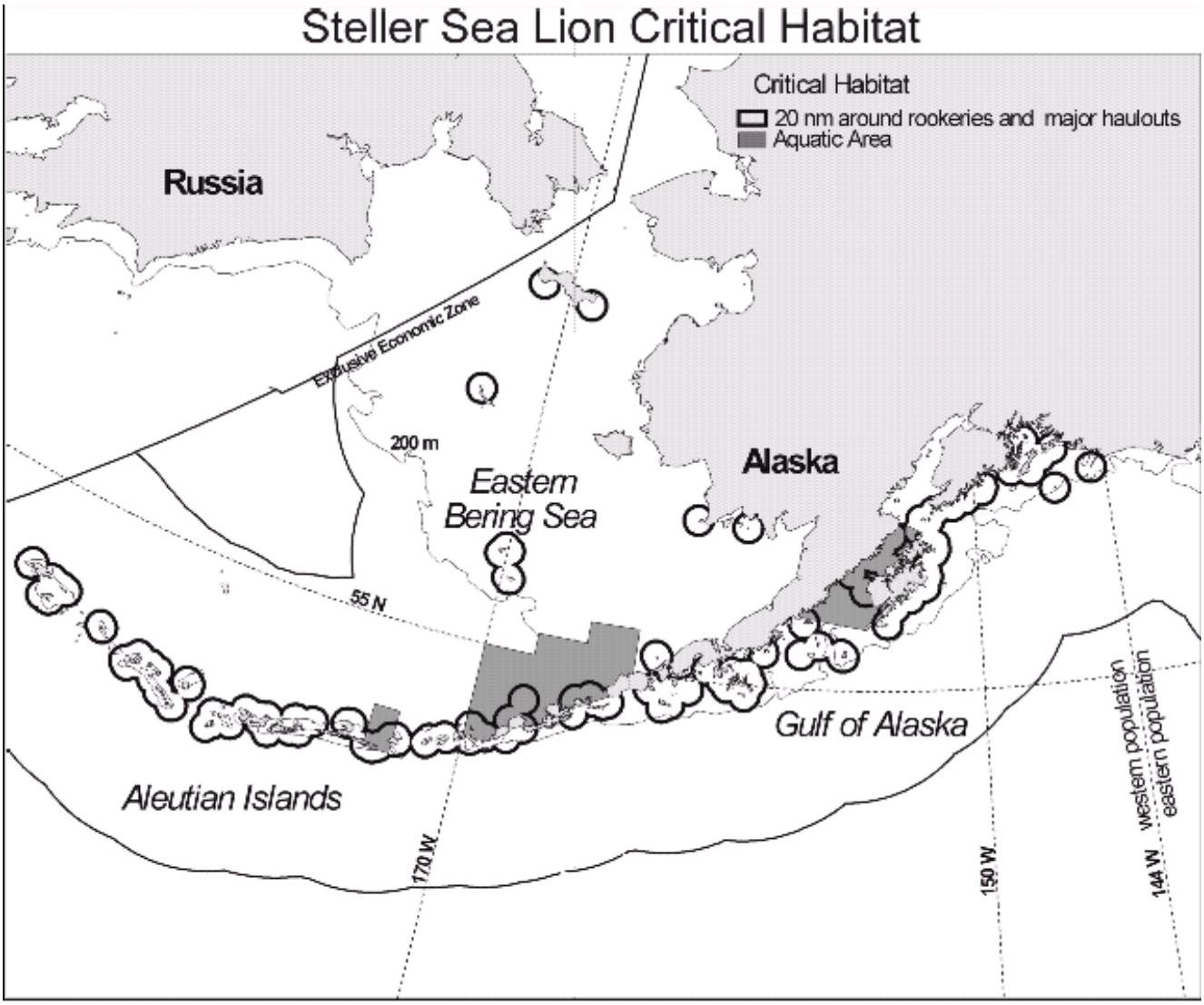

Figure 13. Designated critical habitat for the western population of Steller sea lions.

In the 1950s worldwide abundance of Steller sea lions was estimated at 240,000 to 300,000 animals. Since then, counts have revealed a severe and ongoing decline in abundance throughout the central and western part of the species' range (Table 3). At many sites, the number of Steller sea lions has declined by more than 80 percent since the mid- to late 1970s, and at some sites sea lions have all but disappeared. The decline was first noted in the eastern Aleutian Islands, but then spread westward and eastward to include all areas west of 144°W longitude (Cape Suckling, near the eastern edge of Prince William Sound, Alaska). The rate of decline appears to have been most severe in the late 1980s, but counts in some areas have continued to decline at high rates since then. Over the last decade, counts in the central and western Gulf of Alaska declined at an average of about 10 to 15 percent annually. In 2000 in the far western region of the Aleutian Islands, only 1,071 adults and juveniles were counted, compared with 1,913 in 1998, indicating a decrease of 40 percent in this area. Mortality may account for most of this decline although emigration or changes in behavior (i.e., spending more time in the water where they are not counted) also could have contributed to the decline. The large decrease in the count for the western Aleutian region and the continuing decline of the total western population heighten concern for the status of this population and

underscore its vulnerability to factors that could exacerbate the decline further. Counts of Steller sea lions at Russian sites reveal a similar decline over the past three decades, although it is not clear that the decline in Russian territory was for the same reasons. In contrast to the observed trends in the Gulf of Alaska, Aleutian Islands, and Russian territory, combined counts from the western coast of North America, east and south of Prince William Sound, have increased at about 2 to 3 percent annually over the last three decades. The observed population growth in this region probably reflects recovery from periods of intentional sea lion killing in the 1800s and early to mid-1900s.

Status under the Endangered Species Act

In 1990 the National Marine Fisheries Service designated the Steller sea lion species as threatened under the Endangered Species Act. The designation treated the species as a single population. In 1993, critical habitat was designated as (1) all waters within 20 nmi of rookeries and major haul-out sites west of 144°W longitude; (2) three special foraging areas in Shelikof Strait, the southeastern Bering Sea, and a pass (Seguam Pass) in the central Aleutian Island chain; and (3) waters within 0.9 km (3,000 feet) of rookeries and major haul-out sites east of 144°W longitude (Fig. 13). Subsequent research indicates that the species comprises at least two populations distinguishable on the basis of geography, demography, and genetic composition. The Steller Sea Lion Recovery Team and the Marine Mammal Commission therefore recommended

that the Service revise the species' listing under the Endangered Species Act to more accurately reflect the new information on stock structure. The Service agreed and on 5 May 1997 it published final rules designating the stock west of 144°W longitude as endangered while maintaining the threatened status for the stock east of this line. In doing so, 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 of the Western Population

The factors causing the decline of the western population of Steller sea lions have been a matter of extensive controversy. Over the past decade, the Service has attempted to evaluate the potential causes, including disease, pollution, entanglement in marine debris, commercial and subsistence harvests of sea lions, predation by killer whales and sharks, illegal killing, natural environmental changes in carrying capacity, and interactions with commercial fisheries (incidental catch, competition). Disease, pollution, and entanglement in marine debris are not considered significant contributors to the decline. Rather, contributing factors include commercial harvests of sea lions in the late 1950s to early 1970s, subsistence harvests by Alaska Natives, legal and illegal killing (which has not been and probably cannot be quantified), and incidental catch in the trawl fisheries in the Bering Sea and the Gulf of Alaska (which has been reduced to negligible levels). Killer whales and sharks are known predators of Steller sea lions, but their contribution to the ongoing decline cannot be determined from the available data. Modeling studies indicate that such predation probably was not a significant factor in the initial decline, but may be more significant at present because of the reduced size of the western population.

Additional suspected contributors include natural environmental changes and competition with commercial fisheries. The decline of the western population is characterized by poor growth and survival of juveniles and reduced reproductive success of mature females. The evidence for poor juvenile growth and survival is based on field observations and modeling efforts. The evidence for reduced reproductive success is based on observations of high fetal mortality and low birth rates. Much of the data on which these observations are based were collected in the mid- to late 1970s and the mid-1980s to early 1990s, and new data are needed. Nevertheless, these data strongly suggest that Steller sea lions are nutritionally stressed, and this is the leading hypothesis to explain the current decline.

Analyses of the ongoing Steller sea lion decline have focused on the potential roles of the environment versus fisheries in determining the quality and quantity of prey available to sea lions and, thus, the nature of nutritional stress. Two contrasting views have developed. The first is that sea lions are nutritionally stressed by factors unrelated to fisheries. Such factors could include natural ecosystem changes resulting from variation or trends in environmental conditions (i.e., a "regime shift") or changes resulting from previous human activities such as the removal of extensive numbers of large whales in the North Pacific and Bering Sea in the 1950s to 1970s (i.e., the "cascade hypothesis"). Alternatively, nutritional stress may result, at least in part, from competition with com-

Table 3. Counts of adult and juvenile (nonpup) Steller sea lions at U.S. rookery and haul-out trend sites by region, 1975–2000[1]

Year	Gulf of Alaska			Aleutian Islands			Southeast Alaska
	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	7,629
1991	4,596	6,273	3,734	4,231	7,499	3,085	7,715
1992	3,738	5,721	3,720	4,839	6,399	2,869	7,558
1994	3,369	4,520	3,982	4,421	5,790	2,037	8,826
1996	2,133	3,915	3,741	4,716	5,528	2,190	8,231
1997	–	3,352	3,633	–	–	–	–
1998	–	3,346	3,361	3,847	5,761	1,913	8,693
1999	1,952	–	–	–	–	–	–
2000	1,894	3,117	2,842	3,842	5,427	1,071	–

[1] For the Gulf of Alaska, the eastern sector includes rookeries from Seal Rocks in Prince William Sound to Outer Island; the central sector extends from Sugarloaf and Marmot Islands to Chowiet Island; and the western sector extends from Atkins Island to Clubbing Rocks. For the Aleutian Islands, the eastern sector includes rookeries from Sea Lion Rock (near Amak Island) to Adugak Island; the central sector extends from Yunaska Island to Kiska Island; and the western sector extends from Buldir Island to Attu Island.

Source: 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 Oceanic and Atmospheric Administration Technical Memorandum NMFS-AFSC-100.

mercial groundfish fisheries (i.e., fisheries for pollock, Atka mackerel, Pacific cod, and a variety of flatfish and rockfish) in the Bering Sea/Aleutian Islands region and the Gulf of Alaska. The potential for competition between the Alaska groundfish fisheries and Steller sea lions was recognized as a matter of concern when the fishery management plans were developed for the groundfish fisheries of the Bering Sea/Aleutian Islands region and the Gulf of Alaska in the late 1970s and early 1980s.

These two views (as well as others) need not be mutually exclusive. Historical data demonstrate that multiple factors have contributed to the decline, and the effects of any single factor do not necessarily exclude the influence of other potential factors. Rather, contributing factors may act concurrently, either independently, synergistically, or in a countervailing manner. For example, if Steller sea lions are nutritionally stressed, they may spend more time foraging at sea. By increasing foraging time, they also increase their vulnerability to predators (i.e., killer whales and sharks). Similarly, if natural oceanographic changes reduced prey availability for sea lions, then their vulnerability to competition with groundfish fisheries could be increased. Thus, the search for a single cause may belie complex interactions leading to the decline of the western population of Steller sea lions.

Table 4. Steller sea lion recovery actions taken by the National Marine Fisheries Service, 1990 –1998

Year	Action
1990	Listed the species as threatened. Prohibited the discharge of firearms within 91.4 m (100 yards) of a sea lion. Prohibited most vessel transit within 3 nmi of major rookeries in the Aleutian Islands and Gulf of Alaska. Monitored incidental mortality; reduced the allowable annual quota from 1,350 to 675 sea lions killed. Established a recovery team.
1991–1993	Established no-trawl zones within 10 nmi of 37 sea lion rookeries in Alaska, with seasonal extensions to 20 nmi of six major rookeries in the eastern Aleutian Islands and the Bering Sea
1990-1998	Adjusted time and area catch allocations to prevent concentrated fishing effort in foraging areas beyond the no-trawl zones around major haul-out sites.
1993	Designated critical habitat. Released a recovery plan.
1994	Conducted a status review.
1997	Split species into two populations; relisted western population as endangered.
1998	Established a forage fish category; prohibited directed fisheries on included species. Split the Atka mackerel fishery into two even seasons and reduced the portion of the seasonal catch that could be taken in critical habitat to 40 percent (to be achieved incrementally over a 4-year period). Began implementation of a reasonable and prudent alternative to the pollock fisheries in the Bering Sea/Aleutian Islands Region and Gulf of Alaska to prevent jeopardy and adverse modification, as determined by a section 7 consultation (3 December 1998) under the Endangered Species Act.

Management and Research

The National Marine Fisheries Service has lead responsibility for the recovery of Steller sea lions under the Marine Mammal Protection Act and 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. Key partners in the recovery program include the Alaska Department of Fish and Game, the North Pacific Fishery Management Council, the University of Alaska, Alaska SeaLife Center, and the North Pacific Universities Marine Mammal Research Consortium. The latter group, a consortium of academic institutions in Alaska, British Columbia, Oregon, and Washington, was established in 1992 at the request of fishing industries to investigate the causes of the Steller sea lion decline.

Between 1990 and 1998 the Service took a number of actions and established a number of regulations to mitigate possible effects of commercial fisheries on Steller sea lions (Table 4). In addition, the Service, the Alaska Department of Fish and Game, the North Pacific Universities Marine Mammal Research Con-sortium, the Alaska SeaLife Center, and a number of affiliated scientists increased research efforts to monitor the

status and trends of Steller sea lion numbers (both populations), investigate their life history patterns and foraging ecology, assess possible causes of the decline of the western population, and evaluate the efficacy of adopted protective measures.

The direction for the research effort has come from the Steller Sea Lion Recovery Team and Recovery Plan, the principal investigators at the main research centers, and needs of the Service and the North Pacific Fishery Management Council to manage the Alaska groundfish fisheries in accordance with the Bering Sea/Aleutian Islands and Gulf of Alaska fishery management plans. Between December 1997 and February 1999, the Recovery Team held two meetings and four workshops to consider past and future directions for Steller sea lion research. The workshops focused on research priorities in four main areas: behavior, telemetry studies, physiology, and foraging ecology. The primary findings and recommendations of the Recovery Team meetings and workshops are to be used to update research and recovery objectives and guidelines in the revised recovery plan. As an initial step, it is suggested that Steller sea lions and research efforts be considered in a broader ecological or ecosystem context. The research agencies should develop a strategic plan to guide and coordinate research efforts, and the plan should include a Steller sea lion model, including both demographics and bioenergetics. 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 state fisheries (e.g., salmon and herring) as well as federal 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. Finally, assess-ment methods for subsistence harvests of Steller sea lions should be improved.

Steller Sea Lion Subsistence Harvests

For centuries, Steller sea lions have been hunted by Alaska Natives for subsistence although little is known about historic harvest levels. Since 1992 the National Marine Fisheries Service has contracted with the Alaska Department of Fish and Game to assess annual subsistence harvests of Steller sea lions and harbor seals by interviewing Native households in 60 coastal villages where one or both species are harvested. The majority of Steller sea lions are harvested around the Pribilof Islands in the Bering Sea. Other important areas of harvesting include Akutan, Kodiak Island, and Prince William Sound. Virtually all sea lions taken in the subsistence harvest are from the western population. The estimated number of Steller sea lions harvested in Alaska in recent years has declined from about 550 in 1992 to about 178 in 1998 (Table 5). Estimates of the 1999 and 2000 harvests were not available at the end of 2000.

Table 5. Estimates of Steller sea lions harvested and struck and lost in the annual subsistence harvest by Alaska Natives, 1992–1998

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

Source: Alaska Department of Fish and Game.

As noted in previous annual reports, the National Marine Fisheries Service and the tribal governments on St. Paul and St. George Islands (of the Pribilof Islands have met and developed a draft co-management agreement that would cover both Steller sea lions and northern fur seals. The draft agreement would estab-lish a six-member co-management council composed of three representatives from the Service and three from the tribal authority. The council would develop annual management plans for the subsistence harvests, identify monitoring and research needs, and provide for local decisionmaking on the harvests, including which rookery or rookeries to harvest, numbers to be taken, and the timing of the harvests. Under the agreement, a tribal ecosystem officer would be designated to oversee the harvests and ensure that they are both humane and

efficient. The officer would also partici-pate in a biosampling program to be established under the draft co-management agreement. The co-manage-ment agreement was signed in July 2000 and the first meeting for implementation of the agreement was scheduled for March 2001.

In 2000 the Service held separate preliminary discussions with the Alaska Sea Otter and Sea Lion Commission, East Aleutians Borough, and the Alaska Department of Fish and Game, Subsistence Division, to consider real-time harvest monitoring at sites where most sea lions are harvested. The plan under discussion would integrate annual community-based monitoring data from these primary sites with information from biennial statewide surveys. This plan would provide real-time estimates of the number of animals harvested and more accurate assessment in areas where most sea lions are harvested. The Alaska Sea Otter and Sea Lion Commission and East Aleutians Borough would partici-pate by coordinating the community-based harvest monitoring in much the same manner as the tribal governments in the Pribilof Islands would coordinate monitoring on those islands.

Interactions with Commercial Fisheries

Since 1998 management of the western population of Steller sea lions has focused on potential interactions between sea lions and the lucrative Alaska groundfish fisheries (e.g., fisheries for pollock, Atka mackerel, Pacific cod, and a variety of flatfish and rockfish). In aggregate, the fisheries generate about one billion dollars of revenue and are therefore of considerable importance to the economies of the states of Alaska, Washington, and (to a lesser extent) Oregon. The Alaska groundfish fisheries are managed and conducted under fishery management plans required by the Magnuson-Stevens Fishery Conservation and Management Act. Because the fishery management plans provide the overarching guides for management of the fisheries, they determine the nature and extent of fishery effects on the associated marine ecosystems, including listed species and critical habitat. The fisheries have been evaluated in section 7 consultations and have been the subject of litigation in the U.S. District Court for the Western District of Washington at Seattle because of concerns that the fisheries may jeopardize the continued existence of Steller sea lions or adversely modify their critical habitat. The following is a brief chronology of these consultations and associated litigation.

In February 1998 the Service determined that the previous (1996) section 7 consultation for the Bering Sea/Aleutian Islands groundfish fisheries provided sufficient and up-to-date assessment of fishery effects on Steller sea lions and other listed species, and did not reinitiate consultation on these fisheries. The follow-ing month, the Service completed a consultation on the Gulf of Alaska pollock fishery, concluding that the shift of 10 percent of the pollock total allowable catch from the winter season to the summer/fall season would neither jeopardize the western population of sea lions nor adversely modify its critical habitat. The consultation covered 1998 only, requiring reinitiation of section 7 consultation for the 1999 fisheries.

In April 1998 Greenpeace, the American Oceans Campaign, and the Sierra Club filed suit against the Service, alleging inadequate protection of Steller sea lions from the effects of the Alaska groundfish fisheries. A number of fishing companies and com-munities intervened on behalf of the Service.

In June 1998 the North Pacific Fishery Manage-ment Council revised inshore/offshore allocation of pollock catch for the Bering Sea fishery and prepared new regulations for the Atka mackerel fishery in the Bering Sea/Aleutian Islands region. The regulations were deemed necessary because of evidence that the fishery results in localized depletion of a major sea lion prey. The regulations split the Atka mackerel fishery into two even seasons and reduced the portion of the seasonal quota that could be taken in critical habitat from 80 percent or more to no more than 40 percent (the reduction to be achieved incrementally over a four-year period).

In October 1999 the President signed the Ameri-can Fisheries Act, which modified management and allocation of the pollock fishery in the Bering Sea. Key provisions of the Act included a new allocation scheme for the pollock fishery in the Bering Sea/ Aleutian Island region, reduction in the associated fleet size through the buyout and scraping of nine catcher/ processor vessels, increased U.S. ownership require-ments for participating vessels, increased observer coverage and scale requirements for assessing catch weight, allowance and constraints for the creation of

cooperatives in the pollock fishery, constraints on vessels fishing under the Act to prevent them from accruing advantages in other fisheries as an inadvertent consequence of the Act, and caps on the share of total catch that could be taken by any one vessel or processor.

On 3 December 1998 the Service completed a section 7 consultation on the Atka mackerel and pollock fisheries in the Bering Sea/Aleutian Islands region and the pollock fishery in the Gulf of Alaska. The consultation concluded that the Atka mackerel fishery was not likely to jeopardize the western population of Steller sea lions or adversely modify its critical habitat (largely on the basis of the new regulations developed in June 1998), but that the pollock fisheries, as proposed for 1999 to 2002, were likely to jeopardize the western population and adversely modify its critical habitat. The Service and council developed a set of measures to avoid jeopardy and adverse modification. The measures were imple-mented by emergency rule for the first half of 1999. The measures were subsequently challenged in court by both plaintiffs and interveners.

The Service completed a second section 7 consultation (22 December 1998) on total allowable catch specifications for the 1999 groundfish fisheries in the Bering Sea/Aleutian Islands region and the Gulf of Alaska. The consultation concluded that there was no jeopardy or adverse modification based, in part, on the reasonable and prudent alternatives to be implemented for the pollock fisheries. The Service also completed a supplemental environmental impact statement for the Alaska groundfish fisheries.

In April 1999 the North Pacific Fishery Management Council, together with the Marine Mammal Commission, the National Marine Fisheries Service, and the Alaska Department of Fish and Game, held a review of the 3 December 1998 biological opinion. The review panel, a group of independent marine sci-entists, determined that, based on the best available data, the conclusions of the opinion were reasonable. In June 1999 the Service and council developed emer-gency measures for the latter half of 1999 and for a permanent rule to ensure that the pollock fisheries do not result in jeopardy and adverse modification.

In July 1999 the court ruled on the 3 December 1998 biological opinion. The court upheld the jeopardy/adverse modification conclusions for the pollock fisheries, but found the reasonable and prudent alternative to be arbitrary and capricious for lack of sufficient explanation of how it avoided jeopardy and adverse modification. The court remanded the opinion back to the Service with orders to revise the final reasonable and prudent alternative and explain how it avoids jeopardy and adverse modification. The court also ruled that the supplemental environmental impact statement completed in December 1998 was insufficient in scope, and also remanded that document back to the Service. On 15 October 1999 the Service presented a revised final reasonable and prudent alternative to the court. Elements of the alternative were challenged in the lawsuit by both plaintiffs and interveners, but have not yet undergone judicial review.

In December 1999 the Service completed a section 7 consultation on the 2000 total allowable catch specifications for the groundfish fisheries and the implementing regulations for the American Fisheries Act. The consultation concluded that the catch specifications and the measures implemented under the American Fisheries Act would not jeopardize listed species or adversely modify critical habitat.

In January 2000 the Service implemented measures consistent with the revised final alternative. In the same month, the court ruled that the 22 December 1998 biological opinion completed by the Service (on 1999 total allowable catch specifications) was not of sufficient scope and did not provide the broad overview of the fisheries and associated fishery management plans expected by the court. At the court's direction, the plaintiffs, defendants, and interveners attempted to mediate their differences regarding management of the Alaska groundfish fisheries, but were not successful.

In April 2000 the Service notified the North Pacific Fishery Management Council that its staff was analyzing potential interactions between Steller sea lions and Pacific cod fisheries in the Bering Sea/ Aleutian Islands region and the Gulf of Alaska Pacific cod are an important prey of Steller sea lions, and the fisheries are temporally concentrated in late winter and early spring, and spatially concentrated in Steller sea lion critical habitat.

In July 2000 the court ruled that it would enjoin all groundfish trawl fishing in Steller sea lion critical habitat west of 144°W longitude (the dividing line

between the eastern and western populations). The injunction went into effect on 8 August 2000.

On 30 November 2000 the Service completed a programmatic biological opinion on the fishery management plans for the groundfish fisheries of the Bering Sea/Aleutian Islands region and the Gulf of Alaska. The opinion concluded that the fishery management plans and the fisheries, as implemented under those plans, both jeopardized the western population of Steller sea lions and adversely modified their designated critical habitat. The opinion, therefore, also contained a reasonable and prudent alternative to avoid jeopardy and adverse modification.

On 5 December 2000 the injunction on trawl fishing within Steller sea lion critical habitat was dissolved. On 15 December 2000, Congress passed an appropriations bill with attached provisions to modify implementation of the reasonable and prudent alternative in the 30 November 2000 biological opinion. Members of the fishing industry have indicated that they will sue the Service over the conclusion and reasonable and prudent alternative of the 30 November 2000 biological opinion. The plaintiffs in the ongoing litigation have not expressed their intent with respect to the programmatic opinion.

Major Issues in the Steller Sea Lion Programmatic Biological Opinion

The programmatic section 7 consultation completed on 30 November 2000 was required to examine the broad management approach implemented under the existing fishery management plans for the Bering Sea/Aleutian Islands region and the Gulf of Alaska. The consultation was to determine whether the fisheries jeopardize the continued existence of any listed species, or destroy or adversely modify critical habitat.[1] These determinations must be made in the context of all effects on the listed species/critical habitat, whether by other federal, state, local, private, or tribal actions. Although the programmatic consul-tation (and the other consultations described above) was required to consider all listed species and critical habitat, it focused primarily on the western population of Steller sea lions and its critical habitat.

The Alaska groundfish fisheries may have both direct and indirect effects on Steller sea lions. Direct effects include incidental killing of individuals or other operational interactions between members of the species or stock and fishing vessels, gear, or activities. Indirect (biological) effects include competition for prey (exploitative competition), disturbance (interference competition), or changes to the ecosystem on which sea lions depend. Effects on Steller sea lion critical habitat include changes in the nature and quantity of prey available to foraging sea lions and direct physical alteration of habitat by bottom trawling or other gear/habitat interactions.

Thousands of sea lions were killed incidentally in the fisheries from the 1960s to 1980s, and their proximity to such operations suggests that those sea lions may have been more tolerant of fishing disturbance. Incidental catch may have selectively removed many animals that were less sensitive to the presence of fishing vessels, gear, and activity. However, direct fishery effects on Steller sea lions have been reduced to levels considered negligible at the population level. Recent data from the National Marine Fisheries Service indicate that 25 to 30 sea lions are killed annually by direct interactions with fishing vessels and gear. The programmatic biological opinion was, therefore, focused on indirect effects (i.e., disturbance, ecosystem effects, and competition for prey). Sea lions are known to be sensitive to human disturbance (e.g., noise from aircraft, vessel traffic, and the presence of humans), but the population effects of such disturbance are difficult to measure. Although sea lions have continued to use most areas after repeated disturbance, they have temporarily or permanently abandoned others. The vulnerability of Steller sea lions to disturbance by fishing-related activity may vary by individual, age, sex, season, reproductive state, habitat, and previous experience. The Service considered the effects of disturbance to be potentially significant and included mitigative measures in the reasonable and prudent alternative for the biological opinion (described later).

Indirect effects of the fisheries on the ecosystem also are difficult to evaluate based on the available data, but are potentially important. The fisheries are known

[1] To *jeopardize the continued existence of* means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. To *destroy or adversely modify* means a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species.

to have caused significant changes in the abundance and biomass of some species, but the ecosystem-level effects of such changes are poorly known. The Bering Sea/Aleutian Islands and the Gulf of Alaska ecosystems are complex, subject to the influence of multiple factors (both natural and human-related), and change over time. The current state of science is not sufficient to describe the nature of these ecosystems with sufficient confidence to associate observed changes with specific causes.

Therefore, the programmatic opinion focused on competition between the fisheries and the western population of Steller sea lions. Sea lions and the fisheries exploit the same resources. The use of those resources by one may limit the availability of the resources to the other. The Service concluded that the best available data support the hypothesis that the decline of the western population of Steller sea lions is due to nutritional stress although other factors may also be important. The fundamental question to be addressed by the Service is whether the removal of groundfish by the fisheries limits the availability of such prey to sea lions and thereby contributes to nutritional stress, reduces survival and reproduction, and impedes recovery and conservation.

The Service determined that competition may occur at global, regional, and local levels. At the global level, the underlying theory for management of these fisheries is that surplus production (i.e., available catch) is highest when the spawning biomass is 35 to 40 percent of the pristine (unfished) level. This theory is based on single-species concepts inherent in the management approach required by the Magnuson-Stevens Fishery Conservation and Management Act and embedded in the fishery management plans pre-pared under the Act. The Service believes that reduc-tion of target stocks to 40 percent of pristine levels is safe in an ecosystem context and with respect to the western population of Steller sea lions. However, the Service determined that fishing must be curtailed if the spawning biomass falls below 40 percent of its pristine level, and suspended if the spawning biomass falls below 20 percent of its pristine level. These changes were reflected in a new "global control rule" incorporated into the reasonable and prudent alternative of the opinion (described later in this section).

The Service also determined that competition may occur at regional and local levels if fishing is not dispersed geographically throughout the distribution of the target stock and temporally through the fishing year. That is, the Service concluded that excessive concentration of catch in certain regions or local areas may result in harvest levels exceeding the overall or global harvest rate set by fisheries management. Such concentrations of effort have been observed in the past (e.g., Shelikof Strait area and the Aleutian Basin) and may have contributed significantly to long-standing reductions of pollock stocks in those areas. Similarly, concentrated fishing in local areas or in certain seasons may cause significant reductions in prey availability to foraging sea lions.

Finally, prey availability is the primary feature of marine critical habitat for the Steller sea lion. The Service determined that excessive reductions in prey availability within critical habitat significantly reduce the value of such habitat for the recovery and survival of the western population of Steller sea lions. In its biological opinion, the Service observed that excessive reductions in prey availability may occur in critical habitat if the fisheries are not appropriately distributed spatially (according to the distribution of the stock) and seasonally.

Based on its analyses of the potential effects of fishing on listed species and critical habitat, the Service concluded that the fishery management plans for the Bering Sea/Aleutian Islands region and the Gulf of Alaska, in their current state, would likely jeopardize the continued existence of the western Steller sea lion population and adversely modify its critical habitat.

Reasonable and Prudent Alternative

Based on analyses in its 30 November 2000 programmatic biological opinion, the Service prepared a reasonable and prudent alternative to the measures regulating the current groundfish fisheries. The Service concluded that to avoid jeopardy to the western population of Steller sea lions and prevent adverse modification of its designated critical habitat, an alternative consisting of four main principles was needed.

Global Control Rule – The fishery management plans evaluated in the biological opinion allow fishing on stocks when they are between 2 and 100 percent of

their "pristine" biomass (i.e., expected biomass in the absence of fishing). The new control rule would allow fishing for pollock, Atka mackerel, and Pacific cod only when each stock is at least 20 percent of its pristine biomass.

Fishing Closures – The Service's opinion also included three types of fishery closures. The first type continues current closures (no entry) out to 3 nmi around rookeries. The second type initiates 3-nmi no-fishing zones around major haul-out sites designated as critical habitat or otherwise listed in its 15 October 1999 revised final reasonable and prudent alternative for the pollock fishery. The third type includes portions of critical habitat and protection zones expanded beyond 3 nmi. These areas will be closed to fishing for pollock, Pacific cod, and Atka mackerel as part of a monitoring scheme developed by the Service.

Spatial Distribution – Existing mechanisms for distributing catch among management areas will still be used. However, catches of pollock, Pacific cod, and Atka mackerel inside open portions of critical habitat will be limited on the basis of the distribution of fish stock biomass in the areas during the pertinent season.

Temporal Distribution – Inside open portions of critical habitat, fishing for pollock, Pacific cod, and Atka mackerel will be prohibited between 1 November and 20 January. In all areas, trawl fishing for these species will be prohibited during the same period. (Trawling is the major fishing method for all three species although they are also caught by pots and longlines.) Inside open areas of critical habitat, each of these three fisheries will be split into four evenly distributed seasons, with 40 percent of the total allowable catch divided evenly between the first two (A and B) seasons and the remaining 60 percent divided evenly between the third and fourth (C and D) seasons. Outside critical habitat, the fisheries will occur in two seasons (effectively A+B and C+D). Catch allocated to open critical habitat areas can be taken outside critical habitat at any time in the corresponding season (e.g., B season catch inside critical habitat could be taken outside of critical habitat in the A+B season).

In addition to these four management principles, the Service developed a monitoring scheme to assess the efficacy of measures to protect the Steller sea lion. The scheme is based on 13 spatial zones consisting primarily of critical habitat. Five of these areas will be open to fishing (under the above constraints), and the remainder will be closed. The effects of fishing will be assessed by comparing sea lion trends in abundance in the open and closed zones after 5 to 10 years.

Steller Sea Lion Legislation

As noted earlier, parties representing the fishing industry and environmental groups have objected to provisions in the Service's 30 November 2000 biological opinion and expressed intent to return to court. To help resolve this issue, Congress passed legislation on 15 December 2000, calling for additional research on the relations between Steller sea lion trends and the groundfish (i.e., pollock, Atka mackerel, Pacific cod, various flatfishes and rockfishes) fisheries. The legislation confirmed the fisheries management authority of the regional councils and the Secretary of Commerce as established in the Magnuson-Stevens Fishery Conservation and Management Act. The legislation clarified that this management authority also pertains to changes required by the Endangered Species Act, and that the implementation of such changes must follow the procedures and requirements of the Magnuson-Stevens Act.

The legislation directed the North Pacific Fishery Management Council and the National Academy of Science to conduct an independent scientific review of the 30 November 2000 biological opinion, its underlying hypotheses, and its reasonable and prudent alternative. The Secretary of Commerce was instructed to submit to the council proposed measures to implement the alternative in the biological opinion. Based on those measures, the council must prepare and transmit to the Secretary an amendment (or amendments) to the fishery management plans to implement the alternative for the 2002 fishing year. The alternative and related measures may be modified based on the results of the scientific review or new information.

For the 2001 fishing seasons, the fisheries must be managed according to the fishery management plans and regulations in effect before 15 July 2000. Those plans and regulations include, among other things, conservative total allowable catch levels, no-entry zones within 3 nmi of rookeries, restricted harvest levels near rookeries and haul-out sites, continuation of the observer program, spatial and temporal harvest restrictions, federally mandated bycatch reduction

programs, and additional conservation benefits through cooperative fishing arrangements. To the extent practicable, the Secretary, in consultation with the Council, must amend the 2000 regulations to be consistent with the 30 November 2000 opinion. However, changes to the 2000 regulations can only be implemented after 15 March 2001.

The legislation also requires that the global control rule take effect immediately, but must not reduce the total allowable catch for any 2001 fishery by more than 10 percent. The Council also is to be given authority to recommend changes to the portions of the alternative to be implemented in 2001 (after 15 March 2001). The Secretary may make such changes, including the opening of additional critical habitat for fishing by small boats, the postponement of seasonal closures inside critical habitat for small boats, or other measures that would ensure that small boat fishermen and on-shore processors in Alaska are not adversely affected as compared with the fisheries before the 15 July 2000 injunction.

Finally, the legislation provided $20,000,000 for the development of a comprehensive research and recovery plan for the Steller sea lion. Such research will include studies of available prey, predator/prey relationships, predation by other marine mammals, interactions between fisheries and Steller sea lions (including localized depletion theory), the effects of changes in environmental conditions, disease, juvenile and pup survival rates, population counts, nutritional stress, the effects of foreign commercial harvest of sea lions outside the exclusive economic zone, the residual impacts of former government-authorized eradication bounty programs, and the residual impacts of intentional lethal takes of sea lions. The Secretary was also instructed to implement, on a pilot basis, nonlethal measures to protect sea lions from marine mammal predators including killer whales. The legislation also provided $30,000,000 to the Southwest Alaska Municipal Conference for distribution to fishing communities, businesses, community development quota groups, individuals, and other entities to mitigate the economic losses caused by sea lion protection measures.

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Pacific Walrus

(*Odobenus rosmarus divergens)*

The Pacific walrus is a subspecies of walruses that inhabits the Bering and Chukchi Seas between Alaska and Russia (Fig. 14) in a single, wide-ranging population. Most Pacific walruses usually haul out on sea ice and undertake a seasonal migration that follows the annual advance and retreat of the pack ice. They move north through the Bering Strait into the Chukchi Sea in spring and return to the Bering Sea in late fall. Some animals, however, remain year-round in the Bering Sea. During nonwinter seasons, these animals, mostly adult males, haul out on land at several sites in Alaska and Russia. There are four major land-based haul-out sites in Alaska, all of which are located in Bristol Bay in the southeastern Bering Sea (i.e., Round Island, Cape Peirce, Cape Newenham, and Cape Seniavin).

The only other subspecies of walrus, the Atlantic walrus (*O. r. rosmarus*), is distributed among several small populations between eastern Canada and the Laptev Sea off the Siberian coast of north-central Russia. Together, these populations are far less abundant than the Pacific walrus, which includes perhaps 80 to 90 percent of all walruses worldwide. Based on a rangewide survey conducted in 1990, Pacific walruses probably numbered more than 200,000 animals at that time. As discussed later in this section, however, no rangewide surveys have been conducted since 1990, and the current size of the Pacific population is unknown. The diet of walruses consists principally of clams, snails, worms, and other benthic invertebrates, which they feed on by rooting through soft mud and sandy bottoms. Their foraging behavior and their consumption of large amounts of prey make walruses a key component of the ecology of the Bering and Chukchi Seas. Walruses also are a vital economic and cultural resource for Native communities in both Alaska and Russia. Annual walrus hunts help maintain Native cultural and subsistence traditions and provide food, ivory, and other raw materials for making crafts and sustaining Native lifestyles. Ivory from walrus tusks is used to make handicrafts that provide an important source of income for Native villagers.

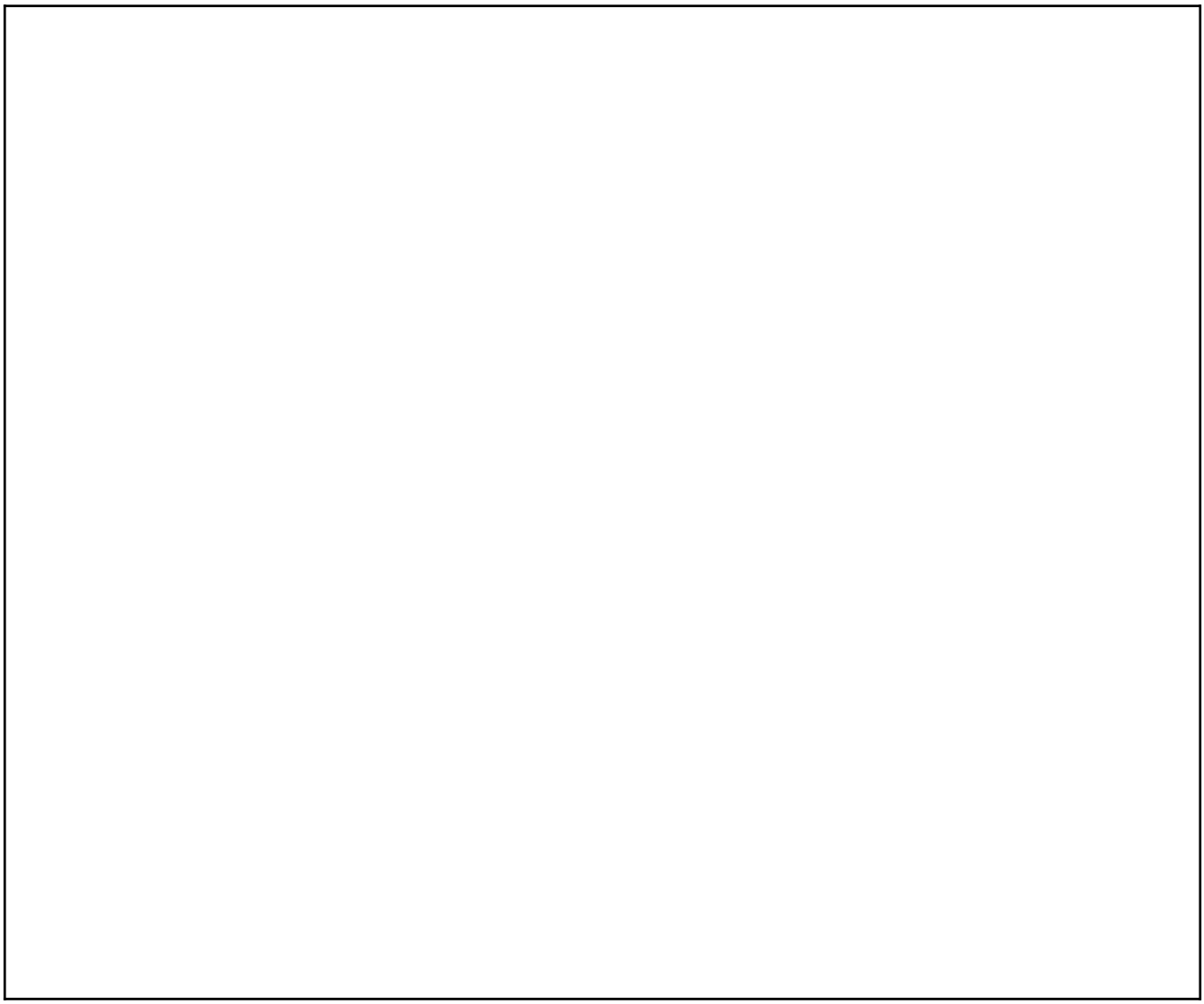

Figure 14. Range of the Pacific walrus (courtesy of Fish and Wildlife Service).

Since the mid-1800s Pacific walruses have gone through a series of major population declines and recoveries. This fluctuating pattern of abundance was caused by periodic episodes of overharvesting by U.S. and Russian hunters who killed walruses for their oil and other commercial purposes. The depletion of walruses in the 1870s was particularly severe and caused widespread starvation among Native villages around the Bering Sea. The most recent decline occurred during the decades before and after World War II due to commercial harvesting by Russian hunters. The population recovered during the 1960s and 1970s under independent restrictions on hunting imposed by the former Soviet Union and the State of Alaska. Recent analyses of walrus counts and life history data suggest that the number of Pacific walruses may have peaked in the 1980s and then started a decline as both reproductive and juvenile survival rates decreased. Although trends since the 1980s are unknown, well-documented declines of many other species of Alaska marine life, including several species of marine mammals (e.g., Steller sea lions, northern fur seals, harbor seals, and sea otters) have raised concern that walruses also could be experi-encing a decline due

to regional ecosystem changes perhaps related to changing climactic conditions or other factors.

In the United States, walrus research and management is a shared responsibility exercised under a co-management arrangement between the Fish and Wildlife Service, which has lead responsibility under the Marine Mammal Protection Act, and the Native community, which established the Eskimo Walrus Commission in 1978 to organize Native involvement in walrus conservation programs. Other key partners in walrus research and management include the Biological Resources Division of the U.S. Geological Survey, the Alaska Department of Fish and Game, scientists at various universities and research organi-zations, and environmental groups. To help direct walrus conservation work, the Service, at the recom-mendation of the Marine Mammal Commission, developed a Pacific Walrus Conservation Plan that was adopted in 1994. As discussed in past annual reports, the Commission encouraged the development of such plans for several marine mammal species in Alaska by preparing a series of species accounts, with research and management recommendations, for walruses and nine other marine mammal species (see Lentfer 1988 in Appendix B).

Subsistence Harvests of Pacific Walrus

The Marine Mammal Protection Act includes provisions that preserve the right of Alaska Natives to hunt walruses and other marine mammals for purposes of subsistence or to obtain marine mammal parts for making traditional Native handicrafts, provided the take is not done in a wasteful manner. Under other provisions of the Act, the Service calculated a potential biological removal (PBR) level for the Pacific walrus stock. This number is calculated using a formula designed to estimate how many animals could be removed from a marine mammal stock annually (not including natural mortality) while maintaining a high degree of assurance that it would remain at, or increase toward, its optimum sustainable population level. The formula for calculating the PBR level includes a best estimate of minimum population size, which, based on the 1990 rangewide survey of Pacific walruses, is 188,316 animals. Pacific walruses are considered to be within the range of their optimum sustainable population size and, using that estimate, the PBR level for the stock is currently calculated at 7,533 walruses per year.

The number of walruses harvested annually in Alaska is monitored using two sources of data collected cooperatively by the Service, the Eskimo Walrus Commission, and Native hunters. One source is a harvest monitoring program. Under that program, personnel located in Alaska's four major walrus hunting villages (i.e., Gambell and Savoonga on St. Lawrence Island, Diomede on Little Diomede Island in the Bering Strait, and Wales on the tip of the Seward Peninsula) record catch data and collect biological samples for research as hunters return to their villages. The program, which began in 1980, succeeded a harvest monitoring program operated by the State of Alaska during the 1960s and 1970s. The second source of data is a marking, tagging, and reporting program begun in 1988. Under this program, Native hunters are required to have all walrus tusks tagged no more than 30 days after a walrus is taken. Because calves, which lack tusks, also are taken, and because compliance with tagging requirements in some villages is less than 100 percent, tagging data do not reflect all walruses taken.

Based on these programs, the estimated catch level in Alaska for 1999 (the latest year for which complete data are available) was 2,485 walruses. Although this was one of the highest catches estimated during the 1990s (see Table 6), it is below most annual catches for Alaska during the 1980s, which ranged between about 2,500 and 5,000 walruses per year. Preliminary data from the marking, tagging, and reporting program for 2000, which include tagging records for more than 1,850 walruses as of the end of the year, suggest that the catch level in Alaska during 2000 may be slightly below the 1999 catch level. In recent years, hunters have reported seeing fewer calves than in the past and this observation was again reported during 2000.

Pacific walruses also are hunted in Russia. The Fishery Department in the Russian Federation's Agricultural Ministry is the agency responsible for managing walruses in Russia. Since 1992 walrus hunting has been limited to Native people. Under current harvest limits set by the Fishery Department, up to 3,000 Pacific walruses may be taken annually. The department also is responsible for conducting a

Table 6. Estimated catches of Pacific walruses in Alaska and total reported catch of walruses in Russia, 1992–1999

	Alaska		Russia		Total Catch	
Year	Catch[1]	Struck/Lost[2]	Catch[3]	Struck/Lost[2]	Total Catch	Struck/Lost[2]
1992	1,884	1,364	1,670	1,209	3,554	6,127
1993	1,385	1,003	856	620	2,241	3,864
1994	1,624	1,225	1,071	734	2,763	4,567
1995	1,692	1,225	1,071	776	1,762	4,764
1996	2,501	1,811	941	681	3,442	5,934
1997	1,672	1,211	731	529	2,403[3]	4,143
1998	1,747	1,265	950[4]	688	2,697	4,650
1999	2,485	1,800	1,670[5]	1,209	4,155	7,164

[1] Estimates provided by the Fish and Wildlife Service following methodology described in J. Garlich-Miller and D. M Burns. 1999. Estimating the harvest of Pacific walrus, *Odobenus 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, Alaska. 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. Garlich-Miller and Pungowiyi (eds). USFWS Technical Report MMM 99-1. 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 the U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, AK 99503.

harvest monitoring program; however, agency funding for this program has been all but eliminated in recent years due to Russia's economic crisis. Because of the importance of harvest data for managing the Pacific walrus population, the Eskimo Walrus Commission, the Fish and Wildlife Service, the State of Alaska, and the North Slope Borough jointly provided funds in 1999 to train harvest monitors and support the collection of harvest data in six major walrus hunting villages in Russia. In 2000 the National Park Service's Beringia Program provided a three-year grant through the Eskimo Walrus Commission to support a con-tinuation of Russian harvest monitoring through 2002. The Fish and Wildlife Service also continued to pro-vide technical support. Based on monitoring work done in 1999, the reported Russian catch for 1999 was 1,670 walruses (see Table 6). A catch estimate for 2000 was not available as of the end of 2000.

During Native walrus hunts, some animals that are shot escape or sink before they can be retrieved and are not reflected in recorded catch data. Because few walruses are found with healed bullet wounds, it is thought that most animals stuck and lost die of their wounds. Recent data on struck-lost rates are not available; however, based on data collected between 1952 and 1972, it was estimated that 42 percent of the walruses shot during hunts in Alaska during that period were not recovered. If that ratio is applied to available catch data and if it is assumed that all animals shot die of their wounds, the total number of walruses killed in United States and Russian walrus hunts combined would range from about 3,800 to 7,200 between 1992 and 1999.

Pacific Walrus Research Activities

Probably the greatest problem now facing walrus conservation is the lack of reliable information on the size and trend of the Pacific walrus population. Without such information, it is not possible to make meaningful assessments of the impact of current harvest levels on the population or to assure that walruses do not decline to a point below their optimum sustainable population or where they are no longer able to meet Native subsistence needs.

In the past, population estimates were developed based on rangewide aerial surveys conducted jointly by

U.S. and Soviet agencies at five-year intervals between 1975 and 1990. Those surveys were undertaken in summer when walruses occur along the edge of the pack ice in the Chukchi Sea and on coastal haul-out sites. No surveys have been conducted since 1990. In part this is because of the cost of such surveys and economic constraints on U.S. and, in particular, Russian agencies. A comparable survey today could cost in excess of $1.5 million. In addition, because of difficult sampling problems, such as the patchy distribution of walruses in sea ice and uncertainty as to the number of walruses that may be in the water and not visible at the time of a survey, past surveys have yielded imprecise population estimates that have been of limited value for detecting trends.

As a result of the poor and increasingly out-of-date population data, recent Pacific walrus research has focused principally on work that could contribute directly and indirectly to improving information on population abundance and trends. To help organize work in this regard, a walrus survey population workshop was held during 2000. Results of this workshop and follow-up activities are discussed below.

Pacific Walrus Survey Workshop – On 27–28 March 2000 the Fish and Wildlife Service and the U.S. Geological Survey convened the Pacific Walrus Survey Workshop to examine alternative research techniques and approaches for determining the size and trend of the Pacific walrus population. Workshop participants included walrus biologists, managers from federal and state agencies, Native walrus hunters from the Eskimo Walrus Commission, and university scientists. During the meeting, participants evaluated research possibilities for developing three types of population measures: (1) a count that could provide a minimum population estimate suitable for preparing stock assessments and calculating a potential biological removal level pursuant to requirements of the Marine Mammal Protection Act, (2) indices that could be used to track population trends (e.g., the age-sex composition of a segment of the population), and (3) an estimate of total population size with an acceptable measure of precision.

There was general agreement that an estimate of total population size would be the most useful population measure for management purposes. However, it also was recognized that tools and techniques necessary to conduct a population survey and generate such a population estimate were not currently available and would require a significant investment in research to develop. In addition, it was recognized that a large amount of survey effort would be required to generate a population estimate with an acceptably small variance. Such a survey therefore would be both difficult and expensive. With these thoughts in mind, the group evaluated various survey approaches, identified information needs, and recommended research priorities to develop and test survey tools and techniques.

The participants were unable to agree on the best season to survey the walrus population. It was suggested, therefore, that a modeling exercise be done to evaluate the extent of area that would need to be surveyed in different seasons to produce a satisfactory abundance estimate and estimate the likely cost of such surveys.

Participants also identified several information needs to help design and interpret walrus surveys. It was noted that a better understanding of the seasonal distribution of walruses was important. To meet this need, participants recommended a telemetry program to track between 25 and 40 walruses per year with satellite transmitters, with reconnaissance surveys to be flown over ice habitats used by walruses. Telemetry techniques for walruses, however, are currently experimental. Because of their size (walruses can weigh more than 1,600 kg [3,600 lbs]), habitat, and unfavorable reactions to immobilizing drugs, walruses are difficult to capture for tagging purposes. In addition, the duration of tag transmissions once affixed to walruses has typically been only a few weeks or months. The group therefore recommended that research be undertaken to improve techniques for immobilizing and handling walruses, and to develop satellite transmitters for walruses that will transmit data for longer periods.

The group also noted a need for better information on walrus habitat selection. For this purpose, the group recommended investigating relationships between walrus distribution and sea ice characteristics. This could be done by using data on walrus distribution from satellite transmitters, satellite imaging, or other remote-sensing techniques, and overlaying those data with sea ice imagery. As a related matter, it was recommended that steps be taken to evaluate satellite imagery or the use of infrared and multispectral sensors on aerial reconnaissance surveys to detect walrus distribution patterns over broad areas.

The group also recommended work to develop correction factors to account for the number of walruses not hauled out on land or ice at the time of a survey. To generate these factors, it was recommended that time-depth recorders be used to study haul-out patterns of walruses on both land and sea ice. It also was suggested that consideration be given to develop-ing real-time correction factors by attaching trans-mitters to a sample of walruses before a population survey was to be conducted.

Other recommendations developed during the workshop included the following: investigating the application of videotaping walrus groups during aerial surveys to help verify observer estimates of group sizes; assessing the feasibility of conducting replicate counts of walrus concentrations in sea ice; investigating alternative means of obtaining aerial photographs to count walruses at terrestrial haul-out sites; evaluating the feasibility of conducting index counts of animals migrating through the Bering Strait; and evaluating the feasibility of estimating population size through mark-recapture techniques.

A report of the workshop was completed and distributed by the Service and the U.S. Geological Survey in September 2000 and is being used by both agencies to help organize and plan future walrus research activities. As discussed below, work on several recommended tasks has already been initiated or planned.

Follow-Up Studies – Based on results of the March 2000 walrus survey workshop, the Fish and Wildlife Service, in cooperation with other agencies and groups, developed plans for several studies to be undertaken in 2001 to test research techniques that might improve the accuracy of walrus population surveys. In cooperation with the U.S. Coast Guard, the Service made plans to field-test digital video equipment to create a permanent visual record of walruses counted by observers during surveys in the pack ice. The fieldwork, which will help verify and improve the accuracy of observer counts, is expected to be undertaken between March and July 2001 in the Bering and Chukchi Seas.

The Service also developed plans for a contract to assess the feasibility of remote-sensing technologies to survey walruses in pack ice. Field work for this study is anticipated in April 2001 in the St. Lawrence Island polynya. The Service also initiated a study to analyze past surveys and estimate the amount of survey effort that would be needed in different seasons to obtain future population estimates with a reasonable degree of precision. Preliminary results from the latter study are expected to be available in mid-2001.

Plans also were developed for two other studies in 2001: (1) an evaluation of mark-recapture procedures to estimate the size and trend of the Pacific walrus population, and (2) a study by the U.S. Geological Survey using genetic markers to assess the population structure and movement of walruses between terrestrial haul-out sites. The latter project, a multiyear effort, will be undertaken in cooperation with Russian officials and Native hunters in both the United States and Russia. In part, the study will examine the feasibility of using genetically identified walruses to conduct a mark-recapture analysis of the population.

Monitoring Haul-Out Sites in Bristol Bay – As noted above, there are four major land-based walrus haul-out sites in Alaska, all of them in Bristol Bay. In 1997 a maximum same-day count at three of these sites revealed that at least 9,400 walruses were using Bristol Bay during the summer that year. In 1998 monitoring efforts were expanded to include all four sites. Maximum same-day counts from all four sites in 1998 and 1999 were 6,650 and 4,788 walruses, respectively. In 2000 it was not possible to monitor walruses at Cape Seniavin; however, the maximum same-day count for the other three haul-out sites was 7,384 walruses. Such counts are difficult to interpret because walruses sometimes display a synchronous hauling behavior in which many walruses may haul out or return to the water in a very short period, and maximum counts at the various locations occur on different dates. As a result, such counts can vary widely between years without necessarily reflecting trends in regional abundance.

U.S.–Russian Cooperative Agreements

To help ensure complementary walrus research and management programs in both the United States

and Russia, representatives of the two countries signed a protocol in 1994 expressing mutual interest in negotiating an agreement for the conservation of Pacific walruses. The protocol envisioned separate government-to-government and Native-to-Native agreements between respective counterparts in the two nations. A similar protocol was signed in 1992 for work on a polar bear bilateral agreement. To speed completion of the polar bear agreement, officials of the two countries agreed to defer work on the walrus agreement until the former was completed. As discussed in the polar bear section of this chapter, a U.S.–Russian polar bear agreement was signed late in 2000; however, as of the end of 2000, no plans had been made to begin work on a walrus agreement. Such efforts may be delayed until funding for walrus research and management in Russia improves.

Harbor Seals in Alaska (*Phoca vitulina richardsi*)

Harbor seals are nonmigratory marine mammals found in subarctic and temperate waters of the North Atlantic, North Pacific, 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 occur almost continuously throughout their Alaskan range. They generally are found near shore in estuaries or protected waters, but may range far out to sea in deep pelagic waters or into freshwater rivers and lakes.

The main events in the annual cycle of harbor seals are pupping and nursing, mating, and molting. Pupping occurs from early May to late July, and mothers nurse their pups for three to six weeks, followed by gradual or abrupt weaning. After weaning, adult females mate within a few weeks. After fertilization, development of the embryo slows and its implantation in the uterus is delayed for a period of weeks to several months. This delayed implantation presumably enables the birth and weaning of pups to coincide with environmental conditions conducive to their survival. The delay also reduces postnursing demands on the adult female while she recovers her condition and molts. Although the full molting process occurs over a period of four to six months, molting is most apparent from late July to early September when old hair is shed and new hair is exposed. Because nursing and molting seals spend extended periods of time hauled out on land, counts to assess the status and trends of harbor seals generally are made during the molting period.

Status and Trends within Alaska

For purposes of stock assessment the National Marine Fisheries Service currently recognizes three management units of harbor seals in Alaska—southeastern Alaska, the Gulf of Alaska (including the Aleutian Islands), and the Bering Sea. Current research suggests that these management units are not consistent with demographic and genotypic data and likely do not reflect biologically or ecologically based stocks. As explained later in this section, the Service is conducting research to better describe the stock structure of harbor seals in Alaska.

To assess status and trends of harbor seals in Alaska, the state is divided into five regions, based primarily on logistical constraints. Counts are conducted in one region each year so that the seal population of the entire state is counted every five years or twice each decade. Supplemental research is conducted on the effects of various covariates that may affect harbor seal behavior and, therefore, the counts. Such covariates include tide, time of day, weather, wind speed, direction, cloud cover, and visibility. Additional research is intended to characterize hauling patterns so that the number of seals counted can be adjusted or expanded to a total abundance estimate.

The status and trends of the three management units exhibit considerable variation. Counts at two sites in southeastern Alaska indicate that the number of seals in this region has been increasing at 2 to 9 percent per year over the last several decades. Before passage of the Marine Mammal Protection Act, tens of thousands of harbor seals were killed in the state for commercial purposes and because they were considered competitors for commercially valuable fish species. The recent increase in harbor seal abundance in southeastern Alaska probably represents recovery from this preceding period of population reduction. The Service's most recent estimate of harbor seals in this region, which was based on (unadjusted) counts during the annual molt in 1997 and 1998, is 45,039.

In contrast, the number of harbor seals in the Gulf of Alaska appears to have declined significantly over

the past several decades. Counts in Prince William Sound decreased by about 57 percent from 1984 to 1992. The decline, which started before the *Exxon Valdez* oil spill in 1989, was most severe in the year of the spill and has continued at a slower rate since then. Counts in the Kodiak archipelago have revealed an even more severe decline. From 1976 to 1992 counts on Tugidak Island (south of Kodiak Island) dropped from nearly 7,000 to less than 1,000, a decline of 85 to 90 percent. Although counts in the Kodiak archipelago have increased in recent years (1,420 in 1996 at Tugidak Island), the number of harbor seals in this region remains significantly depressed relative to numbers observed in the 1970s. The Service's most recent estimate of 29,175 harbor seals in the Gulf of Alaska was based on surveys in 1994 and 1996.

The first survey specifically designed to census harbor seals along the Aleutian Islands was conducted by the Service in 1994 and repeated in 1999. The current estimate for this region is 3,489 (unadjusted). Because historic counts were not conducted in the Aleutian Islands, trends in this region cannot be assessed.

In the Bering Sea, 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. 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 northern side of the Alaska peninsula declined by more than about 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 but apparently have remained relatively constant since 1990.

A range of factors may have contributed to the observed declines of harbor seals in Alaska. Natural factors could include ecosystem changes that may have reduced 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 describe quantitatively the importance of each of these factors in the observed decline of harbor seals in Alaska.

The National Marine Fisheries Service is the lead federal agency responsible for the conservation of harbor seals. For the Alaska Region, the Service's Protected Resources Division has the lead management responsibility. Research support is provided by the Service's National Marine Mammal Laboratory of the Alaska Fisheries Science Center, and the Southwest Fisheries Science Center. Cooperative research is also conducted by the State of Alaska through its Department of Fish and Game and by the Alaska Native community.

Based on concerns about the declines of harbor seals in Alaska, the Marine Mammal Commission wrote to the National Marine Fisheries Service on 10 June 1994, urging the Service to develop a conservation plan for harbor seals in Alaska. The Service agreed and drafted a plan that was forwarded for comment to the Alaska Native Harbor Seal Commission in 1995. The plan was not finalized and, after its November 1997 annual meeting in Fairbanks, Alaska, the Commission wrote to the Service urging its completion. In its 23 December 1997 letter, the Commission offered to help in developing the plan and noted that input from the Alaska Native Harbor Seal Commission would be particularly important in guiding conservation efforts and laying the groundwork for a harbor seal co-management agreement. The Service responded on 12 February 1998 and indicated that the 1995 draft plan was out of date and would require significant revision. Therefore,

the Service shifted its focus toward development of a co-management agreement and, more recently, a research plan (both of which are described below). Although the co-management agreement and the research plan represent significant progress in the management of harbor seals in Alaska, they do not provide the comprehensive management overview expected in a conservation plan. As of the end of 2000 a conservation plan has still not been completed.

Co-Management of Harbor Seals

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. Estimates of the number of seals taken for this purpose, however, are available only for the past decade. Beginning in 1992 the Service contracted with the Alaska Department of Fish and Game to survey Native households to estimate the number of seals taken annually. As described earlier in this chapter in the section on Steller sea lions, this method of estimating harvest levels has been questioned because it relies on recollections of hunters as much as a year after the actual harvests. Nonetheless, this information provides the only basis for estimating the size of the subsistence harvest. Since these surveys were first conducted, the estimates of the annual harvest have remained consistently between about 2,500 and 2,900 animals.

On 29 April 2000 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, research recommendations, and other recommendations.

In September 2000 the Service and the Alaska Native 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 chosen from academia, the government, and Native Alaska tribes and were chosen for their expertise in population monitoring, harvest management, and education. The workshop resulted in the formulation of an action plan for 2001. The plan consists primarily of an agreement by each party, the National Marine Fisheries Service and the Alaska Native Harbor Seal Commission, to accomplish their respective responsibilities delineated in the workshop.

Research

In addition to studies by the National Marine Fisheries Service and the Alaska Department of Fish and Game, research on Alaska harbor seals is conducted by independent researchers, scientists from various universities, and the National Park Service in Glacier Bay National Park and Preserve. In August 2000 the Service and the Alaska Department of Fish and Game completed an Alaska harbor seal research plan. The plan is to be revised annually but is intended to provide a five-year outlook on research needed to address management needs pertaining to harbor seals in Alaska. The objectives of the plan are to consolidate various research efforts into a single coordinated effort, identify needed but unfunded research, increase communication and collaboration among scientists and managers, and ensure that the research conducted satisfies management objectives. The plan focuses research on the following areas.

Stock Identification – The assessment of status relative to management requirements under the Marine Mammal Protection Act and the application of appropriate management measures depend on the identification of population structure or biologically based stock units. Although the National Marine Fisheries Service currently manages harbor seals in Alaska as three separate management units, each of these management units likely consists of multiple biological or ecological stocks. Better identification of stock structure could have significant implications for both management and research. The significance for management is apparent, for example, in the interpretation of harbor seal trends in the Kodiak

archipelago. If these harbor seals constitute a separate biological stock, then existing evidence suggests that this stock has declined to levels below its optimum sustainable range and should be listed as depleted under the Marine Mammal Protection Act and protected accordingly. On the other hand, if harbor seals in the Kodiak archipelago are part of a larger stock that includes the entire Gulf of Alaska from Prince William Sound to the western Aleutian Islands, then the stock as a whole may not be depleted, at least not solely on the basis of numbers in the Kodiak archipelago.

Since the mid-1990s scientists with the Service's Southwest Fisheries Science Center have been conducting studies on harbor seal stock structure in Alaska. Their efforts have been based primarily on genetic studies, but have included other (e.g., geographic, demographic) information as well. Preliminary results indicate that the three currently recognized units are not biologically meaningful and that review and revision of the current stock boundaries are warranted. Such information on stock structure is central to management of harbor seals in Alaska.

Abundance and Trend Estimation – Information on stock abundance and trends provides the primary indices for determining the status of stocks and is essential for management. A description of status must include not only seal abundance at any given point in time, but also changes in abundance over time. Baseline counts are therefore essential for determining stock status. Such baseline data are not available for harbor seals in large regions of Alaska (e.g., the Aleutian Islands and extensive portions of the Bering Sea), and determination of current status is confounded by lack of suitable reference information. Similarly, assessment of status can be confounded by variation in counts. Harbor seal counts are known to be highly variable as a function of their biology (e.g., pupping and molting schedules, haul-out patterns), as well as other factors such as location, season, year, environmental conditions, and prey availability. Interpretations of count data are also confounded by the frequency with which such data are available; infrequent counts provide less information about the nature of population growth or decline. For these reasons, frequent and regular count data are crucial for managing and conserving harbor seals in Alaska.

Habitat – The habitat of harbor seals in Alaska may be adversely altered by a range of human activities, including disturbance at haul-out sites, fouling by pollution such as the *Exxon Valdez* oil spill, coastal development, cruise ship discharge, and fisheries, particularly in nearshore waters. The effects of such factors may be more or less severe depending, in part, on how the seals use their habitat. Without better information on habitat use, the role of habitat modification or loss in the decline of harbor seals in Alaska is difficult to describe and appropriate protective measures are difficult to design.

Health and Condition – Changes in the health and condition of seals may be one of the first indicators of problems related to disease, contaminants, or nutritional stress. Studies of health and condition are important to assessment of the harbor seal decline in the Gulf of Alaska and the Bering Sea.

Food Habits – One hypothesis for the observed declines in harbor seals in the Gulf of Alaska and the Bering Sea is nutritional stress, which may be caused by changes in the quality or quantity of available prey. Changes in prey availability may result from natural causes (e.g., the environmental regime shift) or from human activities (e.g., fisheries competition for prey). Although additional studies of the harbor seal diet are needed, seals are known to consume a range of species including herring, Pacific cod, walleye pollock, squid, shrimp, octopus, salmon, eulachon, and capelin. These prey are targets or bycatch of commercial fisheries in Alaska, and earlier reviews have identified harbor seals as one of three species in Alaska especially vulnerable to competition with groundfish fisheries. Fishing, therefore, may have contributed to the harbor seal decline by reducing the nature and amount of available prey.

Life History and General Biology – The life history and general biology of harbor seals are basic information necessary for research and management. However, even relatively straightforward research, such as counting the number of seals, is confounded by variation and clines in pupping and molting. Similarly, adequate assessment of vital rates is essential to understand not only the population dynamics of the various stocks, but also to investigate potential causes for the decline. Vital rates include survival (or mortality) rates, reproductive rates, and movement rates (immigration and emigration). Together, these rates determine population status (growth, stability, or decline), and any factor that affects population status must do so by altering one or more vital rate. The study of vital rates is confounded by the fact that such

rates may vary as a function of a wide range of factors such as size, age, sex, season, location, environmental conditions, disease, resource availability, changes in quality of habitat, and human interactions.

Human Interactions – As noted earlier, harbor seals may be affected by a range of human interactions including disturbance at haul-out sites, subsistence harvests, coastal development, anthropogenic contaminants or pollutants, direct fisheries interactions, and indirect competitive interactions. This segment of the Alaska Harbor Seal Research Plan addresses questions related to such interactions, with particular focus on disturbance and incidental take associated with commercial fisheries and better accounting of the subsistence harvest by Alaska Natives.

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Polar Bear (*Ursus maritimus*)

Polar bears are distributed throughout the Arctic region within the national boundaries of the United States, Canada, Greenland, Norway, and Russia, as well as in international waters. The species comprises several largely discrete stocks, two of which occur in Alaska—the western Alaska (Chukchi/Bering Seas) stock, shared with Russia, and the northern Alaska (southern Beaufort Sea) stock, shared with Canada. The total number of polar bears in Alaska and adjacent waters has been estimated at 2,000 to 5,000 animals. The worldwide population has been estimated at 21,000 to 28,000 animals.

Accurate estimates of the current and historic sizes of polar bear stocks are difficult to obtain for several reasons—the species' inaccessible habitat, the movement of bears across international boundaries, and the costs of conducting surveys. It is thought, however, that intense sport hunting before enactment of the Marine Mammal Protection Act may have reduced both the Chukchi/Bering Seas and the Beaufort Sea stocks. In September 1998 the Fish and Wildlife Service published stock assessments for these two stocks, suggesting that both have grown since passage of the Act.

Until the middle of the twentieth century, polar bears in Alaska were taken primarily by Natives for subsistence purposes and for the sale of hides. Late in the 1940s trophy hunters using professional guides, and sometimes aircraft, began taking polar bears. As the size of the sport hunt grew, pressure on polar bear stocks in Alaska and elsewhere increased substantially. Recognizing this, in 1961 the State of Alaska adopted regulations restricting the sport-hunting season and requiring hunters to present all polar bear skins and skulls for tagging and examination. At the same time, preference was provided to subsistence hunters, and a prohibition was placed on shooting cubs and females with cubs. Between 1961 and 1972 an average of 260 polar bears was taken annually in Alaska, 75 percent of which were males. In 1972 the state banned hunting with the use of aircraft.

That same year, enactment of the Marine Mammal Protection Act placed a moratorium on the take of polar bears and other marine mammals, and management responsibility for these species was transferred to the federal government. Under the Act, Alaska Natives are allowed to take polar bears and other marine mammals for purposes of subsistence and creating and selling traditional handicrafts and clothing. The Act does not restrict the number of animals that can be taken or prohibit the take of cubs or females with cubs by Alaska Natives, provided that the take is not wasteful and the population is not depleted. The Act also established a general prohibition on the import of polar bear parts, such as hides, into the United States.

Because the ranges of many polar bear stocks cross national boundaries, efforts to protect and conserve polar bears require cooperation among the various nations. Concern over the dramatic increase in polar bear harvest levels in the 1950s and 1960s led to negotiation of 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.

In 1994 Congress amended the Marine Mammal Protection Act, adding a number of measures related to polar bears. Among these was a provision allowing the issuance of permits to import sport-hunted polar bear trophies legally taken by U.S. citizens in Canada provided that the Fish and Wildlife Service, in consultation with the Marine Mammal Commission, made certain findings. Efforts by the Fish and Wildlife Service to promulgate regulations allowing imports from certain stocks and further amendments enacted in 1997 have been discussed in previous annual reports. The 1994 amendments also called on the Secretary of the Interior to initiate two reviews relative to the 1973 polar bear agreement. Activities in this regard, along with efforts to develop an agreement between the governments of the United States and Russia, are discussed later in this chapter. Activities related to the take of polar bears and other marine mammals incidental to oil and gas development, exploration, and production in the Arctic are discussed under small-take authorizations in Chapter IX.

Polar Bear Stock Assessments

The 1994 amendments to the Marine Mammal Protection Act require the Fish and Wildlife Service and the National Marine Fisheries Service to prepare and periodically update stock assessment reports for each marine mammal stock in U.S. waters. Initial stock assessments for the two polar bear stocks in Alaska were published by the Fish and Wildlife Service in October 1995 and were updated in September 1998. In its latest assessments, the Service estimates the size of the Beaufort Sea polar bear stock at 1,765 (CV = 0.10). However, no reliable stock estimate could be made for the Chukchi/Bering Seas stock in either 1995 or 1998.

At the Marine Mammal Commission's 1999 annual meeting, representatives of the Fish and Wildlife Service emphasized the pressing need to obtain information about the Chukchi/Bering Seas stock. The Service noted that one method for obtaining needed information was to continue earlier work to survey polar bear dens for use as an index of abundance. The Service advised the Commission that it planned to meet with Russian colleagues early in 2000 to work out a protocol for den surveys. In addition, the Service expressed optimism that, during 2000, researchers would be able to use a Coast Guard icebreaker or a similar vessel operating in the area as a platform of opportunity to conduct aerial surveys of polar bears in the Chukchi and Bering Seas.

As hoped, Fish and Wildlife Service scientists conducted a pilot study of its aerial survey methodology in August 2000 from aboard the Coast Guard icebreaker *Polar Star*. In all, 71 hours of aerial surveys were flown, covering almost 9,000 km of transect lines. During those surveys 52 polar bear were observed. An additional 12 bears were spotted from the ship during its transit of the survey area. Polar bear density estimates derived from the study ranged from 0.0093 to 0.0164 bears per square kilometer. Contingent upon the availability of ship time and helicopters, the Service plans to conduct additional surveys in 2001.

Also in 2000, the Service convened a workshop of U.S. and Russian scientists to develop a protocol for conducting den surveys on Wrangel Island, north of the Chukotka Peninsula. Although a protocol was agreed to, joint surveys are not likely to be conducted until the new bilateral U.S.–Russian polar bear agreement has been implemented and the parties have agreed on procedures for authorizing, funding, and conducting such projects. As an interim step, the Service has contracted for development of a habitat suitability index of polar bears on Wrangel Island that would be used to focus survey effort on those areas that, because of topography and other factors, are most likely to be used for denning.

New information is also needed to refine and update the Service's estimates for the Beaufort Sea polar bear stock. The data currently being used are about 10 years old, and the Fish and Wildlife Service hopes to work with Canadian scientists to carry out a systematic mark-recapture study to help assess the current status of that stock. At the Commission's 1999 meeting, Service representatives also provided information on work being conducted by the Biological Resources Division of the U.S. Geological Survey to radio-tag female polar bears to test the effectiveness of forward-looking infrared imagery as a means of detecting bears in their dens. A final field study of this technology was conducted during 2000. Preliminary results suggest that about 50 percent of

polar bear dens are detected using this technique. The Service plans to hold a workshop during 2001 to consider whether use of infrared imagery in con-ducting polar bear surveys is warranted in light of the experimental detection rate.

Section 117 of the Marine Mammal Protection Act specifies that, except for strategic stocks or those stocks for which significant new information is avai-lable, stock assessments are to be reviewed and updated at least once every three years. In keeping with this schedule, the Service expects to update the assessments for both the Beaufort Sea stock and the Chukchi/Bering Seas stock of polar bears during 2001.

Polar Bear Conservation Plan

In 1988 Congress amended the Marine Mammal Protection Act to direct the Secretaries of the Interior and Commerce to develop conservation plans for depleted and, when appropriate, nondepleted marine mammal species and populations. In January 1989 the Marine Mammal Commission recommended that the Fish and Wildlife Service prepare conservation plans for polar bears, walruses, and sea otters in Alaska. The Service agreed and, from 1992 through 1994, the Commission worked closely with the Service to ensure that the conservation plans identified research and management actions necessary to maintain populations in Alaska within their optimum sustainable population range, as required by the Act.

The final conservation plan for polar bears in Alaska, as well as the plans for walruses and sea otters in Alaska, was issued by the Service in 1994. At that time, the Service noted that the plans would be reviewed annually with the idea of updating the plans, if necessary, in three to five years. Although it has been more than five years since the polar bear conser-vation plan was published and the Service still intends to review and, if necessary, update the plan, other responsibilities related to polar bear management have been more pressing and have precluded directing staff time and resources to this task.

Co-Management Agreements

Section 119 of the Marine Mammal Protection Act, enacted in 1994, provides explicit authority for establishing cooperative agreements between the Secretaries of Commerce and the Interior and Alaska Native organizations to conserve marine mammals and provide for co-management of subsistence uses by Alaska Natives. Under such agreements, the Secretaries may make grants to Native organizations for collecting and analyzing data on marine mammal populations, monitoring the taking of marine mammals for subsistence, participating in marine mammal research, and developing marine mammal co-management programs with federal and state agencies.

On 19 February 1997 the Fish and Wildlife Service and the Alaska Nanuuq (Polar Bear) Commission signed a cooperative agreement pursuant to section 119 for the co-management of polar bears. In each of the first three years under that agreement about $90,000 was provided to the Nanuuq Commis-sion, which, among other things, helped to fund its participation in efforts to conclude a bilateral agreement between the United States and Russia on conservation of polar bears in the Bering and Chukchi Seas (see discussion later in this section). Under the cooperative agreement for 2000, $80,000 was provided by the Service to continue these efforts, to help cover operating expenses, and to enable the Nanuuq Commission to engage in other activities. Among other things, the Nanuuq Commission, with additional support from the National Park Service, has been working with the Union of Marine Mammal Hunters in Chukotka, Russia, to gather traditional ecological knowledge about polar bear habitat use in Chukotka.

Another co-management project involves the collection of samples from polar bears taken by subsistence hunters to facilitate assessment of contaminant levels. During the 1999–2000 hunting season, four sample sets were collected, bringing the total number collected over the past four years to 24. The Service has obtained preliminary results from the analyses of these samples, which indicate that organochlorine levels do not appear high, when compared with concentrations found in bears from other polar regions. However, some concentrations of hexachlorocyclohexane (HCH) found in samples from polar bears in the Chukchi, Bering, and Beaufort Seas are among the highest reported in the Arctic region. With respect to heavy metal concentrations found in Alaskan polar bears, mercury levels were lower and cadmium and copper levels were somewhat higher than those reported in bears from western Canada.

Marking, Tagging, and Reporting Program

As noted above, the Marine Mammal Protection Act allows Alaska Natives to take marine mammals for purposes of subsistence and for making and selling traditional handicrafts. Under amendments to the Act adopted in 1981, the Fish and Wildlife Service and the National Marine Fisheries Service have specific authority to establish marking, tagging, and reporting programs to monitor Native harvests of marine mammals. The Fish and Wildlife Service issued regulations in 1988 establishing such programs for sea otters, walruses, and polar bears. The purposes of those programs are to estimate annual harvest levels, obtain biological data needed to manage the species and stocks, and help control illegal trade in products from those species.

The Service's regulations require that, within 30 days of taking a polar bear, walrus, or sea otter, Native hunters must report the take to an authorized Service agent and present specified parts, including polar bear hides and skulls, to be marked and tagged. Since promulgating its regulations, the Service has worked closely with Native groups to implement the program. Data obtained from the program are maintained by the Service in a computerized database. During the harvest year running from 1 July 1999 to 30 June 2000, 39 polar bears were presented for marking and tagging by Alaska Natives. The numbers of polar bears tagged during each harvest year since inception of the program are shown in Table 7.

Table 7. Numbers of polar bears tagged during Alaska Native harvests, 1989–2000

Harvest Year	Number Tagged	Harvest Year	Number Tagged
1989/90	99	1995/96	40
1990/91	76	1996/97	69
1991/92	59	1997/98	49
1992/93	66	1998/99	90
1993/94	121	1999/00	39
1994/95	92	2000/01	–

Source: U.S. Fish and Wildlife Service.

Agreement on the Conservation of Polar Bears

As noted earlier, polar bears occur throughout the Arctic in relatively discrete stocks that overlap national boundaries. Thus, effective conservation of polar bears requires international cooperation. In 1973 the governments of Canada, Denmark (for Greenland), Norway, the Soviet Union, and the United States concluded the Agreement on the Conservation of Polar Bears. The Agreement was prompted by growing concern about the possible effects of sport and commercial hunting of polar bears, which had increased in the 1950s and 1960s, and the potential effects of industrial activities.

The Marine Mammal Commission and others have questioned whether the Marine Mammal Protection Act or other domestic statutes provide sufficient legal authority for the United States to implement fully all provisions of the Agreement, particularly those related to habitat protection. Accordingly, in 1992 the Commission contracted for an examination of the Agreement's provisions, the Marine Mammal Protection Act, and other domestic legislation to identify possible inconsistencies and provide suggestions as to how inconsistent provisions of the Agreement and the Act might be reconciled. The report of that study was provided to the Fish and Wildlife Service in January 1994 and was subsequently updated to reflect amendments to the Marine Mammal Protection Act enacted in 1994 (see Baur 1995, Appendix B).

In response to concerns that the Agreement may not have been implemented fully by the United States and other parties, Congress amended section 113 of the Marine Mammal Protection Act in 1994 to require the Secretary of the Interior to initiate a review of the effectiveness of the Agreement and to work with the contracting parties to establish a process by which future reviews of the Agreement would be conducted. The amendments also required that the Secretary of the Interior, in consultation with the Secretary of State and the Marine Mammal Commission, review the effectiveness of U.S. implementation of the Agreement, particularly with respect to habitat protection. A report on the results of that review was to be submitted to Congress by 1 April 1995.

In June 1995 the 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 provisions of the Agreement and with a resolution adopted by the Parties to the Agreement concerning the taking of female bears, cubs, and denning bears. However, as of the end of 2000, the report had yet to be finalized and trans-mitted to Congress.

Section 113 of the Marine Mammal Protection Act also directs the Secretary of the Interior to consult with contracting parties to review the effectiveness of the Agreement on the Conservation of Polar Bears. In May 1997 the Fish and Wildlife Service wrote to the other parties seeking their assistance in conducting the review. The Service received final reviews from Canada, Norway, and Greenland, but, as of the end of 2000, was waiting for a final response from the Russian Federation. A preliminary response from Russia suggested that there may be some sentiment to open 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 as to what further review is needed.

Bilateral Polar Bear Agreements

As discussed earlier, two discrete polar bear stocks occur in Alaska, and both are shared with other countries. The northern (Beaufort Sea) stock is shared with Canada and the western (Chukchi/Bering Seas) stock is shared with Russia. Efforts to develop and implement cooperative programs with these countries for the management and conservation of polar bears are discussed below.

North Slope Borough/Inuvialuit Polar Bear Agreement – Native hunters in both Alaska and northwestern Canada have traditionally hunted polar bears in the Beaufort Sea area. Because both groups were targeting polar bears from the same stock, unregulated hunting, by itself and in combination with other activities, could have caused the stock to decline. Recognizing this possibility, the Fish and Game Management Committee of Alaska's North Slope Borough and the Inuvialuit Game Council of Canada's Northwest Territories entered into an agreement in January 1988 to govern cooperatively the hunting of polar bears in the area between Icy Cape, Alaska, and the Baillie Islands, Canada.

The agreement is more restrictive than the Marine Mammal Protection Act because it calls for protecting cubs, females with cubs, and all bears inhabiting or constructing dens, and prohibits airborne hunting. Other provisions of the agreement prohibit hunting at certain times of the year and provide that a harvest quota, based on the best available scientific evidence, be established annually. Quotas are allocated equitably between Natives in Alaska and Canada, and data are collected and shared on the number, location, age, and sex of bears killed.

Although the agreement is not legally binding, both Alaska and Canadian Natives have largely complied with the mutually agreed conservation measures. The subsistence harvest of Beaufort Sea polar bears has remained well below the calculated sustainable level, and the take of female bears and cubs has been reduced significantly since establishment of the agreement. After more than 10 years of experience with the agreement, it is considered to be a model for cooperative, voluntary management of a resource by user groups.

The parties to the agreement held a meeting of commissioners and technical advisors on 3–4 March 2000, in Inuvik, Canada. At that meeting, the agreement was modified to clarify that annual sustainable harvest levels are to be determined by the commissioners, in consultation with the technical advisory committee. Another amendment specified that prior notification of and consultation with the commissioners is required before undertaking research projects under the agreement.

U.S.–Russian 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. In 1992 the Fish and Wildlife Service's Alaska Regional Director and a representative of the Russian Ministry of Ecology and Natural Resources signed a protocol stating the parties' intentions to conclude a bilateral agreement on the conservation and regulated use of polar bears from the shared stock. The protocol called on both governments to create special working groups

composed of representatives of government agencies and Native communities to prepare proposals for such an agreement and to convene a meeting of the working groups to prepare a draft agreement.

The 1994 amendments to the Marine Mammal Protection Act added a new provision, section 113(d), which specifically addresses conservation of the shared U.S.–Russian polar bear stock. The provision directed the Secretary of the Interior, in consultation with the 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 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. As a result of those discussions, the parties signed the Protocol on U.S./Russia Technical Consultation for the Conservation of Polar Bears of the Chukchi/Bering Sea Regions on 9 September 1994. Further scientific and technical discussions concerning the proposed government-to-government agreement were held with Russian officials during 1995 and 1998, culminating in the adoption, on 12 February 1998, of an ad referendum text of a bilateral agreement for submission to the two national governments for approval. Participants in those negotiating sessions included both government officials and representatives of the affected Native communities. The U.S. delegations included a representative of the Marine Mammal Commission.

After reviewing that text, the U.S. Department of State suggested minor revisions, which were forwarded to the Russian Federation for consideration in 1998. In July 1999 the Russian Federation forwarded it suggestions for additional changes to the U.S. Department of State and the Department of the Interior. Following review of the revisions suggested by Russia, the two agencies wrote jointly to the head of the Russian State Committee for Environmental Protection on 8 December 1999 indicating that some of the proposed modifications reflected a significant departure from the principles worked out at the February 1998 meeting. The letter stated that, although some of the technical revisions proposed by the Russians were agreeable, others were not acceptable to the United States. Subsequently, it was agreed that a further negotiating session was needed to work out these differences.

A final round of face-to-face negotiations was held in Anchorage, Alaska, on 7–9 March 2000. The U.S. delegation, headed jointly by the Fish and Wildlife Service and the Department of State, included a representative of the Commission, Alaska Natives, and a representative of an Alaska-based conservation organization. These negotiations re-sulted in a new text that was circulated for approval within the respective governments and provided to the other three parties to the Agreement on the Con-servation 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 by the parties in Washington, D.C., on 16 October 2000. The text of the agreement and related information can be found at the web site maintained by the Fish and Wildlife Service's Alaska Region (http://www.r7.fws.
gov/ea/pbsigning/). Before the Agreement enters into effect, the advice and consent of the Senate is needed. It is expected that the Agreement, along with proposed implementing legislation, will be transmitted to the Senate for its consideration early in 2001.

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 Native representative from each jurisdiction—is to establish annual taking limits that may not exceed the sustainable harvest level determined for the stock. The allowable taking limit will be divided equally between the two parties, but, subject to approval by the joint commission, one party may transfer a portion of its allowable take to the other party. It is expected that the joint com-mission 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.

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 amend-ments 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 bears in 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 the 12 Canadian polar bear management units met the Marine Mammal Protection Act's criteria and that parts from those subpopulations could be imported. The management units from which imports were originally authorized included the southern Beaufort Sea, the northern Beaufort Sea, Viscount Melville Sound, western Hudson Bay, and M'Clintock Channel. A key feature of the final rule was establishment of a $1,000 permit issuance fee, in addition to a $25 processing fee, to be used for polar bear conservation activities.

As discussed in previous annual reports, the regulations were not well received by hunters, who expected findings also to be made for other management units, or by animal welfare groups, who believed the Service had erred by making any affirmative findings. This prompted the House Resources Committee to convene a hearing early in 1997 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.

Shortly after publication of the final regulations in February 1997, the Commission requested and received from the Service additional information on Canada's polar bear program. Among other things, Canada had revised the boundaries of some polar bear management units. What previously had comprised three management units (Queen Elizabeth Islands, Parry Channel, and Baffin Bay) had been realigned into smaller Baffin Bay and Queen Elizabeth Islands units and three new management units (Kane Basin, Lancaster Sound, and Norwegian Bay). In light of the new information, the Commission contracted for a review of Canada's polar bear management program, particularly as it relates to the current status and sustainability of those populations for which the Fish and Wildlife Service deferred making findings under the 1997 final rule (see Testa 1997, Appendix B).

The Commission transmitted a copy of the contract report to the Service in late April 1997 and, based on the information in the report and its independent review of the available data, recommended that the Service initiate a rulemaking to make affirmative findings for the Lancaster Sound and Norwegian Bay management units. The Service considered this recommendation and, on 2 February 1998, published a proposed rule to make affirmative findings for these two management units. A final rule allowing the import of polar bear trophies from the Lancaster Sound and Norwegian Bay management units was published by the Service on 11 January 1999. Approval of the Baffin Bay and Kane Basin populations was deferred pending the establishment of cooperative management arrangements between Canada and Greenland. The Service also deferred making a finding on the revised Queen Elizabeth Islands population that now contains land only in the far northern part of the Canadian Arctic archipelago.

In October 2000 the Fish and Wildlife Service received a report from the Canadian Wildlife Service concerning the status of the M'Clintock Channel polar bear population. That report indicated that a new survey of this population had begun in 1998 to update the population estimate from 1978, which was being

used in setting harvest limits. Based upon a preliminary analysis of three years of data from the survey, it appeared that the population size was lower than originally believed (the best estimate was 288 bears) and that the sex ratio of the adult population was heavily skewed toward female bears (65 percent females). The analysis in the report explained that these data suggest that the adult male population had been reduced by hunting and that any continuing harvest would be increasingly composed of adult females. The report projected that, at the current rate of exploitation, the population would be extirpated within 10 years. The report concluded that the M'Clintock Channel polar bear population should be considered depleted and recommended that the maximum sustainable harvest level be reduced from 32 to 8 bears per year. However, even at that reduced level, the removal of bears would not allow the population to recover. Therefore, the territorial government of Nunavut initiated discussions with local communities to establish new harvest limits before the onset of the hunting season in February 2001.

In response to the information it had received from the Canadian authorities, the Fish and Wildlife Service began an expedited review of its finding under which imports of polar bear trophies taken from the M'Clintock Channel management unit were authorized. The Service wrote to the Commission on 13 December 2000, indicating its intent to amend its regulations to rescind the approval of imports from this population. Under the anticipated amendment, imports of polar bears taken by U.S. hunters from M'Clintock Channel after the 1999–2000 hunting season would no longer be permitted. The Service indicated its intent to publish an emergency interim rule early in 2001 to implement the change before the next hunting season.

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. During 2000 the Fish and Wildlife Service updated the draft status review with recent data obtained from Canada, including new information on the M'Clintock Channel population. As of the end of 2000, however, the review had yet to be completed. The Fish and Wildlife Service expects to finalize the status review in 2001.

Since regulations authorizing the import of polar bear trophies went into effect in 1997, 411 import permits have been issued. Of these, 132 were issued in 1997, 60 in 1998, 143 in 1999, and 76 in 2000.

Sea Otter (*Enhydra lutris*)

Sea otters occurred historically in shallow, coastal waters along the rim of the North Pacific Ocean from Hokkaido in northern Japan, north and east along the Kurile Islands, the Kamchatka Peninsula, the Commander Islands, the Aleutian Islands to the Gulf of Alaska, and south along the west coast of North America to Baja California, Mexico. The species was driven to near extinction by commercial hunting that began in the mid-1700s and continued intermittently until 1911 when hunting was prohibited under the terms of the North Pacific Fur Seal Convention. By that time only a few thousand animals remained from pre-exploitation populations estimated to have totaled between 150,000 to 300,000 individuals. These were scattered in small remnant colonies in Russia, Alaska, British Columbia, and central California.

Since protection was provided in 1911, sea otters have recolonized or have been reintroduced into much of their historic range. By the early 1990s the California population had recolonized more than 200 miles of its historic range and grown from perhaps as few as 50 otters to more than 2,000 (an average annual growth rate of about 5 percent). Remnant groups in Alaska grew even more rapidly and, in the late 1960s and early 1970s, several hundred otters were moved from Amchitka Island and Prince William Sound to reestablish populations in southeastern Alaska and the outer coast of Washington. In 1995 the Fish and

Wildlife Service estimated that there were approximately 100,000 sea otters in Alaska, more than 2,300 in California, and more than 300 in Washington, and that all of the populations were continuing to grow. Since then, however, both the California and Aleutian Islands populations have declined, the latter by 70 percent or more.

Efforts by the Marine Mammal Commission and others to protect sea otters and their habitats since the Marine Mammal Protection Act was passed in 1972 are described in previous annual reports. Background information and efforts in the past year by the Commission and others to determine the cause or causes of recent population declines and steps neces-sary to stop and reverse them are described below.

The Alaska Sea Otter Population

As noted in previous annual reports, the Fish and Wildlife Service advised the Commission in 1996 that, for unknown reasons, there had been a dramatic decline in the number of sea otters in the area around Adak Island in the central Aleutians. At its annual meeting in November 1997 in Fairbanks, Alaska, the Commission was advised that declines may have occurred at other islands as well and that the Biological Resources Division of the U. S. Geological Survey had not received the funding it had requested for studies to determine the geographic extent and cause of the decline. At its November 1998 annual meeting in Portland, Maine, the Commission was advised that the Division had undertaken some of the studies necessary to assess possible causes of the decline, but that funding for abundance surveys necessary to document the magnitude and extent of the decline had not been available. Further, the Commission was advised that killer whale predation appeared to be the most likely cause of the decline.

At the Commission's annual meeting in October 1999 in Seaside, California, representatives of the Fish and Wildlife Service and the Biological Resources Division of the U.S. Geological Survey reported that the sea otter decline in the Aleutians was continuing and that, although the geographic extent of the decline had not yet been determined, abundance in some areas had declined by an order of magnitude. The Commission also was advised that, although a range-wide survey had been planned to determine the magnitude and geographic extent of the decline, funding to carry it out had not been obtained. Believing that reliable information on the magnitude and extent of the decline was critically needed, the Commission recommended in a letter dated 23 November 1999 that the Service reprogram funds, seek a supplemental appropriation, or take such other steps as necessary to conduct a census of sea otters throughout their range in Alaska in the spring or early summer of 2000. The Commission also recommended that the Service consult with the National Marine Fisheries Service to determine if the abundance, general condition, or feeding behavior of killer whales in or near the area of the sea otter decline has changed and to explore the possibility of conducting a killer whale survey along with the recommended range-wide sea otter survey.

The Service responded to the Commission's recommendations by letter of 18 January 2000. The letter indicated that the Service shared the Commission's concerns regarding the decline, that funding had been obtained to conduct an aerial survey of the Aleutian archipelago in spring 2000, and that funding also was being sought to survey the Alaska peninsula and the Kodiak archipelago. The letter indicated that the Service was working with Russian colleagues to include the Commander Islands in the Aleutian survey and to find funding to continue boat surveys of sea otters in the Commander Islands. Further, the letter indicated that the National Marine Fisheries Service was not conducting killer whale studies in the Aleutians and that, as one of its co-management projects with the Alaska Sea Otter and Steller Sea Lion Commission, the Fish and Wildlife Service had enlisted the aid of a killer whale expert to train local Native residents to collect information on killer whale/sea otter interactions in Alaska.

The aerial survey of the Aleutian Islands was carried out in the spring of 2000 as planned. The number of sea otters seen was approximately 70 percent less than the number seen during a comparable survey in 1992 (2,442 vs. 8,048). The decline was already under way in 1992, and current densities in the western and central Aleutians are 90 percent less than the estimated equilibrium densities in the mid-1960s. The Service estimates that as few as 6,000 otters may remain in the entire Aleutian chain, down from an estimate of between 50,000 and 100,000 otters in the

1980s. Funding was not available to survey the Alaska peninsula and the Kodiak archipelago, and thus it is not known whether there have been similar declines in these areas. Also, available data are insufficient to confirm whether the decline has been due to increased killer whale predation, as hypothesized, or due to some other factor or combination of factors.

Because of the magnitude of the decline and the uncertainty as to its cause, the Fish and Wildlife Service designated sea otters in the Aleutian Islands as a candidate species under the Endangered Species Act on 22 August 2000. The Service has requested funds for fiscal year 2002 to prepare a proposed rule to list the northern sea otter in the Aleutian Islands as either threatened or endangered. The Commission believes that this is a necessary action and early in 2001 will consult with its Committee of Scientific Advisors and other experts to determine what more reasonably can be done to stop and reverse the decline.

The California Sea Otter Population

As noted in previous Commission reports, the remnant sea otter population in California was listed as threatened under the Endangered Species Act in January 1977, and in February 1982 the Fish and Wildlife Service adopted a recovery plan incorporating a zonal management strategy recommended by the Commission. The zonal management strategy was intended to do two things: (1) minimize the risk of an oil spill endangering the population by establishing one or more colonies in areas where they could not be affected by an oil spill affecting the parent population, and (2) minimize the impacts of sea otter range expansion on commercial and recreational shellfish fisheries by preventing otters from recolonizing areas where valuable fisheries for abalone and other principal sea otter prey species had developed in their absence. The action also was intended to establish a database for identifying the optimum sustainable population level for the California sea otter population.

Implementing the zonal management strategy required capturing and moving otters to a designated translocation zone and removing them from no-otter fishery zones. At the time the translocation was being considered, the Marine Mammal Protection Act prohibited the taking of species listed as depleted under the Act or as endangered or threatened under the Endangered Species Act for purposes other than scientific research. Therefore, to provide authority to implement this aspect of the recovery plan, Congress enacted Public Law 99-625. This law, enacted in 1986, authorized the capture and relocation of sea otters to establish at least one colony outside the population's then-existing range in California. It directed the Fish and Wildlife Service to establish a translocation zone that would meet the habitat needs of the translocated animals and provide a buffer against activities in nearby areas that could affect them. It also specified that the area around the translocation zone be designated as a management zone from which otters would be excluded by nonlethal means to protect fishery resources.

In response to the law, the Service, in consultation with the Marine Mammal Commission, the California Coastal Commission, and the California Department of Fish and Game, developed a plan and promulgated regulations to establish a reserve sea otter colony at San Nicolas Island, one of the California Channel Islands. As part of the process, the Service prepared an environmental impact statement, prepared a biological opinion in accordance with section 7 of the Endangered Species Act, and signed a Memorandum of Understanding with the California Department of Fish and Game setting out responsibilities for the translocation and related activities.

Between August 1987 and July 1990, 140 otters were moved from the mainland California range to San Nicolas Island. Most of these animals subse-quently left the translocation zone or disappeared. Although a minimum of 60 pups is known to have been born in the translocation zone, the colony has not grown and on average has numbered fewer than 20 individuals. The reason for the lack of growth is unknown. The possibilities include mortality from natural causes, entrapment in fishing gear, illegal shooting, and dispersal of otters from the island.

When it was listed as threatened in 1977, the California sea otter population was believed to be increasing at about 5 percent per year and was ex-pected to continue to increase at that rate until it had

Table 8. California sea otter population counts, 1984–2000

Year .		Independent Otters	Dependent Pups	Total
1984	Spring	1,180	123	1,303
	Fall	–	–	–
1985	Spring	1,119	242	1,361
	Fall	1,065	150	1,215
1986	Spring	1,358	228	1,586
	Fall	1,091	113	1,204
1987	Spring	1,435	226	1,661
	Fall	1,260	110	1,370
1988	Spring	1,504	221	1,725
	Fall	–	–	–
1989	Spring	1,571	285	1,856
	Fall	1,492	115	1,607
1990	Spring	1,466	214	1,680
	Fall	1,516	120	1,636
1991	Spring	1,700	241	1,941
	Fall	1,523	138	1,661
1992	Spring	1,810	291	2,101
	Fall	1,581	134	1,715
1993	Spring	2,022	217	2,239
	Fall	1,662	143	1,805
1994	Spring	2,076	283	2,359
	Fall	1,730	115	1,845
1995	Spring	2,095	282	2,377
	Fall	2,053	137	2,190
1996	Spring	1,963	315	2,278
	Fall	1,858	161	2,019
1997	Spring	1,919	310	2,229
	Fall	2,008	197	2,205
1998	Spring	1,955	159	2,114
	Fall	1,726	211	1,937
1999	Spring	1,858	232	2,090
	Fall	1,808	162	1,970
2000	Spring	2,053	264	2,317
	Fall	1,678	199	1,877

Source: U.S. Fish and Wildlife Service, California Department of Fish and Game, and U.S. Geological Survey.

recolonized most or all of its former range. However, subsequent studies supported by the Commission (see Bishop 1985, Henry 1986, and Hatfield 1991, Appendix B) and others found that the population was not growing and that substantial numbers of otters were being caught and killed in coastal gill and trammel net fisheries. Large numbers of seabirds and other non-target species also were being caught and killed in these fisheries, and in 1982 the State of California enacted regulations prohibiting use of gill and trammel nets in areas where seabirds, sea otters, and other marine mammals were known to be caught. Following enactment of these regulations, the sea otter population began to grow again. The expected resumption of range expansion was one of the factors that led to enactment of Public Law 99-625 and adoption of the zonal management program described earlier

As indicated in Table 8, the numbers of sea otters counted during the annual spring and fall surveys declined during the period between 1995 and 1999. Also, since the spring of 1998 significant numbers of otters have moved in and out of the sea otter management zone south of Point Conception that was to be kept otter-free under the regulations governing the translocation. The cause or causes of the decline in abundance and changes in distribution have not been determined but may include incidental take in new live-trap fisheries or the gill and trammel net fisheries, new or unusual diseases such as encephalitis, new or increasing levels of anthropo-genic chemical contaminants such as butyltin, and habitat degradation due to temporary or long-term climate change or otter densities exceeding carrying capacity levels. Possible causes of the movement of animals in and out of the management zone include the natural process of range expansion and degrada-tion of habitat in the existing population range as a consequence of any of the factors noted previously.

Because of the death of some otters after their removal from the management zone and other factors, the Fish and Wildlife Service stopped capturing and removing otters from the management zone in 1993, as required by their regulations, pending consultations with the affected stakeholders. In August 1998 the Service held public meetings in Santa Barbara and Monterey to seek public input concerning possible management options. At the meetings, the Service announced that it was reinitiating consultation

pursuant to section 7 of the Endangered Species Act to reexamine the translocation and containment program in light of the new information summarized above. In March 1999 the Service made available for public review and comment a draft evaluation of the Southern Sea Otter Translocation Program and a draft memorandum concerning reinitiation of formal (ESA section 7) consultation on the containment program of the southern sea otter. These drafts set forth the Service's preliminary determinations that (1) the translocation program should be declared a failure; (2) the zonal management concept should be abandoned; and (3) sea otters should be allowed to naturally recolonize their former range, both to the north and to the south of the existing California range, at least until the population is removed from the List of Endangered and Threatened Species. The action appears to have been precipitated, at least in part, by a 4 August 1998 letter from the Friends of the Sea Otter to the Service expressing concern about the effects and effectiveness of zonal management.

The Service provided the Commission with prepublication drafts of these two documents and, as noted in its previous annual report, the Commission returned comments to the Service on 1 April 1999. State agencies, environmental groups, fisheries groups, and others with related interests received and commented on a later draft. In general, environmental groups supported and fisheries groups opposed the Service's preliminary determinations that the translocation program should be declared a failure and the zonal management strategy should be abandoned.

Most of the otters that moved south into the management zone in the spring of 1998 moved north out of the zone later that year. However, more than 100 otters moved into the management zone the following spring and remained there throughout the summer. Believing that the Fish and Wildlife Service was obligated to remove these otters from the management zone, the Commercial Fishermen of Santa Barbara, Inc., and the California Abalone Association, Inc., advised the Secretary of the Interior and the Director of the Fish and Wildlife Service by letter of 26 August 1999 that they were prepared to file suit against the Department and the Service if the otters were not removed in accordance with the regulations imple-menting Public Law 99-625. The Friends of the Sea Otter, on behalf of itself and several other environ-mental groups, subsequently advised the Secretary and the Director that they believed further containment efforts would jeopardize the population and were prepared to take legal action, if necessary, to stop the removal of otters from the management zone.

Because of the uncertainties and conflicting views regarding the status and management of the California sea otter population, the Commission and its Committee of Scientific Advisors held their 1999 annual meeting in California and invited repre-sentatives of the state and federal agencies and the environmental and fisheries groups with related interests and responsibilities to attend the meeting and present information and views regarding the various issues. From the information presented at the meeting, held 19–21 October, it was clear that it was not known why the attempt to establish a reserve sea otter colony at San Nicolas Island had been unsuc-cessful, why the mainland population was declining, or what had caused the movement of otters into and out of the management zone south of Point Con-ception in 1998 and again in 1999. It also was clear that funding and personnel constraints had limited what could be done to resolve these uncertainties.

After the meeting, the Commission, in con-sultation with its Committee of Scientific Advisors, developed and on 23 December 1999 forwarded to the Fish and Wildlife Service a draft action plan to promote recovery of and identify the optimal conservation strategy for the California sea otter population. The document explained the rationale for 12 tasks that the Commission and Committee believed should be undertaken as soon as possible to resolve the previously noted uncertainties and to identify actions necessary to restore and maintain the population at its optimum sustainable level, as required by the Marine Mammal Protection Act. In its transmittal letter the Commission recommended that the Service convene a meeting of appropriate repre-sentatives of agencies and organizations with related interests and responsibilities to (1) review and assign priorities to tasks identified in the Commission's draft action plan and in the Service's draft update of the Southern Sea Otter Recovery Plan, which was to be released for public comment early in 2000; (2) identify ongoing or additional research, monitoring, and management

programs that should be afforded priority consideration; (3) reach agreement on the agencies and groups to be responsible for the various tasks; (4) determine when the various tasks could be initiated and completed in light of funding or other constraints; and (5) if available funding was insufficient to begin implementing priority tasks immediately, determine and take such steps as necessary to obtain the funding required to undertake the critically important tasks in fiscal year 2000.

The Service advised the Commission by letter of 14 February 2000 that the draft revision of the Southern Sea Otter Recovery Plan had been released for public comment on 8 February. On 6 March representatives of the Commission and the Service met to discuss the recommendations in the Commission's draft action plan as they related to recommended actions in the Ser-vice's draft recovery plan revision. It was agreed that the Commission would review and provide comments on the recovery plan revision as quickly as possible.

The Commission, in consultation with its Committee of Scientific Advisors, subsequently did so and on 3 April 2000 forwarded comments to the Service. The Commission noted that, although the draft recovery plan identified the range of activities necessary to assess and address factors jeopardizing the population and its habitat, it was not clear what precisely the Service was actually proposing or recommending be done. The Commission also noted that the draft 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 recom-mended that the revision be restructured to give priority to measures necessary to stop and reverse the decline.

On a related matter, the Commission indicated its understanding that the Service had not consulted the agencies and organizations listed in the draft recovery plan revision as being responsible for various tasks to determine whether they agreed with the priorities and responsibilities as listed. The Commission recommended that, if this was the case, the Service should convene a meeting of representatives from the agencies and organizations listed in the draft implementation schedule to review and agree on priorities and responsibilities for conducting the research and recovery activities referenced in the draft. The Commission noted that the draft implementation schedule could be used as the agenda for the meeting and indicated that it saw no reason why such a planning meeting should not be held before completing the recovery plan revision. With regard to the last point, the Commission pointed out that the meeting results could be used to help finalize the recovery plan revision and to develop a comprehensive plan for implementing it. The Commission also pointed out that the Service's efforts to update and implement the recovery plan had been hampered by the lack of a full-time recovery program coordinator and it therefore recommended that an appropriately qualified individual be hired, contracted with, or appointed to fill that position.

On 21 April 2000 the Commercial Fishermen of Santa Barbara, Inc., and several other groups and individuals filed suit in the U.S. District Court for the Central District of California seeking to compel the Fish and Wildlife Service to remove sea otters that entered the designated management zone south of Point Conception. The plaintiffs contend that the Service's failure to do so violates the provisions of the regulations promulgated by the Service to implement Public Law 99-625. At the end of the year, the court had not yet considered the matter.

As noted earlier, in March 1999 the Service published a draft memorandum concerning re-initiation of formal (ESA section 7) consultation on the containment program of the southern sea otter. On 20 July 2000 the Service released the final product of the consultations, a biological opinion concluding that "the continued existence of southern sea otters is likely to be jeopardized by removing them from the area of the Pacific Ocean south of Point Conception on the California coast to the U.S.–Mexican border and relocating them to the north of this designated 'otter-free' management zone." In a press release issued the same day, the Service indicated that it would begin a comprehensive review under the National Environmental Policy Act to determine whether the translocation and containment program should be continued, modified, or terminated.

At the end of the year, it was the Commission's understanding that the Service was completing the update of its Southern Sea Otter Recovery Plan and a draft supplement to the environmental impact statement originally completed in 1987 when the Service was developing the regulations to implement

Public Law 99-625, and that these documents would be published early in 2001.

Florida Manatee (*Trichechus manatus latirostris*)

Florida manatees, a subspecies of the West Indian manatee, occur only in the southeastern United States, which is the northern limit of the species' range. Florida manatees live in coastal bays and rivers and rarely venture into nearshore ocean waters. West Indian manatees are distributed along the tropical and subtropical Atlantic coastline from the southeastern United States to Brazil, including the Greater Antilles in the Caribbean Sea. They are listed under the Endangered Species Act as endangered throughout their range. Because of the limited conservation efforts and magnitude of threats elsewhere in the species' range, the conservation of Florida manatees is particularly important in assuring the species' long-term survival.

Prolonged exposure to water temperatures below 65°F (18°C) can be lethal to manatees, particularly calves. As a result, most Florida manatees overwinter in the central and southern parts of the Florida peninsula, where they typically remain near natural or artificial warm-water sources, such as thermal springs and power plant outfalls, or areas where ambient water temperatures remain above 65°F. As water temperatures rise in spring, manatees disperse throughout Florida. By summer, a few animals typically move north into Georgia and the Carolinas along the Atlantic coast and at least as far west as Louisiana along the Gulf of Mexico coast. Most manatees, however, remain in Florida year-round. Like all manatees, Florida manatees are herbivores that feed on aquatic vegetation.

The status of Florida manatees before the 1970s is poorly known. Based on the few historical references to manatees in Florida, their numbers are thought to have been significantly reduced by commercial and subsistence hunting, particularly in the 1800s. As one of the earliest species conservation measures in the United States, the State of Florida passed a law in 1893 prohibiting the killing of manatees.

Research on Florida manatees did not begin in earnest until the mid-1970s. At that time, a crude population estimate based on very limited data placed their number at perhaps 600 to 1,000 animals. Late in the 1970s regular manatee counts were begun at major warm-water refuges during winter cold periods when they aggregate in greatest numbers at these sites. Based on maximum counts made within a few days of each other at major refuges, a new minimum abundance estimate of about 1,200 animals was developed, and this figure was generally accepted through most of the 1980s.

In 1989 the State of Florida began conducting synoptic statewide manatee counts using aircraft surveys and, at some locations, ground counts. These are conducted during winter cold spells and focus mainly on known warm-water refuges and surrounding areas. The results offered a new basis for estimating the minimum population size. The highest single count from these surveys, 2,639 manatees, was obtained in February 1996 shortly before an unprecedented die-off of about 150 manatees during a red tide episode in the spring of that year. The counts indicate that approximately equal numbers of manatees occur on the east and west coasts of Florida. From radio-tagging studies and manatee photo-identification records, it appears that animals rarely move between the east and west coasts of Florida. In 2000 two statewide surveys yielded counts of 1,629 on 16–17 January (621 on the east coast and 1,008 on the west coast) and 2,222 manatees on 27 January (1,131 on the east coast and 1,091 on the west coast).

Because manatees are difficult to see in turbid estuaries and rivers typical of most of their habitat, it has not been possible to estimate the number of manatees away from warm-water refuges at the time surveys are made. For the same reasons, it has not been possible to detect year-to-year variations in manatee abundance. Nevertheless, based on increasing counts at major warm-water refuges over the long term, analyses suggest that manatee numbers increased by some uncertain extent during the 1980s and early 1990s.

Trends since the early 1990s, however, may have changed. Florida manatees occur in four relatively discrete groups (Fig. 15) that tend to return to the same warm-water refuges each year: one group now numbering about 125 manatees overwinters at Blue Spring on the upper St. Johns River; another number-

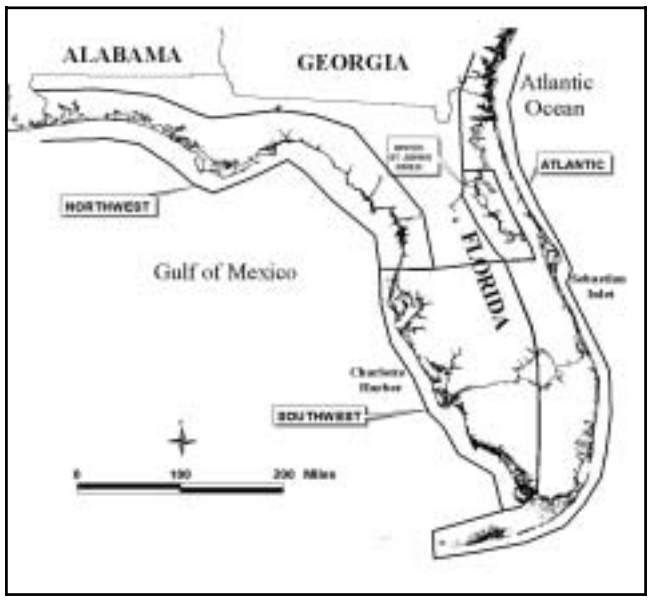

Figure 15. Regional boundaries of Florida manatee subpopulation units (courtesy of Sirenia Project, U.S. Geological Survey).

ing more than 300 animals overwinters at natural warm-water springs at the head of the Crystal and Homosassa Rivers in northwestern Florida; and two larger groups use various artificial warm-water refuges scattered along the Atlantic coast from Cape Canaveral south and along the Gulf of Mexico coast from Tampa Bay south. Analyses of manatee counts and life history data from photo-identified animals suggest that the two smaller groups in the upper St. Johns River and northwestern Florida have been increasing steadily since the 1970s. These increases appear to be due to both immigration from other areas and reproduction. The two larger groups, however, appear to have remained relatively stable in size since the early 1990s and may even have declined slightly.

At the same time, manatee mortality has continued to climb steadily. Average annual mortality in the 1990s was twice that of the 1980s (Table 9), and this trend continued in 2000, when 278 dead manatees were recorded. Totals over the past four years have averaged 46 percent higher than in the early 1990s. When the record high total of 1996 is added (the year in which the red tide die-off inflated total mortality to 416 animals), average annual mortality over the past five years has been nearly 65 percent greater than in the early 1990s.

Watercraft-related mortality, the largest cause of human-related manatee deaths, also has approached or exceeded record levels in each of the last five years and has become a larger proportion of total mortality. Since 1998 watercraft-related deaths have represented about 29 percent of all mortality, a nearly 5 percent jump compared with the early 1990s. A status of manatees has provoked increasingly divergent views about future manatee recovery efforts. On the one hand, increases in manatee abundance although an increase in manatee deaths would be expected during periods of population growth, as apparently occurred in the 1980s and early 1990s, if population growth has leveled off and manatee mortality continues to increase, a decline in abundance is inevitable.

In addition to increasing mortality levels, manatees face serious long-term threats from destruction and alteration of habitat. In the 1950s and 1960s the core of historic manatee habitat, assumed to have been the rivers and nearshore waters in and around the Florida Everglades, was substantially altered by flood control projects. At the same time, power plant construction created new artificial warm-water sources north of the Everglades that attracted overwintering manatees into areas where they could not normally survive. Although those plants have provided safe, reliable winter refuges for manatees for more than 40 years and made available new winter habitat for the population, most of those plants have now reached or exceeded their planned operational life. In addition, steps are being considered to deregulate Florida's electric utilities to increase competition. This could hasten the closure of older plants or cause them to be run sporadically, depending on fluctuating economic conditions. If this occurs, the availability of winter refuges on which most manatees have come to depend will be eliminated or become less reliable and likely will cause a sharp increase in manatee mortality. Because of restrictions on new thermal discharges adopted since those plants were built, new power plant outfalls suitable for manatees cannot be authorized.

In addition, Florida's human population has been increasing at about 1,000 people per day for more than two decades. This has given rise to a major coastal

Table 9. Known manatee mortality in the southeastern United States (excluding Puerto Rico) reported through the manatee salvage and necropsy program, 1978–2000

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 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[5]	79(28)	7(3)	9(3)	58(21)	125(45)	278

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 red-tide event in southwestern Florida.

4 Includes 149 deaths attributed to a spring red-tide event in southwestern Florida.

5 Data for 2000 are preliminary.

Source: Florida Fish and Wildlife Conservation Commission

development boom that continues to alter manatee habitat. For example, grass beds on which manatees feed have been damaged or destroyed by polluted runoff, boat propellers, and waterway dredging and bulkheading. Similarly, quiet, secluded areas for mating, calving, and nursing have been modified by dredging and shoreline development, and exposed to disturbance by increasing vessel traffic. Even natural warm-water springs are being affected. Increased pumping of groundwater for agricultural and household uses has lowered water tables and reduced flow rates at warm-water springs used by manatees.

In recent years, information on the, despite increasing manatee mortality by boats and other

causes, has been cited as evidence that the Florida manatee population is resilient and recovering well and that the level of protection accorded in the past is no longer needed. Some groups therefore have called for downlisting manatees from endangered to threatened, or even removing them entirely from the endangered species list. Some management agencies also have shifted attention from manatees to other endangered species and adopted more lenient positions on initiatives and decisions bearing on manatee protection.

On the other hand, information suggesting that the largest population segments may no longer be increasing and that manatee mortality is continuing to reach new record high levels has prompted concern that Florida manatees could be entering a period of decline with effective means of controlling human-related manatee deaths and habitat alteration yet to be demonstrated. These concerns prompted several environmental groups to jointly file lawsuits late in 1999 alleging that management actions required by federal and state agencies to protect manatees and essential manatee habitat have not been adequate and are now more important than ever.

Responsibility for most manatee recovery work is shared by two federal and two state agencies. The two federal agencies, both within the Department of the Interior, are the Fish and Wildlife Service and the Sirenia Project in the Biological Resources Division of the U.S. Geological Survey. The Service has lead responsibility for manatee recovery under both the Endangered Species Act and the Marine Mammal Protection Act. Among other things, the Service is charged with developing and overseeing implementation of the Florida Manatee Recovery Plan, which identifies all actions deemed important to protect manatees, with ensuring that the issuance of permits and other actions by other federal agencies do not adversely affect manatees or their critical habitat, and with overseeing efforts to rescue and rehabilitate injured manatees. The Sirenia Project has the lead in certain manatee research, including the development of population models, assessments of life history infor-ation from manatee photo-identification records, and research on feeding ecology and habitat needs.

At the state level, the two lead agencies are the Bureau of Protected Species Management and the Florida Marine Research Institute. Both are part of the Florida Fish and Wildlife Conservation Commission, which was created under a reorganization in 1999. The Bureau oversees state regulatory, planning, and public education matters directly related to manatee conservation, including the development of boat speed regulations and manatee protection plans for Florida counties that contain important manatee habitat. The Institute has the lead in certain manatee research, including the manatee carcass salvage and necropsy program, aerial surveys of manatees, coordinating the rescue of injured manatees, and maintaining a geographic information system for archiving and synthesizing data on manatees and manatee habitats.

The manatee recovery program also has relied heavily on the cooperation of other agencies and groups to help carry out important recovery tasks. For example, the Army Corps of Engineers and the South Florida Water Management District developed and secured funding to install devices to prevent manatees from being crushed and drowned in flood gates and navigation locks; the U.S. Coast Guard and the Florida Division of Law Enforcement (formerly the Florida Marine Patrol) has helped enforce boat speed regulatory zones; the Save the Manatee Club has assisted by purchasing equipment, funding research projects, and lobbying state and federal legislatures for funding and actions to support manatee recovery; Florida Power and Light Company has funded surveys of manatee abundance at major power plant outfalls and public education materials on manatees; and various marine aquariums and zoological parks have provided facilities and medical treatment to rehabilitate injured and distressed manatees for release back into the wild. The Marine Mammal Commission has participated in the manatee recovery program by providing periodic support to help start needed projects and determine recovery priorities. The Commission was instrumental in organizing the mana-tee recovery program in the late 1970s and early 1980s, and since then it has conducted periodic reviews of efforts to conserve Florida manatees.

Because of increasingly disparate views about the direction and urgency of work to assist recovery of Florida manatees, extensive efforts were undertaken in 2000 to evaluate and determine future recovery needs and priorities. The Fish and Wildlife Service, with the assistance of the Florida Manatee Recovery Team (a

team composed of representatives from most of the key agencies and groups involved in manatee recovery efforts), completed a revised draft manatee recovery plan that was released for public comment on 30 November 2000. In addition, on 19 October 2000 Florida Governor Jeb Bush convened a "Manatee Summit" bringing together representatives of concerned agencies and groups to clarify and resolve opposing views on manatee conservation needs. The Marine Mammal Commission also conducted a review of the manatee recovery program during its 2000 annual meeting. The results of these and related ac-tivities during 2000 are discussed in the next section.

The Marine Mammal Commission Manatee Review

To help resolve controversy about future manatee recovery needs, the Marine Mammal Commission scheduled its 2000 annual meeting in St. Petersburg Beach, Florida, on 10–12 October and devoted a full day to a review of the major components of the Florida manatee recovery program. Held a few days before the Manatee Summit convened by Governor Jeb Bush, the Commission's review provided an opportunity for the Commission and officials of other agencies and groups to examine recent and planned activities by all major participants in the Florida manatee recovery program. The meeting involved key officials from federal and state agencies, environmental groups, and industry.

After its meeting, the Commission, in consultation with its Committee of Scientific Advisors, wrote a series of letters to involved agencies providing comments and recommendations on manatee recovery needs and priorities. Separate letters were sent on 17 November 2000 to the South Florida Water Management District and the Florida Power and Light Company, and on 1 December 2000 to the Fish and Wildlife Service, the Florida Fish and Wildlife Conservation Commission, the Florida Department of Environmental Protection, and Governor Jeb Bush. The findings of its review are discussed below. As of the end of 2000, replies to most of its letters had not yet been received.

Watercraft-Related Manatee Deaths – The largest cause of human-related manatee mortality is collisions between manatees and watercraft. Although some manatees are caught in propellers or crushed beneath the hulls of tugs and other large ships, most watercraft-related deaths are caused by propellers and impacts of fast-moving recreational boats. In 2000 watercraft deaths approached or exceeded record high levels for the fifth year in a row. To assess related management needs, at its annual meeting the Commission examined past efforts to establish waterway speed zones in areas where manatees are most likely to occur and to ensure that proposals for new boating facilities are not likely to affect manatees or their habitats.

Pursuant to a 1989 directive by the Florida governor and cabinet, the state of Florida has assumed lead responsibility for developing most boat speed regulatory zones to protect manatees. Because boaters cannot easily see and avoid manatees, the speed zones are needed in areas where manatees are most likely to occur to allow manatees time to avoid oncoming boats. Under the 1989 directive, the Bureau of Protected Species Management and county governments were required to enter into what proved to be a contentious rulemaking process to negotiate and adopt speed zones in 13 key Florida counties. In an effort to balance manatee protection and boating interests, the Bureau and counties devised various types of zones based on a waterway-by-waterway analysis of data on manatee movements and boat traffic. The types of zones have included channel-exempt, channel-inclusive, and shoreline speed zones with differing speed limits, high-speed water sports areas, and, in a few cases at major warm-water refuges for manatees, small no-entry areas. In 1999, rules for the last of the 13 counties identified in the 1989 directive were completed. The Fish and Wildlife Ser-vice also has designated manatee sanctuaries and management areas in National Wildlife Refuges important for manatees.

At a cost of several million dollars to develop and post, speed zones for most of the 13 counties have been in effect for several years and cover thousands of miles of waterways. As noted earlier, however, watercraft-related manatee deaths have continued to increase. Although they have undoubtedly prevented some watercraft deaths, the limited effectiveness of speed zones to date may be due to poor compliance. To assess this possibility, the Bureau has funded boater compliance studies in several counties. The results suggest that compliance rates, at least in some

Figure 16. Enforcement patrol at manatee speed zone in Crystal River, Florida (photo courtesy of Florida Fish and Wildlife Conservation Commission, Division of Law Enforcement).

key waterways, have been poor, particularly among operators of small boats. In Sarasota County, for example, compliance studies suggest that operators of more than half of all boats less than 12 feet long, such as johnboats and personal watercraft, blatantly disregard speed restrictions, and that in some areas, the figure exceeds 75 percent. For vessels greater than 25 feet long, blatant noncompliance levels drop to less than 10 percent. The studies also suggest that compliance rates differ greatly by location due to factors such as enforcement presence, geography, and extent of restriction. They also indicate that regulatory signs in some areas are not easily visible to boaters, thereby contributing to compliance problems.

Until recently, enforcement of boat speed rules in most parts of the state has been lax due to competing responsibilities for the limited available manpower. To help address this, in 1997 the Fish and Wildlife Service began dedicated manatee law enforcement operations (Fig. 16). That year, four to six officers targeted particular stretches of waterway with enforceable signage and histories of poor compliance during five weekend periods. Similar efforts were conducted in 1998 and 1999. For fiscal year 2000 the Service received a special congressional appropriation for manatee enforcement that enabled a fivefold increase in effort. As of September 2000 Service officers had spent more than 300 officer-days on manatee enforcement and conducted 26 operations during which more than 1,400 citations carrying fines of $100 each were issued. Beginning in 1998 the Coast Guard also increased manatee-related enforcement, issuing 259 and 697 citations in 1998 and 1999, respectively. In 2000 the Florida Division of Law Enforcement also

significantly increased its efforts, dedicating more than 13,000 hours to manatee protection zone enforcement.

Because of the reliance that managers have placed on boat speed zones to reduce watercraft-related manatee deaths, enforcement has become one of the highest—if not the highest—priorities for manatee recovery efforts. Although strongly supportive of steps to increase enforcement, the Commission concluded that, to be effective, even greater effort would be required because of the thousands of miles of waterways to be regulated and the need to maintain a continued enforcement presence on the water. Thus, the Commission's 1 December letter to the Fish and Wildlife Service recommended that the Service provide at least $1 million annually over the next five years for manatee enforcement, and that it hire or assign at least four officers to work full-time on the task. Because the Coast Guard and the Florida Division of Law Enforcement also enforce boat speed zones, the Commission also recommended that the Service form an interagency manatee enforcement task force to coordinate enforcement strategies and that the Service ask the other two agencies to assign staff members to participate on the task force and oversee their agencies' manatee enforcement work.

The governor's Manatee Summit also underscored the need for stronger enforcement. At that meeting, a boating industry representative proposed that the state's annual boat registration fee be increased to support hiring 100 additional officers for the Division of Law Enforcement. In light of discussions at both the summit and the Commission's meeting, the Commission wrote to the Florida Fish and Wildlife Conservation Commission, which administers the Florida Division of Law Enforcement, on 1 December expressing strong support for the proposal to secure funding for new officers. The Commission also en-couraged the Florida Conservation Commission to increase support for compliance studies so as to expand them geographically. The Commission noted that video systems now used to monitor automobile traffic might be used to assess vessel traffic levels and boater compliance. To help explore application of this technology, the Commission offered, if funds are available, to help support a pilot project to test various systems.

Planning and Review of New Boating Facilities – New boating facilities can affect manatees in at least two ways. First, their construction can damage or modify grass beds or other habitat vital to manatees. Second, boats using the new facilities can increase or otherwise alter vessel traffic in adjacent waterways. If adjacent waters include habitats regularly used by manatees, new levels and patterns of vessel traffic could increase the risk of manatees being hit. During its annual meeting, the Commission reviewed two approaches used to reduce potential effects of new boating facilities on manatees: the development of countywide manatee protection plans and the review of dredge and fill permits required by the Army Corps of Engineers and the Florida Department of Environmental Protection for waterway construction projects.

Work on county manatee protection plans began in response to the 1989 directive by the Florida governor and cabinet noted earlier. That directive called on the 13 counties required to develop boat speed zones also to prepare manatee protection plans that, in part, would identify sites where boating facilities should and should not be located. In addition to providing protection to manatees, such provisions would provide developers advanced notice of acceptable and unacceptable facility sites. As an incentive for completing the plans, the governor and cabinet adopted an interim policy limiting approval of permits for new boat slips in those counties unless they were consistent with an approved county manatee protection plan.

Work on the plans, however, proceeded slowly. Initial focus was on completing rules for boat speed zones, and planning efforts were deferred by most counties. In addition, the interim policy was subsequently withdrawn, leaving little incentive and no requirement for completing the plans. As a result, only four counties have completed manatee protection plans to date. Also, because no standards or criteria were developed to guide the plan preparation and approval processes, measures in some adopted plans offer little protection and some even omit facility siting provisions.

Meanwhile, the Army Corps of Engineers has continued to send hundreds of permit applications for new boating facilities in manatee habitat to the Fish and Wildlife Service for review pursuant to requirements of section 7 of the Endangered Species Act. That section requires federal agencies, in con-sultation with either

the Fish and Wildlife Service or the National Marine Fisheries Service (depending on the species affected), to use their authorities to help carry out conservation programs for species listed as endangered or threatened. Similarly, state permits required by the Florida Department of Environmental Protection are reviewed by the Bureau of Protected Species Management. This has been a demanding process in which federal and state agencies have sometimes offered conflicting advice on the same projects. In addition, as alleged in the lawsuits filed by environmental groups, the agencies have failed to address the incremental effects of boating facility projects whose individual impact on manatees may be negligible, but whose cumulative impacts could be significant.

To address this situation, Governor Jeb Bush announced on 25 July 2000 that he was reinstating the interim policy adopted in 1989 to limit the approval of permits for new multislip boating facilities in the 13 key counties and called on those counties to complete their manatee protection plans. The Marine Mammal Commission supported the 1989 directive when it was first proposed and continues to believe that county manatee protection plans are needed to protect manatee habitat from cumulative impacts. Therefore, based on discussions at its October annual meeting, the Commission wrote to the Fish and Wildlife Service, the Florida Fish and Wildlife Conservation Commission, and the Florida Department of Environmental Protection on 1 December in support of measures to encourage completion of manatee protection plans. In addition, to help ensure consistency among the planning and permit review processes, the Commission recommended that the three agencies, along with the Army Corps of Engineers, cooperatively develop criteria to distinguish between boating facilities that would be likely to jeopardize manatees or adversely affect their critical habitat and those that would not. It also urged that the same criteria be used as guidance in preparing and approving county manatee protection plans.

Although it was not clear at the end of 2000 what steps might be taken to develop the recommended criteria, late in 2000 Governor Bush and the Florida cabinet signaled an easing of restrictions on new multislip projects in counties without completed manatee protection plans. A few weeks after the Manatee

Figure 17. Power plant outfalls (in roman type) and natural springs (*italics*) used by Florida manatees as major warm-water refuges (i.e., sites with at least one count of 40 or more animals) (figure by Leslie Ward, courtesy of Florida Marine Research Institute).

Summit, the governor and cabinet approved a marina project that had been deferred following the governor's July announcement even though the county in which it was located had not completed a manatee protection plan. In approving the project, it was noted that the county had recently accepted a state grant to begin work on a plan and that the county therefore was making significant progress toward plan development.

Management Strategies for Warm-Water Refuges – If reducing watercraft-related mortality is the most immediate need for manatee recovery, assuring the availability of an optimal network of warm-water refuges may well be the most important and challenging long-term need. Most manatees rely on natural or artificial warm-water refuges to survive cold winter periods (see Fig. 17), and over the past 30 years artificial refuges at power plants have become particularly important. Recent single-day counts at several power plants have exceeded 200 animals, including more than 400 animals at a plant in southwestern Florida in 1996 and more than 500 animals at a plant in Cape Canaveral in 1999.

Although a few manatees use different refuges in different years and some move between refuges within the same winter, most tend to return to the same refuges or group of refuges year after year. Such ingrained patterns of habitat use can place manatees at risk if warm-water sources are eliminated or become unreliable. For example, an industrial outfall used by a small number of manatees in northeastern Florida was eliminated in 1997 after installation of a waste-water diffuser pipe to meet water quality standards. During the first winter after the change, some animals visited the site repeatedly seeking warm water. Finding none, most animals turned to other marginally adequate refuges in the area, rather than move more than a hundred miles south to the nearest warm-water site. That winter, mortality among manatees accus-tomed to overwintering in northeastern Florida in-creased substantially even though it was a compara-tively mild winter. Thus, it seems that manatees are unable to adapt quickly to changes in the availability of warm-water refuges and that elimination of artificial refuges used by large numbers of manatees could result in high mortality.

The dependence of manatees on particular refuges raises difficult long-term issues. Among these are planning for the inevitable shutdown of aging power plants at some future date that will eliminate warm-water outfalls on which large numbers of manatees have come to depend; ensuring that flow rates at natural springs remain adequate to support manatees; preventing manatees from using warm-water outfalls in situations that could threaten their survival (e.g., outfalls too far north of their historic range); minimizing the risk of a large-scale die-off should large numbers of manatees aggregated at a warm-water refuge be exposed to some lethal perturbation; and defining and maintaining an optimal network of warm-water refuges over the long term. During the Commission's meeting, representatives of the Sirenia Project, Florida Power and Light Company, and the Fish and Wildlife Service described recent activities to address these and related issues.

Florida Power and Light Company operates five power plants that provide major warm-water refuges for manatees. For 20 years the company has supported winter surveys of manatees at its power plants and the preparation of educational materials on manatees. Concerned about industry changes that could disrupt outfalls used by manatees, the company recently began examining the possibility of establishing warm-water refuges not dependent on power plants (e.g., small embayments supplied with water heated by solar or geothermal power) that might provide a more secure way of meeting long-term warm-water refuge needs. As a first step, the company funded a study in 2000 to identify possible sites where alternative refuges might be located. Focusing on central and southeastern Florida, the company's main operating areas, the study identified potential sites based on manatee movements, proximity to manatee feeding areas, land use patterns, human population growth projections, and other factors. In 2001 the company plans to sponsor a cash award competition for graduate engineering students to develop conceptual designs for generating warm water for alternative manatee refuges. Based on the results, the company may support further work to examine winning concepts. The Commission considers Florida Power and Light Company's new initiative on warm-water refuges to be both innovative and forward-looking, and on 17 November 2000 it wrote to the company commending it for the constructive and important contributions it was providing to the manatee recovery program.

Over the past two years, the Fish and Wildlife Service also has devoted considerable attention to warm-water refuge needs. On 24–25 August 1999 it convened a workshop with representatives of state and federal agencies (including the Marine Mammal Commission), scientists, industry officials, and environmental groups to discuss research and management actions necessary to ensure the availability of both natural and artificial warm-water refuges for manatees. The participants reviewed relevant data and developed a series of recommendations that included establishing an interagency task force to oversee the maintenance of a safe, reliable network of warm-water refuges; enhancing manatee access to natural springs currently unused or underutilized; investigating the feasibility of developing nonindustry-dependent artificial refuges; developing strategies to wean manatees from reliance on power plants scheduled to be closed without causing cold-related manatee mortality; and preventing the creation of new industry-related refuges north of the species' historical winter range.

Although a final workshop report was not expected to be available until late 2000, it was apparent at the Commission's meeting that actions already had been taken to address many of the workshop recommendations. The Service established a warm-water task force, which met twice in 2000. The Service also began examining opportunities to enhance manatee access to natural warm-water springs, including Homosassa Springs (see later in this section), and as noted earlier, Florida Power and Light Com-pany took steps to explore the feasibility of creating nonindustry-dependent warm-water refuges that might eventually replace warm-water outfalls from power plants. In addition, Florida's water management districts have recently begun work to address a directive by the state legislature to establish and maintain minimum flow rates at natural springs. As an initial effort to address this mandate, the Service, the State Bureau of Protected Species Management, and other agencies have asked the St. Johns River Water Management District to establish a minimum flow rate for Blue Spring based on its importance as a warm-water manatee refuge. Flow rates at Blue Spring have declined by 13 percent since the 1940s, and the District agreed to the Service's request. Finally, the Service adopted a policy to prevent manatee use of warm-water refuges in northeastern Florida and Georgia because of their distance from the species' historical winter range.

The Commission was pleased to learn that so much had been done to begin addressing the issue and concluded that the ongoing actions were appropriate and well placed. Therefore, in its December letter to the Service, the Commission expressed support for the work that had been started and recommended that the Service continue to give these matters particular attention.

Designating New Manatee Sanctuaries and Refuges – In 1979 the Fish and Wildlife Service adopted rules for establishing manatee protection areas pursuant to provisions of the Endangered Species Act. The rules enable the Service to designate two types of areas: (1) "manatee sanctuaries," in which all human activity must be prevented to protect manatees, and (2) "manatee refuges," where specified human activities must be regulated to protect manatees. To date the Service has designated seven small manatee sanctuaries totaling a combined area of about 50 acres. All are in and around the Kings Bay warm-water refuge at the head of the Crystal River. To date, no manatee refuges have been designated. In part, the lawsuit filed in 1999 by environmental groups against the Service sought action to expand use of this authority to other areas.

On 1 September 2000 the Service published an advanced notice of proposed rulemaking requesting comments and suggestions on the possible designation of new manatee sanctuaries and refuges. During the October annual meeting, Service officials noted that they intended to review potential sites suggested by commenters and to publish proposed rules early in 2001 for proceeding with the designation of selected sites. In response to the September notice and discussions at the October annual meeting, the Commission provided comments to the Service in its letter of 1 December. Noting that there are numerous areas where new manatee sanctuaries and refuges seemed to be warranted, the Commission commended the Service for its initiative to consider expanded application of its authority to designate manatee protection areas. It recommended that the Service proceed expeditiously with the planned rulemaking and that it also gradually expand the number of manatee sanctuaries and refuges over the long term. In this regard, the Commission urged the Service to work toward building a network of areas that, in combination with other site-specific protection measures, could satisfy the long-term habitat pro-tection needs (e.g., for manatee feeding, resting, travel, and thermal refuge) necessary to downlist or delist Florida manatees. To identify an optimal network of sites, the Commission recommended that the Service, in consultation with the Florida Marine Research Institute and the Sirenia Project, consider using the state's geographic information system to identify core areas of special importance to manatees.

With regard to new manatee sanctuaries that might be designated at this time, the Commission recommended that the Service consider small areas (e.g., a few tens of acres) at five thermal refuges: Homosassa Springs, Warm Mineral Springs, and three power plants (i.e., one in Brevard County, one in Pinellas County, and one in St. Lucie County). As possible manatee refuges, the Commission recommended that the Service consider sites where

watercraft-related deaths have been particularly high and management measures were warranted to strengthen speed zone restrictions and control development of new boating facilities. The sites were the Barge Canal and Sykes Creek in Brevard County and downtown Jacksonville in Duval County.

Manatee Harassment in the Crystal River Area – Over the past 25 years, warm, clear water and the chance to dive with wild manatees have attracted increasing numbers of scuba divers and snorkelers to Kings Bay at the head of the Crystal River in northwestern Florida. Where perhaps a few thousand divers used the bay each year in the 1970s, their numbers are now approaching 100,000 per year. In recent years and for similar reasons, divers also have begun using a site called "blue waters" at the mouth of a run formed by Homosassa Springs at the head of the Homosassa River a few miles south of Crystal River. Accompanying these increases have been more frequent reports of manatees being harassed by divers (e.g., chasing, poking, grabbing, climbing on, or otherwise disturbing manatees).

To help prevent animals from being forced away from essential habitat, the Fish and Wildlife Service purchased the islands in Kings Bay and in 1984 designated them as the Crystal River National Wildlife Refuge. The Service also designated seven small manatee sanctuaries in and around Kings Bay where entry by divers and boats is prohibited to provide manatees a place to retreat from unwanted human attention. In cooperation with local dive tour operators, the Service also developed brochures, videos, and other educational material to advise divers about manatee protection needs. Despite these efforts, frequent reports of manatee harassment in the area continue.

During the Commission's review, Service representatives described efforts to address the issue. They noted that staff at the Crystal River refuge were not able to respond effectively to harassment complaints, in part, because only one full-time and two part-time enforcement officers were assigned to cover the Crystal River refuge and several other large refuges in the area. Because of training duties and other demands, time actually devoted to enforcement has been less than the equivalent of one full-time officer for the entire group of area refuges. They also noted that designating a new manatee sanctuary had been discussed as a way to address harassment issues near Homosassa Springs, but that it was Service policy not to pursue such designations unless resources are available to enforce them. In the Commission's view, the level of enforcement was inadequate and would become worse if the Commission's recommendation for a new manatee sanctuary near Homosassa Springs (described earlier) were adopted and enforcement responsibility assigned to the staff of the Crystal River refuge. Therefore, in its 1 December letter to the Ser-vice, the Commission recommended that the Service assign an additional full-time enforcement officer to help address manatee harassment issues in the Crystal River area.

Service representatives also described educational materials advising divers of appropriate conduct when viewing manatees. Over the years, some wild manatees in Kings Bay have become accustomed to divers and approach them to be scratched and petted. Most manatees, however, maintain their distance from divers and often retreat into manatee sanctuaries if divers attempt to come too close. The Service therefore advises visitors that the best way to observe manatees without affecting them is passively from a boat at the surface. However, educational materials also advise divers to allow manatees to approach them and to touch and pet them if they do.

In the Commission's view, this advice gives visitors a conflicting message that may actually increase the chances of animals being harassed by encouraging inappropriate behavior by both divers and manatees. That is, the materials establish an expectation among divers that they will have an opportunity to touch and play with wild manatees. Thus, there is an increased likelihood that divers will attempt to approach and otherwise attract a manatee's attention so that they can get close enough to be touched. For manatees that tend to shun such attention, this would precipitate a chase. Animals that enjoy being scratched and petted also would receive positive reinforcement that perpetuates their interest in approaching humans—a behavior that, in other situations, could expose them to potential harm or injury. Because of the large number of people now diving at Kings Bay and the growing concern about manatees being harassed, the Commission concluded that the Service's educational message was no longer appropriate. In its 1 December letter to the Service, the Commission

therefore recommended that educa-tional materials for divers, particularly the video *Manatee Manners*, be updated to tell divers explicitly that they should avoid touching manatees and should back away from any animals that approach them to prevent animals from learning behaviors that could place them at risk.

Finally, the Commission was advised by the Service that an undeveloped 55-acre site known as Three Sisters Spring had been identified as a potential addition to the Crystal River National Wildlife Refuge. The site, located on a canal off Kings Bay, includes a warm-water spring recently designated as a manatee sanctuary. Service representatives noted that a shoreline platform could be built to allow safe viewing of manatees using the spring and that the property would be an excellent site for a visitor education facility. It was also noted that others were considering the site for residential development and possibly a plant to bottle water from the property's spring. The Commission strongly recommended that the Service pursue all opportunities to acquire the property for use as an education and visitor center for the Crystal River National Wildlife Refuge.

Improving Manatee Access to Homosassa Springs – Homosassa Springs is a major warm-water spring at the head of the Homosassa River six miles (9.7 km) south of Crystal River. Property around the springs was developed privately as a wildlife attraction for tourists in the mid-1940s. A fence was subsequently installed across the spring run about a quarter mile downstream from the main spring to keep boat traffic out of the attraction. In 1980 captive manatees were introduced into the enclosed area above the fence. Spring water flowing through the fence provides a warm-water refuge now used by up to 100 wild manatees in winter.

In 1990 the property was sold to the State of Florida, which has since managed it as the Homosassa Springs State Wildlife Park. Operated by the Division of Recreation and Parks in the Florida Department of Environmental Protection, the park features captive and free-ranging Florida wildlife, including manatees. An underwater viewing kiosk floating over the main spring was built in the 1960s and now allows visitors to view the captive manatees in a natural setting. An educational display on manatees also has been built in cooperation with the Fish and Wildlife Service at the park's visitor center. The fence across the spring run has been retained, additional manatees undergoing rehabilitation have been cycled through the enclosure before release back to the wild, and a 1.2-acre portion of the spring run below the fence was set aside as a sanctuary for wild manatees and other wildlife. Unfortunately, over the past several decades siltation has reduced the depth of the spring run, preventing wild manatees from using the sanctuary at low tide.

To the extent possible, park managers seek to maintain and restore natural resources to conditions that existed before human-related ecological disruptions. In this regard, the Fish and Wildlife Service and others have approached park managers about the possibility of moving the captive manatees now at the spring to another facility, removing the fence across the spring run, dredging the waterway to reestablish depths to allow access to the main spring by wild manatees, and designating a larger portion of the spring run as a manatee sanctuary where boats and divers would continue to be prohibited.

During the Commission's meeting, the park's manager described current plans and deliberations regarding the park's involvement in manatee conservation activities. It was noted that the park had approached the Army Corps of Engineers to discuss a habitat restoration project involving the removal of accumulated sediment from the spring run to reestablish conditions that would allow manatee access at all tides. It was also noted that the park was about to construct an isolation pool off the spring run to enable handling and medical treatment of captive manatees. Although the possibility of opening the spring run to wild manatees is being considered, assuring park visitors an opportunity to see manatees is considered a vital part of the park's education mission and current plans therefore envision retaining a closed-off area at the head of the spring run to maintain captive manatees.

With few natural warm-water springs as large as Homosassa Springs available to manatees in Florida, the Commission strongly supported efforts to open the spring run to wild manatees. Therefore, in its 1 December letter to the Florida Department of Environmental Protection, the Commission urged the Department to fully explore and, if at all possible, to adopt options to open the entire spring run to wild manatees.

Noting that wild manatees often return to warm-water refuges during summer months, the Commission noted that park visitors could have a chance to see wild manatees throughout much of the year, which would add enormously to the park's public appeal while at the same time greatly increasing the park's manatee conservation and research values. To ensure an opportunity for visitors to see manatees, the Commission also suggested that the envisioned holding facility for treating captive manatees might be used or expanded to maintain captive animals that could be viewed by the visiting public.

Manatee Mortality from Water Control Structures – The second largest source of human-related manatee mortality involves animals crushed or held underwater and drowned in flood gates and navigation locks. This has been a relatively small, but persistent source of manatee deaths. Since mortality records were first kept in the mid-1970s, more than 150 manatees have been killed by these structures. To reduce the number of these deaths, the South Florida Water Management District and the Army Corps of Engineers, in consultation with the Fish and Wildlife Service, the Bureau of Protected Species Management, and Dade County, have tried various approaches. Initial attempts, including changes to gate-opening procedures and various types of protective grates and screens, proved unsuccessful. Then, in the mid-1990s the District and the Corps began developing mechanisms, similar to elevator doors, that would reverse closing flood gates and lock doors when an object becomes caught in them. After experimenting with various design options, a prototype mechanism using piezoelectric film (a tough plastic that converts mechanical energy into electric current) was developed and installed on a flood gate in mid-1997. A related device suitable for navigation locks was initially installed late in 1998.

Based on promising test results, the Army Corps of Engineers secured funds and developed a multiyear plan to install the devices on 20 flood-control structures and seven navigation locks. During the Commission's meeting, representatives of the Bureau of Protected Species Management and the Army Corps of Engineers reviewed the status of this work. It was noted that two locks and five flood gates had been equipped with new devices as of the Commission's meeting and that the schedule for remaining structures calls for all gates and locks to be modified by the end of 2004.

Although initial work has focused on the most deadly structures (e.g., the first four flood gates fitted had caused nearly 60 percent of all past gate-related deaths), deaths due to flood gates and locks have not declined in the past two years. In part, this is because of an increase in deaths at structures not previously noted for high mortality levels and not yet equipped with new devices. However, some deaths also have occurred at structures equipped with the new devices. In 2000 one manatee died at a navigation lock with the new device. This death did not appear to be due to a system failure, but rather to entrapment in a depression beneath a swinging lock door. A floor grating was therefore installed beneath the area swept by the operating doors to eliminate the recess, and similar barriers will be added as needed to other locks. Three manatees also have died at flood gates with new devices. Several of these deaths may have been due to minor design and installation flaws, which have since been corrected.

During its review, the Commission was advised that no studies had been done to assess manatee behavior at gate and lock structures. The Commission believes that such work could provide important clues about how and why animals get entrapped. The Commission suggested in its 1 December 2000 letter to the Florida Fish and Wildlife Conservation Commission that the Florida Marine Research Institute consult with the agencies cooperating to resolve this source of mortality to explore the possibility of undertaking a study of manatee behavior to develop information that could be useful for further reducing manatee mortality at gate and lock structures.

During its meeting, the Commission also was advised that the South Florida Water Management District staff member in charge of overseeing the installation of the new devices on district gates and coordinating work with other agencies had retired several months earlier and that a replacement had not yet been named. Coordinating installation of the devices with gate maintenance and operating schedules requires careful advance planning. Therefore, to prevent a lapse in coordination that could delay future work, the Commission wrote to the District on 17

November 2000 urging that it appoint a new staff member as quickly as possible to work with other agencies on scheduling installation and monitoring the effectiveness of manatee protection devices on the District-owned flood gates. By letter of 27 December 2000, the South Florida Water Management District advised the Commission that a new staff member had been assigned to oversee installation efforts and to coordinate activities with other agencies.

Manatee Research – The success of management actions depends in large part on a solid understanding of manatee biology and ecology. Over the past several decades, manatee research by the Sirenia Project and the Florida Marine Research Institute has produced numerous long-term data sets (e.g., manatee mortality, aerial surveys, and life history data from photo-identification and telemetry studies) that have made Florida manatees one of the best-studied marine mammal species in the United States. These research techniques and databases provide opportunities to investigate management issues at a level of detail not possible for most other species.

Based on its review, the Commission identified several new research opportunities made possible by the data and research techniques developed in recent years. In this regard, the Commission's 1 December letter to the Florida Fish and Wildlife Conservation Commission urged that the Florida Marine Research Institute consider support work in the following areas: (1) radio tracking studies using geographic positioning system receivers able to pinpoint manatee locations and movements in waterways to evaluate manatee movements relative to established speed zones in different areas; (2) a synthesis of data on manatee habitat use patterns to identify essential manatee habitat and help county planners and permit reviewers determine where new boating facilities and other coastal construction projects would be most suitable and least suitable with respect to manatees; (3) detailed analyses of data sets to help elucidate patterns, such as the timing and location of manatee deaths by small and large vessels, that could help managers assess the effectiveness of measures to prevent watercraft mortality; and (4) research on manatee behavior to improve understanding of manatee mortality in water control structures.

Updating the Manatee Recovery Plan

The Fish and Wildlife Service, with assistance from the Marine Mammal Commission, first completed a recovery plan for West Indian manatees pursuant to provisions of the Endangered Species Act in 1980. As the first such plan for any marine mammal and one of the first for any endangered or threatened species, it has served as a model species recovery plan. The Service has updated the plan at five-year intervals, with the most recent plan approved early in 1996. The 1996 plan was developed by the Florida Manatee Recovery Team composed of representatives from key agencies, industry groups, and environmental organizations. After submitting a recommended plan to the Service, the team was disbanded. Although the Commission urged the Service to reconvene the team several times to help coordinate recovery activities and improve communications among interested parties, the Service chose not to do so until early 1999 when it formed a new team to again update the plan.

The new team includes representatives of federal agencies (including the Service, the Sirenia Project, the Army Corps of Engineers, the Environmental Protection Agency, and the Marine Mammal Commission), state agencies (the Bureau of Protected Species Management, the Florida Marine Research Institute, and the Georgia Department of Natural Resources), environmental organizations (Save the Manatee Club), the research community (Eckerd College and Mote Marine Laboratory), the electric utility, boat manufacturing, and commercial fishing industries, and the boating public. The team met several times in 1999 and 2000 and, with the team's comments and assistance, the Service completed a draft revised recovery plan for Florida manatees that was made available for public and agency review on 30 November 2000.

The draft revision includes, for the first time, benchmark recovery criteria to be used in guiding decisions to downlist manatees from endangered to threatened. The criteria establish recommended benchmarks for manatee survivorship, reproduction, and growth rates for each of four Florida regions (the upper St. Johns River, northwestern Florida, along the Atlantic coast, and southwestern Florida). According to the draft revision, data on these benchmarks and recovery criteria still need to be developed for manatee

habitat, and will be reviewed at a manatee population biology workshop to be held in 2002. After the workshop, the Service will conduct a status review of the Florida manatee population to determine if it should be reclassified or removed from the list of endangered and threatened species. The draft plan also identifies tasks to meet four objectives: (1) minimizing the causes of manatee disturbance, injury, and mortality; (2) determining and monitoring the status of the manatee population; (3) protecting and monitoring manatee habitats; and (4) facilitating manatee recovery through public awareness and education.

At the end of 2000 the comment period on the draft revised plan had not yet expired. The Service is expected to complete and adopt a fourth revision to the Florida Manatee Recovery Plan early in 2001.

The Governor's Manatee Summit

On 19 October 2000 Florida Governor Jeb Bush convened a panel to discuss goals and options for manatee protection, and the management of vessel traffic. Panel members included elected officials; representatives of environmental groups, boaters, and the boat manufacturing industry; and officials from involved federal, state, and county agencies. The panel was asked to provide views on various issues including the establishment of boat speed zones and new manatee sanctuaries, planning and permitting for new boating facilities, law enforcement, public education, technological approaches to reduce vessel collisions with manatees, and research needs. The chairman of the Marine Mammal Commission was invited to participate on the panel and did so.

To help identify potential manatee protection strategies, a questionnaire posted on the Internet in advance of the workshop sought comments on the following issues: the scope of county manatee protection plans and the types of facilities that should be addressed; who should approve elements of manatee protection plans related to boat access; the need for new boat speed zones; the adequacy of efforts to post and enforce boat speed zones; the adequacy of boater education programs; and research needs. More than 800 people responded to the survey. The results were summarized and provided to the panel for consideration at the meeting.

The questionnaire and panel discussion produced a wide range of views and opinions on all issues. Among those actions for which support was strongest were strengthening manatee enforcement, increasing minimum fines for violators of speed zones, and developing a comprehensive education program for boaters and schools on manatee protection needs. As of the end of 2000 a report on the results of the summit had not yet been distributed. It is anticipated that the results of the review will be examined carefully by Governor Bush and his cabinet.

Chapter IV

MARINE MAMMAL/FISHERIES INTERACTIONS

Marine mammals may be disturbed, harassed, injured, or killed either accidentally or deliberately during fishing operations. They, in turn, may take or damage bait and fish caught on lines, in traps, and in nets; damage or destroy fishing gear; or injure fishermen trying to remove them from fishing gear. Marine mammals and fishermen also may compete for the same fish and shellfish resources.

In 1994 the Marine Mammal Protection Act was amended to establish a new regime to govern the taking 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. In addition, this chapter provides information on efforts to address interactions between various species of pinnipeds and certain fish stocks. Fishery interactions affecting specific species, including Hawaiian monk seals, Steller sea lions, sea otters, harbor porpoises, and right whales, are discussed 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 which 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 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 require-ments (e.g., a registration requirement and a require-ment to carry observers) are applicable, depending on a fishery's classification. The amendments focus resources on the most pressing problems—those involving strategic stocks. A take reduction plan is to be developed for each strategic stock subject to frequent or occasional mortality or serious injury.

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 estab-lish a task force to examine problems involving pinni-peds 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), 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 moni-toring 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 and to deterrence of marine mammals from damaging fishing gear or catch are also discussed. Actions taken under section 120 are discussed under the topic of pinniped-fisheries interactions later in this chapter.

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) estimated size, status, and trends of marine mammal stocks, (2) uncertainties and research needs regarding stock separation, abundance, and trends, (3) research on modifications in fishing gear and practices to reduce the incidental mortality and serious injury of marine mammals, and (4) potential impacts of habitat destruction on marine mammals and, for strategic stocks, conservation measures to reduce such impacts.

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. The Act directs that each assessment:

- describe the geographic range of the stock;
- provide a minimum population estimate, the stock's current and maximum net productivity rates, and current population trend, including the basis for those findings;
- estimate the annual human-caused mortality and serious injury, by source, and, for stocks determined to be strategic stocks, describe other factors that may be causing a decline or impeding recovery of the stock;
- describe the commercial fisheries that interact with the stock, including estimates of fishery-specific mortality and serious injury levels and rates, a description of seasonal or area differences in incidental take, and an analysis of whether incidental-take levels are approaching a zero mortality and serious injury rate;
- assess whether the level of human-caused mortality and serious injury would cause the stock to be reduced below its optimum sustainable population level or, alternatively, whether the stock should be categorized as a strategic stock; and
- estimate the potential biological removal level for the stock.

As defined in the Act, a stock's potential biological removal level is the maximum number of animals, not including natural mortality, that can be removed from the stock while allowing 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 – As discussed in previous annual reports, the National Marine Fisheries Service published its original stock assessment reports in 1995. Forty-seven of the 145 stocks assessed were determined to be strategic stocks. The Service also designated as strategic 33 localized stocks of bottlenose dolphins that inhabit bays, sounds, and estuaries in the Gulf of Mexico after concluding that the minimum abundance estimates for these stocks were so low that the take of a single animal from most would exceed the calculated potential biological removal level.

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 1998 and 1999 are discussed in previous annual reports. A notice of availability of the final stock assessments for 1999 was published by the Service in the *Federal Register* on 9 March 2000. These reports may be accessed on the National Marine Fisheries Service's website at www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/individual_sars.html.

On 18 May 2000 the National Marine Fisheries Service announced the availability of draft revised stock assessment reports for 2000. For the Atlantic and Gulf of Mexico stocks, revisions to 28 of 60 assessment reports were proposed. The proposed revisions applied to 15 strategic and 13 nonstrategic stocks and, for the most part, pertained to abundance and mortality estimates. The Service proposed to change the classification of the western North Atlantic stock of long-finned pilot whales to strategic, based on new estimates of incidental mortality. For the first time, separate abundance estimates were available for the western North Atlantic stocks of Atlantic and pantropical spotted dolphins. The maximum net productivity rate for the western North Atlantic stock of northern right whales was estimated to be zero, indicating that the potential biological removal level would also be zero. The Service also proposed that the stock designation for the humpback whale be changed from the North Atlantic stock to the Gulf of Maine stock. However, inasmuch as the abundance of the proposed Gulf of Maine stock has not been estimated, the estimate provided by the Service continued to be based on the entire North Atlantic aggregation.

Assessments for all 55 marine mammal stocks occurring in the U.S. Pacific, including Hawaii, were revised for 2000. The revision for the central California stock of harbor porpoises proposed to change this stock's status to strategic due to increased mortality in the halibut set gillnet fishery. The revision for the Hawaii stock of false killer whales proposed to change this stock's status to strategic due to mortality in the Hawaii longline fishery. The draft assessment noted the need for a better estimate of this stock's abundance because the one being used currently reflects only a portion of the species' range in Hawaiian waters. The revision for the California– Oregon– Washington stock of short-finned pilot whales proposed to change this stock's status to nonstrategic based on the small number of animals lost to human-related mortality (an average of three each year in 1997 and 1998). The Service proposed to delete the stock assess-ment report for the California–Oregon–Washington stock of dwarf sperm whales due to the lack of evidence that this stock occurs in U.S. waters on a regu-lar basis. The draft revision for the California–Mexico stock of blue whales proposed changing the stock's name to the eastern North Pacific stock based on know-ledge of blue whale movement patterns between the U.S. west coast and the eastern tropical Pacific Ocean.

Of the 32 marine mammal stocks in Alaskan waters, draft reports for 14 were revised based primarily on changes in estimates of abundance or human-related mortality. None of the proposed re-visions resulted in a change of stock status. Notable revisions involved the Cook Inlet beluga whale stock and the North Pacific stock of Pacific white-sided dolphins. The Alaska Scientific Review Group had recommended that the recovery factor for the Cook Inlet beluga whale stock be reduced from 0.5 to 0.1. The Service opted for a recovery factor of 0.3, noting that (1) Alaska Natives in the Cook Inlet area were cooperating to control the harvest and no belugas were killed in 1999, (2) the 1999 survey indicated that the decline of the stock had

abated, and (3) the first year of observer coverage reported that no beluga whales were taken in commercial fisheries. The minimum popu-lation estimate for the North Pacific stock of Pacific white-sided dolphins was reduced from 486,719 to 26,880 to reflect only the portion of the population north of 45°N latitude in the Gulf of Alaska. The potential biological removal level for the stock was changed accordingly, from 4,867 to 269.

The Commission, in consultation with its Committee of Scientific Advisors, reviewed the draft stock assessments for 2000 and, by letter of 14 August 2000, provided comments to the Service. For the most part, the Commission's comments addressed narrow technical issues. With respect to the Cook Inlet stock of beluga whales, however, the Commission took issue with the 0.3 recovery factor adopted by the Service for use in calculating the stock's potential biological removal level. The Commission noted that the Alaska Scientific Review Group had recommended a recovery factor of 0.1 based on the stock's low abundance, declining population trend, limited range, and susceptibility to catastrophic events. The Commission agreed with the review group's conclusion and also recommended that a recovery factor of 0.1 be used to calculate the potential biological removal level for the Cook Inlet beluga whale stock.

With respect to the draft stock assessment for the Hawaiian monk seal, the Commission noted in its letter that the Service had proposed deleting information included in previous stock assessments on lobster harvest levels and trends and adding new information on recent harvest levels for only a portion of the species' range. In the Commission's opinion, information on past catch levels and trends is relevant to the issue of fishery competition for monk seal prey species. Accordingly, the Commission recommended that these data be retained in the 2000 stock assessment and that additional information be provided on recent catch levels and trends of lobsters at Gardner Pinnacles, Necker Island, and Maro Reef, all important monk seal feeding areas. The Commission also believed that the assessment should be expanded to include information on the species and quantities of other monk seal prey that are taken as bycatch in the Northwestern Hawaiian Islands lobster fishery.

The Commission challenged the Service's assertion in the draft assessment that it is not known whether lobster is an important component of the monk seal diet and thus that it is not possible to evaluate the potential for competition between fisheries and monk seals. The Commission noted that preliminary results of studies on fatty acid signatures in monk seal blubber strongly suggest that lobsters are a significant prey species, and it recommended that the stock assessment be revised to note that the best available information, although still preliminary, suggests that lobsters are an important component of monk seal diets.

With respect to the central California stock of harbor porpoises, the draft stock assessment notes that the 1999 bycatch of porpoises in the halibut set gillnet fishery may have been several times higher than the calculated potential biological removal level. In its letter, the Commission recommended that, if it had not already done so, the Service take immediate steps to convene a take reduction team to identify measures to reduce the harbor porpoise bycatch in that fishery.

At the end of 2000 final 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 2001.

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. Although the draft revisions incorporated information not available when the original assessment reports were prepared, no changes in the status of these stocks were proposed. The final reports for these stocks were never published, and they have not been updated since that time.

In September 1998 the Fish and Wildlife Service published updated assessment reports for the stocks of

polar bears and walruses that occur in Alaska. These stocks remained classified as nonstrategic.

Although the Service published a draft assessment for Alaska sea otters earlier in 1998, issuance of a final report was deferred. The draft report had proposed splitting Alaska sea otters, previously considered to be a single stock, into three separate stocks based on genetic studies and other information. In response, the Alaska Sea Otter and Steller Sea Lion Commission, which represents Alaska Natives who hunt sea otters and which opposed the proposed division of Alaska sea otters into three stocks, requested that the Service conduct a proceeding on the record before finalizing the report. Under section 117 of the Marine Mammal Protection Act, an Alaska Native subsistence hunter has a right to request such a hearing before a final stock assessment can be published for any marine mammal stock taken in Alaska for subsistence or handicraft purposes.

As discussed in the sea otter section of Chapter III and in last year's annual report, the Fish and Wildlife Service initiated consultations with the Alaska Sea Otter and Steller Sea Lion Commission in an effort to resolve the issue of stock structure without resorting to a formal hearing. These consultations resulted in the development of a memorandum of agreement, under which the Native Commission withdrew its request for a hearing and the Service agreed to work with the Native group to obtain additional information on sea otter stock structure in Alaska and to make a final determination on the issue by 1 March 2000. It is expected that draft revised stock assessments for sea otters in Alaska, based on new genetic studies, will be published for review in 2001. The Service also plans to update its assessments of Alaska stocks of polar bears and walruses during 2001.

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 greater detail in previous annual reports, the National Marine Fisheries Service published regulations implementing section 118 on 30 August 1995. Among other things, the regulations include procedures for vessel owners to register for an authorization certificate, observer and reporting requirements, and criter-ia for classifying fisheries. Minor changes to the regulations were published on 24 February 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 one issue remains unresolved.

The 1994 amendments to the Marine Mammal Protection Act require 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. Toward this end, the amendments require the National Marine Fisheries Service to review the progress of commercial fisheries in meeting this goal and to report its findings to Congress. The report was to have been submitted by 30 April 1998. As of the end of 2000, however, completion of the report was awaiting resolution by the

Service of how best to quantify the phrase "approaching a zero mortality and serious injury rate."

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, it is important that there 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 January 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. The report also recognized that some marine mammals may succumb from the physiological effects of stress associated with entanglement in fishing gear. In addition, it summarized the participants' views concerning the types of information that should be collected by observers to enable the Service to determine which injuries should be considered serious.

The workshop report included general guidelines for determining when injuries should be considered 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 – As noted earlier,, 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. In 1996 three-year permits were issued to participants in Alaska fisheries, authorizing the incidental taking of North Pacific humpback whales and Steller sea lions from both the eastern and western stocks. Those authorizations were to expire on 31 December 1998. On 30 December 1998, however, the National Marine Fisheries Service published a *Federal Register* notice extending those permits through 30 June 1999. Rather than reissue the permits for a three-year period, the Service chose to extend them for six months while it reviewed its criteria for determining whether authorized taking would have a negligible impact on listed marine mammal stocks.

The National Marine Fisheries Service published a *Federal Register* notice on 27 May 1999 proposing to issue three-year permits authorizing the taking of five stocks of endangered and threatened marine mammals incidental to several fisheries, based on revised criteria for making negligible impact determinations. Under these criteria, the threshold for making a finding of negligible impact would remain at 10 percent of a stock's potential biological removal level. Under this standard, if the number of human-related serious injuries and mortalities was less than 10 percent of the calculated potential biological removal level, incidental taking in all fisheries would be permitted. If the number of serious injuries and mortalities from all human-related causes exceeded this level, incidental taking could still be authorized if fishery-related mortality was less than 10 percent of the stock's potential biological removal level, provided that management measures were being taken to address the other sources of serious injuries and mortalities. In situations where the number of fishery-related serious injuries and mortalities was between 10 and 100 percent of a stock's potential biological removal level, and the stock was stable or increasing, the Service would review information for individual fisheries and make determinations on a case-by-case basis. For stocks that were declining, incidental-take permits would be issued only if the level of human-related mortality and serious injury was less than 10 percent of the stock's potential biological removal level. No incidental-take permits would be issued for any stock for which the total number of fishery-related serious injuries and

mortalities exceeded the stock's potential biological removal level.

Using these criteria, the Service determined that no incidental taking could be authorized from the California–Oregon–Washington–Mexico stock of humpback whales, the western North Atlantic stock of right whales, the California–Oregon–Washington and North Pacific stocks of sperm whales, or the Hawaiian monk seal population. Stocks for which the issuance of incidental-take permits were proposed included the western North Atlantic stock of fin whales, the central North Pacific and North Atlantic stocks of humpback whales, and the eastern and western stocks of Steller sea lions. The Service determined that no taking authorization was needed for the 14 other marine mammal stocks listed as endangered or threatened because there had been no documented fishery-related serious injuries or mortalities from these stocks.

The Commission commented on the Service's 27 May notice by letter of 30 July 1999. The Commission noted that, because all endangered and threatened species are strategic stocks, one of the statutory requirements for issuing an incidental take permit under section 101(a)(5)(E) is that a take reduction plan has been or is being developed for the species or stock. The Commission explained that, in its view, preparing such plans for all listed species was not a wise use of agency resources. The Commission therefore urged the Service to seek an amendment to the Marine Mammal Protection Act that would eliminate the requirement to prepare a take reduction plan for those strategic stocks for which fishery-related mortality and serious injury are determined to be inconsequential. As discussed in Chapter II, such an amendment was included in the proposed Marine Mammal Protection Act reauthorization bill transmitted to Congress by the Secretary of Commerce and the Secretary of the Interior on 16 August 2000.

The Commission was generally supportive of the use of 10 percent of a stock's potential biological removal level as a threshold for determining when fishery-related mortalities and serious injuries from listed species should be considered negligible. However, the Commission cautioned that this might not be an appropriate standard for a stock that is declining despite the fact that known human-caused injuries and mortalities are only a small fraction of its potential biological removal level. Authorizing inci-dental taking in such cases may serve to hasten the decline and may not be negligible. Related to this point, the Commission noted that the *Federal Register* notice did not explain how the Service intended to attribute and quantify indirect adverse effects of human activities, such as the possible localized depletion of prey species on the declining western stock of Steller sea lions. The Commission recommended that the Service discuss whether and how indirect human-related effects will be factored into negligible impact determinations.

The Commission also found the Service's criterion for making negligible impact determinations for declining stocks to be confusing and believed that clarification was needed. Further, the Commission questioned the appropriateness of using blanket numerical criteria to make findings for declining stocks.

The Commission generally agreed with the fisheries identified by the Service as meeting the criteria for obtaining incidental take permits under section 101(a)(5)(E). However, consistent with its general comments concerning declining stocks, the Commission questioned the inclusion of fisheries that take Steller sea lions from the western stock. Because this stock continues to decline for undetermined reasons, the Commission thought that additional discussion of the Service's rationale for believing existing levels of fisheries-related taking to be negligible was needed before any taking could be authorized.

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. As of the end of 2000 the Service had yet to issue new permits authorizing the taking of endangered and threatened marine mammals incidental to commercial fishing operations in the Alaska region, the northeast region, or the southeast region (including the Gulf of Mexico).

List of Fisheries – A key feature of the incidental-take regime is 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.

The Service published its final list of fisheries for 1999 on 24 February 1999. The list included 6 category I fisheries, 26 category II fisheries, and 155 category III fisheries. The most significant changes from the 1998 list involved two fisheries, one in the Atlantic and one in the Gulf of Mexico. The Gulf of Mexico menhaden purse seine fishery was listed as a category II, rather than a category III fishery, based on the estimated number of bottlenose dolphin mortalities incidental to this fishery. Although the level of take may warrant listing this fishery in category I, the Service chose to place it in category II pending a revised analysis of the stock structure of bottlenose dolphins in the Gulf of Mexico. The Atlantic herring midwater trawl fishery was added to the list of fisheries as a category II fishery. This listing includes the mid-Atlantic coastal herring trawl fishery, previously listed separately as a category III fishery. Numerous other changes were incorporated into the 1999 list of fisheries to refine the description of certain fisheries and to update information on the numbers of vessels or persons participating in the fisheries and on the species taken.

On 26 April 2000 the Service announced in the *Federal Register* that the list of fisheries for 1999 would remain in effect for 2000 without additional changes. The proposed list of fisheries for 2001, which, under the applicable regulatory schedule, was to have been published in July 2000, was undergoing final review within the agency at the end of 2000.

Take Reduction Plans – As noted earlier, section 118 requires the National Marine Fisheries Service to develop a take reduction plan for each strategic stock that interacts with a fishery that frequently or occasionally kills or seriously injures marine mammals (i.e., a category I or category II fishery). It directs the Service to establish take reduction teams to assume the lead in developing take reduction plans. These teams are to include members 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 Indian tribal organizations.

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.

As discussed in previous annual reports, the National Marine Fisheries Service has established five 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, and the Mid-Atlantic Coastal Gillnet Take Reduction Team. A repre-

sentative of the Commission has participated as a member of the Gulf of Maine harbor porpoise and Atlantic large whale teams.

Activities of the Gulf of Maine Harbor Porpoise Take Reduction Team and the Mid-Atlantic Coastal Gillnet Take Reduction Team are discussed in the Gulf of Maine harbor porpoise section of Chapter III. Actions by the Service and the Atlantic Large Whale Take Reduction Team to adopt and implement a take reduction plan for endangered whales along the Atlantic coast taken in coastal gillnet and lobster pot fisheries are discussed in the northern right whale section of Chapter III.

The Pacific Offshore Cetacean Take Reduction Team was constituted 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 annual reports, the National Marine Fisheries Service, based on recommendations from the team, published regulations in 1997 requiring that nets be set a minimum of 36 feet (11 m) below the water surface, low-intensity acoustic deterrent devices (pingers) be used on nets, and operators in the fishery attend a skipper education workshop before each fishing season. As noted in previous reports, implementation of these measures has generally reduced marine mammal mortalities to below the potential biological removal levels of the affected stocks. Two exceptions resulted from the entanglement and death of one sperm whale in 1998 and one fin whale in 1999. When extrapolated to account for the approximately 20 percent observer coverage, these mortalities would have exceeded the potential biological removal levels for those years in which the takings occurred. However, when viewed in the context of multiyear averages, mortalities and serious injuries for all stocks remain below potential biological removal levels. For 2000 the estimated number of mortalities and serious injuries did not exceed the potential biological removal level for any stock.

Under the 1997 regulations, operators in the covered fisheries were required to attach pingers on or near the floatline and leadline of their nets at specified intervals. Attaching and removing pingers at the specified locations, however, proved inefficient and, in some instances, required that net reels be slowed or stopped. The National Marine Fisheries Service, in response to a request from affected fishermen, and after determining that alternative placement should be effective in reducing cetacean bycatch, published amended regulations on 22 January 1999. The amendment, which allows pingers to be attached on longer lanyards, was consistent with a recommendation made by the Pacific Offshore Cetacean Take Reduction Team in 1998.

The Atlantic Offshore Cetacean Take Reduction Team was established in 1996 to address the take of several species of cetaceans, including right whales, humpback whales, sperm whales, beaked whales, long-finned and short-finned pilot whales, and common, spotted, and bottlenose dolphins, incidental to operation of the Atlantic pair trawl, longline, and drift gillnet fisheries for swordfish and other species. The team submitted a draft take reduction plan to the National Marine Fisheries Service in November 1996. The team recommended seasonal closures, increased observer coverage, limits on expansion of the fishery, and allocation of catch limits over a longer season.

Before finalizing its take reduction plan, the Service published a proposed rule to prohibit permanently the use of driftnets in the Atlantic swordfish fishery. In making this proposal, the Service noted that measures recommended by the Atlantic Offshore Cetacean Take Reduction Team did not provide sufficient guarantees that marine mammal takes would be reduced to allowable levels and did not adequately address concerns about the bycatch of sea turtles. The Service also noted that the cost of implementing the take reduction team's recommendations would exceed the net value of swordfish landings. Final rules to implement the driftnet closure were issued on 27 January 1999. In light of changes in the fisheries, the Service has indicated it will reconstitute the take reduction team to consider additional measures to reduce marine mammal mortalities and serious in-juries in the remaining offshore fisheries. However, the team had not been reconstituted as of the end of 2000.

Intentional Taking – Unlike the interim exemption that governed incidental taking between 1988 and 1995, the regime established under section 118 prohibits intentional lethal taking of marine

mammals in commercial fishing operations. The only exception is if 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 on 5 May 1995. The Service offered guidance on passive, preventive, and reactive measures that could be taken to deter marine mammals, setting forth four general principles regarding acceptable deterrence measures. In addition to a 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 explo-sives more powerful than seal bombs to deter seals or sea lions, the translocation of any marine mammal, 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 safely deter listed species would be subject to a separate rule-making. Commission comments on the proposed regulations are summarized in the 1995 annual report.

As of the end of 2000 final deterrence regulations had yet to be published by the National Marine Fisheries Service. The Fish and Wildlife Service had not published any guidelines or proposed regulations with respect to deterrence of those species of marine mammals under its jurisdiction.

Oversight Hearing – On 6 April 2000 the House Subcommittee on Fisheries Conservation, Wildlife, and Oceans convened an oversight hearing to review the implementation of the 1994 amendments to the Marine Mammal Protection Act pertaining to the taking of marine mammals incidental to commercial fishing operations. The Marine Mammal Commission testified at the hearing, outlining the steps that had been taken to reduce incidental mortality and serious injury of marine mammals and identifying actions that had yet to be completed. The full text of the Commission's testimony is provided in Appendix D of this report.

The conclusions of the Commission's testimony were as follows. First, the requirements for convening take reduction teams and developing and implementing take reduction plans as set forth in section 118 of the Marine Mammal Protection Act appear to be appropriate and fundamentally sound. One change to the Act that may be warranted involves the requirement to prepare plans for all strategic stocks taken in category I or category II fisheries. Specifically, the Commission suggested that take reduction plans may not be needed for a stock classified as strategic solely because it is listed as endangered or threatened if mortality and serious injury of that stock from com-mercial fishing are inconsequential.

Second, efforts to develop and implement take reduction plans have been inconsistent and, in some cases, difficult. Such difficulties may be undermining the confidence of team members and could slow the pace of implementation, expose the Service to litigation risks, and diminish prospects for recovery of the target species.

Third, the Service needs to take all measures necessary to avoid the deployment of hazardous fishing gear in right whale critical habitat or other areas where right whales occur and to achieve the take reduction goals for the harbor porpoises in the Gulf of Maine.

Finally, the Commission noted that, although fisheries-related mortality and serious injury are significant issues, other factors may also threaten the

persistence of marine mammals (e.g., boat-related mortality and habitat destruction affecting manatees and pollution of marine ecosystems). The Commission noted that research and conservation actions are often taken in the face of acute conservation problems, resulting in a reactive approach to management and conservation. The Commission recommended that Congress consider the need to provide direction for development and implementation of more effective recovery and conservation plans for endangered, threatened, and depleted marine mammals, as well as take reduction plans for stocks being significantly affected by commercial fisheries. The Commission ended its testimony by suggesting that there is a need for broad-based, interdisciplinary, anticipatory research that will allow the government to take action to address potential conservation problems before they become serious and controversial.

The Tuna-Dolphin Issue

For reasons not fully understood, schools of large yellowfin tuna (those greater than 25 kg or 55 lbs) tend to associate with dolphin schools in the eastern tropical Pacific Ocean. This area covers more than 5 million square miles (18.1 million km^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 were 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.

Background

The eastern tropical Pacific tuna fishery was dominated by U.S. vessels during the 1960s and early 1970s. In the late 1970s and early 1980s the U.S. fleet declined and the number of foreign vessels participating in the fishery grew. Along with these shifts in the fishery came changes in the associated dolphin mortality. As reflected by mortality data presented in Table 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. Another factor contributing to the drop in dolphin mortality was the La Jolla Agreement, an agreement entered into voluntarily by the tuna fishing nations in 1992. Among other things, the agreement established vessel-specific mortality limits. The specific provisions of the La Jolla Agreement are discussed in previous annual reports. Under the Marine Mammal Protection Act and the La Jolla Agreement, dolphin mortality declined by more than 95 percent between 1988 and 1993. Although part of this decline 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.

Since 1993 dolphin mortality incidental to the eastern tropical Pacific tuna fishery has been reduced further, although preliminary data from the 2000 fishing season indicate that observed dolphin mortality increased somewhat as compared with 1999.

Nevertheless, dolphin mortality remained well below the annual mortality limit of 5,000 established under international agreement. Although the Inter-American Tropical Tuna Commission is still analyzing the data for 2000, it expects that incidental dolphin

Table 10. Estimated incidental kill of dolphins in the tuna purse seine fishery in the eastern tropical Pacific Ocean, 1972–2000[1]

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

mortality for the year to be about 1,636 individuals. In part, the increased dolphin kill in 2000 is attributable to an increase in the number of dolphin sets made during the year, about 9,250, as compared with 8,648 sets in 1999.

Despite the success of the international tuna fleet 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 was environmentally sound and that increased use of dolphin-safe fishing methods 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 U.S. administration.

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 limit overall mortality to no more than 5,000 a 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 is to be made between 1 July 2001 and 31 December 2002 and a report of that finding submitted to Congress. Unless the Service determines that chase and encirclement are having a significant adverse effect on a depleted dolphin stock, the definition of dolphin-safe tuna will 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 require that the total dolphin mortality limits and the per-stock limits for nations importing tuna to the United States progressively decline from 1997 levels. 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, Honduras, Mexico, Nicaragua, Panama, and Peru. In addition, 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.

Commission Consultations – Shortly after enactment of the International Dolphin Conservation Program Act the Commission wrote to the National Marine Fisheries Service to 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 was 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, in December 1998, convened a meeting to begin development of decision-making criteria. Participants at that meeting, which included representatives of the Commission, generally agreed that the 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? A report providing a detailed discussion of the framework developed at the 1998 meeting, which was used in making the initial finding, is available on the Service's website at http://swfsc.ucsd.edu/mmd/congress/Goodman/Goodman.html.

As discussed in the previous annual report, the Commission wrote to the Service on 30 November 1999 concerning several issues related to implementation of the International Dolphin Conservation Program Act. Although generally impressed with the quality of research that had been conducted and that was planned, the Commission expressed concern that, two years into the research program, virtually no data were available for assessing the possible reasons why depleted populations of dolphins in the eastern tropical Pacific apparently have failed to recover as expected. The Commission noted that, in part, this was due to the inability of the Service to place technicians on board foreign tuna purse seine vessels to collect necropsy samples from dolphins that had died incidental to fishing operations. The Commission therefore reiterated a recommendation it had first made in September 1998 that high-level officials within the Department of Commerce inform their counterparts in other fishing nations that failure to cooperate with the Service's efforts to collect necropsy samples will be viewed as a sign of bad faith and will result in the Service revoking its initial finding. The Commission further recommended that, if the Service did not believe that the International Dolphin Conservation Program Act provides sufficient latitude to defer making the mandated findings or to make affirmative findings if the underlying studies are not completed as expected by Congress, the Service should immediately approach Congress to seek amendments to the Act to compel foreign nations to cooperate with the studies.

The Commission also noted that, even if collection of necropsy samples were to begin immediately, it was doubtful that the Service would be able to obtain sufficient samples from each of the depleted stocks to provide meaningful results before the final determination is to be made. The Commission therefore recommended that the Service, in consultation with the Commission, revisit its plans for the necropsy

study and develop an alternative schedule for collecting and analyzing a statistically significant number of samples from each of the depleted stocks in a shorter period of time. The Commission further recommended that, if the Service were to conclude that a study capable of providing meaningful results cannot be completed within the mandated time frame, and it appeared unlikely that alternative methods of determining the effects of chase and encirclement on dolphin stocks will be conclusive, the Service initiate discussions with appropriate Congressional oversight committees about extending the deadline for making a final determination.

At the Commission's 1999 annual meeting, the Service indicated that it was reconsidering whether the chase and recapture experiment mandated by section 304(a)(3)(C) of the Act should still be conducted and, if so, whether it should be done differently than originally planned. The Service noted that it would be consulting with the Commission as it considered these questions. Although the Commission welcomed the planned consultations, it noted in its 30 November letter that this study had been included in the 1997 amendments based on the recommendations of a team of specialists in marine mammal stress who attended a workshop convened by the Service in 1997. Thus, the Commission believed that, if the Service intended to deviate from the statutory mandate, it was particularly important for the Service to provide a fully developed rationale that considered whether other planned studies are likely to determine whether the slower-than-expected growth of dolphin stocks in the eastern tropical Pacific is attributable to chase and encirclement.

As noted earlier, the 1997 amendments directed the Service to undertake research to further the goals of the International Dolphin Conservation Program, apart from the program to study the effects of chase and encirclement. Because the presentations at the Commission meeting did not discuss efforts and plans for such research, the Commission requested that the Service provide an update concerning activities being carried out pursuant to section 304(b) of the Act and initiate consultations with the Commission regarding any such studies.

By letter of 17 February 2000 the Service invited the Commission to participate in a meeting to consider the appropriateness of conducting the chase and recapture experiment as Congress had envisioned. That letter noted that the Service had met with repre-sentatives of several environmental organizations in September 1999, who had questioned the usefulness of the experiment and proposed alternative lines of research. The Service believed that these concerns warranted further consideration before proceeding further with the "expensive and complicated research program" called for in the International Dolphin Conservation Program Act. The Service also indicated that it would be convening a second meeting to discuss the decision framework that would be used for making the final finding under the Act.

The Commission responded by letter of 19 April 2000, noting several issues that it expected to be raised at those meetings. Among other things, the Commission requested that the Service update it on the status of the necropsy study and on the steps being considered to allow for the collection and analysis of a statistically significant number of samples in time to be considered in making the final determination on the effects of chase and encirclement. In light of the adverse ruling in a lawsuit challenging the Service's initial finding (discussed in the litigation section later in this chapter), the Commission stressed the need to adhere strictly to the statutory mandates unless, and until, they are amended. The Commission further recommended that the planned meeting consider not only the merits of conducting the chase and recapture experiment, but whether other amendments, such as delaying the deadline for making the final finding to enable more necropsy samples to be collected and analyzed, might also be warranted. The Commission also provided comments on some of the alternatives to the chase and recapture experiment being proposed, noting that, although some might be worth pursuing, they are not equivalent to the mandated experiment. With respect to the criticism that the two- to three-week chase and recapture experiment being contemplated by the Service is unlikely to provide sufficient data to draw conclusions on the effects of chase and encirclement, the Commission recommended that the Service undertake an analysis to determine the sample size that would be require to provide meaningful results and estimate the level of effort and funding that would be needed to carry out such a study. With respect to the

Service's concern that the chase and recapture experiment would be compromised by the unexpected lack of data from the necropsy study, the Commission suggested that the Service consider whether the former experiment would yield useful results if more necropsy data were available and, if so, that it might make sense to delay the study, rather than abandoning it completely.

The meeting to evaluate the potential usefulness of the chase and recapture experiment to provide population-level results was convened on 25–26 April 2000. Two members of the Commission's staff participated in that meeting. Potential problems identified by the participants included difficulties associated with extrapolating the results from the expected small sample size to draw generally applicable conclusions, the lack of a control group of unstressed dolphins that could be sampled for comparison, the narrow focus of the anticipated study, which would look only at the effects on adult dolphins, and the difficulties with attributing any observed pathology with the chase and capture events. In light of these concerns, it was generally agreed that the study, as originally envisioned, was unlikely to provide quantitative results with sufficient statistical power to enable the Service to draw conclusions as to whether chase and encirclement are having significant adverse effects on depleted dolphin stocks.

The meeting to refine the decision criteria was held on 27–28 April 2000. Members of the Commission's staff also participated in that meeting. With respect to the issue of population growth, the participants focused on whether abundance estimates derived from observers placed on board the tuna vessels should be pooled with line transect survey data to determine population trends. Because the Service would need to review the data before it could determine whether they were too biased to be useful, it was decided that a separate workshop should be convened to consider this issue. Although progress on the studies being planned or conducted to help attribute the cause of slower than expected growth was discussed, no explicit decision rules concerning attribution were developed. It is expected that a report of this meeting will be published by the Service's Southwest Fisheries Science Center as an administrative report early in 2001. The Service has informed the Commission that it plans to conduct further consultations regarding the decision framework and the underlying research projects early in 2001.

On 4 August 2000 the Service responded to many of the issues that had been raised by the Commission. The Service acknowledged that it had encountered difficulties in getting the necropsy experiment under way, noting that Mexico and, just recently, Venezuela had been the only countries to agree to cooperate in collection of samples for this study. In turn, the delay in establishing the necropsy program had significantly diminished the Service's ability to develop the chase and recapture study, the design of which depends on results from the necropsies. The Service explained that it was finally nearing completion of the pilot portion of the necropsy study, having submitted a total of 11 samples for analyses, with an additional 6 samples having been collected and awaiting export from Mexico. As of the end of 2000, an additional seven samples had been collected. However, it was clear that even an expanded program would be unable to provide anywhere near the 450 samples that the Service had originally planned to collect before making the final finding in 2002. The Service agreed that a reevaluation of the necropsy program was needed and invited continued consultation with the Commission about possible alternatives.

The Service disagreed with the Commission's suggestion that the Service consider an amendment to the Marine Mammal Protection Act that would compel other nations to cooperate with the mandated scientific research. It believed that it was inappropriate to expand the existing requirements to include conditions not specifically mentioned in the Agreement on the International Dolphin Conservation Program. Similarly, the Service did not believe it appropriate to revoke any existing affirmative findings based on a country's failure to participate in the necropsy study. Because those countries are not bound by U.S. legislation, the Service took the view that their participation should remain voluntary. The Service also believed that it was not appropriate to approach Congress about extending the deadline for making the final finding in light of the slower-than-expected progress in conducting the mandated research. Although recognizing that such an extension might be scientifically justified, the Service indicated that the other parties to

the international agreement expect the United States to complete the research and issue a finding as scheduled. If the deadline were to be extended, the Service feared that the other parties might view the United States as dealing in bad faith.

The Service's letter also provided some follow-up thoughts on the consultation meetings held in April 2000. Although reservations had been expressed about the usefulness of the chase and recapture experiment, the Service noted that there had been a general consensus that, if the experiment must be conducted, it could be structured so as to produce some useful data that otherwise would not become available. The Service therefore indicated that it would conduct the experiment during 2001 and consider the results in making the final finding on the effects of chase and encirclement.

As for analyses of historical and demographic data, the Service stated that three studies were ongoing. Among these was a study of the separation of dolphin mothers and their calves during chase and encirclement. Using a large collection of tissue samples collected between 1973 and 1990, researchers have estimated that there is a deficit in the number of calves killed in dolphin sets as compared with the number of lactating females. If these missing calves were added to the observed mortality this would represent an increase of 6 to 15 percent over the reported numbers. The researchers further surmised that the actual number of unobserved calf deaths is likely to be higher than these figures because separation of mothers and calves could occur at several different points during chase and encirclement, with only a fraction of these being represented by the calf deficit detected at the end of the set.

With respect to the Commission's inquiry concerning research into alternative fishing methods designed to reduce or eliminate dolphin mortality and on the extent and impact of the bycatch of other species in the eastern tropical Pacific tuna fishery, as called for under the International Dolphin Conservation Program Act, the Service responded that such a program had yet to be funded.

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. However, as discussed in the previous annual report, the Service decided to conduct an independent peer review of the scientific bases for making the finding, as requested by members of Congress, before publishing its results. To accommodate the review, publication of the initial finding was delayed by one month.

The Service made its initial finding on 29 April 1999 and published notice of that finding in the 7 May *Federal Register*. The rationale for the finding and a summary of the data on which it was based were presented in a report to Congress.

The Service noted that its population assessments indicated that the northeastern offshore stock of spotted dolphins and the eastern stock of spinner dolphins apparently are not increasing at the expected rate, despite the relatively low level of fishery-related mortalities reported from the tuna fishery since 1991. Available data did not enable the Service to assess whether the coastal stock of spotted dolphins had or had not increased at the expected rate. As recom-mended by a group of independent peer reviewers, the Service cautioned that its conclusions were not without some uncertainty because of biases in the way that abundance data had been collected by tuna vessel observers or a possible delay between the birth of dolphins and their attainment of sexual maturity fol-lowing the years in which dolphin mortality was first reduced to low levels.

The report then considered the slower-than-expected growth of these populations, looking at two possible causes: changing environmental conditions and indirect or unobserved effects of tuna fishing operations. The Service concluded that the environmental data examined to date showed no evidence of a recent ocean environmental shift or other long-term change that might have affected the growth rates of the depleted dolphin stocks. Turning to the tuna fishery as a possible cause of the apparently depressed growth rate, the Service indicated that its literature review had led to the conclusion that stress resulting from chase and encirclement could not be dismissed as a possible cause. The Service also identified two other possible fishery-related causes: separation of dolphin mothers and calves during chase and encirclement and under-reporting of direct mortality.

Although it believed that the rate of recovery has been lower than expected, the Service found that, based on the available data, there was insufficient evidence to conclude that chase and encirclement are having a significant adverse impact on any depleted dolphin stock in the eastern tropical Pacific. The Service apparently interpreted the statute as requiring that it make such a finding if it could not determine "with certainty" that depleted dolphin stocks have been adversely affected by chase and encirclement. In making this finding, the Service noted, however, that it could not rule out chase and encirclement as a possible cause. It indicated that efforts to resolve the uncertainties would continue and would be reflected in the final determination to be made by the end of 2002.

The notice published by the Service explained that the initial finding would not become effective until the effective date of final regulations implementing the provisions of the International Dolphin Conservation Program Act. That is, the definition of dolphin-safe tuna would not change until a proposed rule had been published and finalized.

Since the initial finding was made, the results of the abundance surveys conducted during 1999 have become available. The 1999 abundance estimates for the coastal, northeastern offshore, and western/ southern offshore stocks of spotted dolphins were all lower than the 1998 estimates, although not significantly lower from a statistical standpoint. The point estimate of the abundance for eastern spinner dolphins for 1999 was significantly lower than the 1998 estimate. The Service cautions that these estimates should not be interpreted as indicating that any of these stocks are declining, because the estimates are too imprecise to draw such conclusions. Results of the 2000 surveys will not be available until mid- to late 2001.

Implementing Regulations – 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. Proposed implementing regulations were published by the Service on 14 June 1999. The Service proposed to amend the provisions applicable to dolphin-safe tuna to reflect the Service's initial finding on the effects of chase and encirclement. Once implemented, tuna caught in sets with no observed dolphin mortality or serious injuries could be labeled as dolphin-safe. The regulations also would allow entry into the United States of all yellowfin tuna caught in compliance with the International Dolphin Conservation Program Act, whether dolphin-safe or not. As required by statute, the regulations would also establish tracking and verification requirements to ensure that tuna products imported into the United States are accurately labeled.

Other aspects of the proposed rule would apply only to U.S. fishermen. These provisions would establish procedures for U.S. fishing vessels to obtain annual permits allowing them to participate in the eastern tropical Pacific tuna fishery on an equal footing with vessels from other nations.

Comments on the proposed rule were submitted by the Commission on 9 September 1999. The Commission believed that the proposed regulations generally tracked the applicable provisions of the International Dolphin Conservation Program Act and, except as noted in specific comments, recommended that they be adopted. Among other things, the Commission noted that the proposed rule needed to be updated to indicate that the International Dolphin Conservation Program Act had entered into force and to reflect the system for allocating stock-specific dolphin quotas, which was to have been adopted by the parties to the international agreement by 15 August 1999. In response to a specific request for comments as to whether affirmative findings of conformance with the requirements of the International Dolphin Conservation Program Act should be issued on a multi-year basis, the Commission expressed the view that findings should be made annually, at least with respect to determinations concerning whether countries are meeting their financial obligations to the Inter-American Tropical Tuna Commission and are comply-ing with applicable dolphin mortality limits. Similarly, the Commission believed that determinations regarding imports from intermediary nations needed to be reviewed periodically.

The Service proposed to correct, through issuance of the regulations, an apparent drafting error in the 1997 amendments concerning the time relative to sunset by

which sets must be completed. It appears that the applicable statutory provision erroneously established the point at which the backdown process is to be completed at 30 minutes *before*, rather than *after*, sundown. The Commission concurred that the statutory wording probably had resulted from an error, but noted that the legislative language was clear. The Commission therefore recommended that the problem be fixed by amending the Act rather than by regulation.

The Commission commented that the system of reporting and inspection requirements proposed by the Service to track and verify that tuna imported into the United States is properly labeled appears, at least in theory, to be adequate. The Commission expressed concern, however, that, although the Service will have the opportunity to observe offloading, deliveries, and other transfers, it was not clear what effort the Service intended to make in this regard. Without such information, the Commission was unable to comment on whether the proposed tracking and verification program would, in practice, provide the needed oversight. The Commission therefore recommended that the Service provide some sort of estimate of the effort that it expects to make to conduct spot checks under the tracking and verification program.

The Commission also noted that the proposed rule discussed efforts being made to negotiate an agreement among the nations that fish for tuna in the eastern tropical Pacific concerning a cooperative international tracking program, but did not indicate when such a program might be in place. The Commission thought it ill-advised, and possibly contrary to the requirements of the International Dolphin Conservation Program Act, to adopt final regulations allowing tuna to be imported into the United States before the international tracking and verification program has been agreed to and is in place.

The National Marine Fisheries Service published a related proposed rule on 22 December 1999, seeking comments on the proposed design of the official mark to be used to label dolphin-safe tuna. Final regulations adopting the official mark were published by the Service on 30 May 2000.

The National Marine Fisheries Service published an interim final rule implementing the provisions of the International Dolphin Conservation Program Act on 3 January 2000. Based on the Service's initial determination that there was insufficient information to determine that chase and encirclement of dolphins in the eastern tropical Pacific tuna fishery was having significant adverse effects on depleted dolphin stocks, the regulations specified that, beginning on 2 February 2000, the effective date of the regulations, tuna caught in dolphins sets during which no dolphin mortality was observed could be labeled as dolphin-safe. The regulations also set forth the evidence to be supplied and findings to be made before a fishing nation is authorized to import into the United States yellowfin tuna harvested by purse seine nets in the eastern tropical Pacific. As recommended by the Commission, the interim final rule specified that such findings would be reviewed on an annual basis, although harvesting nations need only request an affirmative finding every five years. Contrary to the Commission's recommendation that determinations for intermediary nations also be reviewed periodically, the Service indicated that such a review would be undertaken only when requested by the nation or when there is reason to believe that the nation may have imported yellowfin tuna banned from direct importation into the United States within the preceding six months.

To receive an affirmative finding a nation must provide documentary evidence concerning its membership in the Inter-American Tropical Tuna Commission, compliance with the International Dolphin Conservation Program, adequacy of its tuna tracking and verification program, and compliance with national dolphin mortality limits and annual stock-specific mortality limits. Under the regulations, a nation could exceed its total dolphin mortality limit in a given year and still receive an affirmative finding provided the limit was exceeded due to "extraordinary circumstances" beyond the control of the nation or the vessel captains and the nation took immediate action to require its vessels to cease fishing for tuna in associ-ation with dolphins for the remainder of the year. Similarly an affirmative finding could be made for a

nation that exceeded the annual stock-specific limits during the preceding year if the limit was exceeded due to extraordinary circumstances, setting on dolphins was immediately stopped for the remainder of the year, and the nation was making good-faith efforts to ensure compliance with the requirements of the International Dolphin Conservation Program by all vessels operating under its flag.

As noted earlier, there exists some confusion as to whether all sets must be completed to backdown 30 minutes before or after sunset. The Commission and others who commented on this aspect of the proposed rule cautioned that the proposed rule was inconsistent with the statutory provision and that, if an error had been made in the International Dolphin Conservation Program Act, it should be corrected legislatively. Nevertheless, the Service opted to use the later time limit because previous legislation and regulations had used it and there had been no indication in the legislative history of the 1997 amendments that Congress intended to change this requirement.

The interim final regulations also set forth the specifics of the tracking and verification program. Generally, tuna caught in sets in which no dolphin mortality or serious injury occurred and that caught in sets with mortalities or serious injuries are to be stored in separate wells on board the vessel. However, under the regulations there are two, presumably rare, instances in which dolphin-safe and non-dolphin-safe tuna may be kept in a mixed well. First, if the observer originally designates a set as being dolphin safe and subsequently discovers during the loading process that a dolphin mortality or serious injury has occurred, the dolphin-safe status of the well is changed. In such a situation, most of the previously loaded tuna would retain its dolphin-safe status. Under the regulations, 15 percent of the dolphin-safe tuna (by weight) would be redesignated as non-dolphin-safe to provide a buffer between the two types of tuna maintained in the well. The second exception would occur only at the end of a fishing trip, in those situations where the only storage space available is in a non-dolphin-safe well. In such an instance, dolphin-safe tuna may be loaded on top of the non-dolphin-safe tuna provided that it is segregated by a net or other barrier.

With respect to the Commission's comment that the adequacy of the tracking and verification program depends, in large part, on the resources directed at monitoring, the Service indicated that it plans to monitor all off-loading by U.S. purse seine vessels fishing in the eastern tropical Pacific. Further the Service indicated that it has requested and received funding to hire two inspectors to monitor such off-loading. As for the Commission's concern that the international tracking and verification program be in place before adoption of final regulations, the Service noted that such a program had been adopted by the parties to the International Dolphin Conservation Program.

The regulations also specify the requirements and procedures for U.S. fishermen to obtain operator and vessel permits, mirroring the statutory requirements. During 2000 the National Marine Fisheries Service issued six permits to U.S. tuna fishing vessels and nine permits to vessel operators under the new regulatory provisions. Despite securing such permits, however, no U.S. vessel engaged in setting on dolphins during 2000.

Litigation – As noted earlier, the National Marine Fisheries Service issued an initial finding on 29 April 1999 indicating that it was unable to determine whether chase and encirclement were having significant adverse effects on depleted dolphin stocks. On 18 August 1999 two individuals and ten environmental groups filed a lawsuit in U.S. district court challenging that finding (*Brower* v. *Daley*). The plaintiffs claimed that the best available scientific evidence supports a finding of significant adverse impact. They therefore alleged that the Service's finding was arbitrary and capricious and constituted an abuse of discretion in violation of the Administrative Procedure Act. Further in this regard, the plaintiffs contended that the evidentiary standard employed by the Service in making its finding (i.e., that the evidence show "with certainty" that chase and encirclement are having significant adverse effects on depleted dolphin stocks) is inconsistent with the applicable statutory provision.

The district court issued its ruling in this case on 11 April 2000. In the judge's view, Congress, in requiring that the initial finding be based, in part, on the research conducted by the National Marine Fisheries Service by 1 March 1999, "contemplated that the agency would consider at least preliminary data from the stress research projects in making the initial finding, given that this finding would determine any change in the dolphin safe label standard." Despite this

expectation, the Service "did not consider preliminary data from *any* of the three mandated stress research projects prior to the time of the initial finding." Further, the judge found that the record of the agency's decision failed to demonstrate any compelling reason why the studies had not been pursued promptly as Congress had intended. The court therefore concluded that the Service's decision to trigger a change in the dolphin-safe labeling standard on the grounds that it lacked sufficient evidence to make an informed finding failed to comport with both the spirit and the letter of the law, and could not withstand scrutiny under the Administrative Procedure Act. In line with these determinations, the court ordered that the Service's initial finding be set aside until the agency has had an opportunity to consider preliminary results from the mandated stress studies.

As to the challenge of the standard used to make the initial finding, the court disagreed with the plaintiffs that the Service had adopted a requirement that a finding of significant adverse impact be based on "conclusive evidence." Nevertheless, the court cautioned that the scientific evidence that was available to the decision makers (i.e., the abundance surveys of depleted dolphin stocks and the review of stress-related literature), although not conclusive, all pointed in the direction of there being a significant adverse impact.

The federal defendants filed a notice of appeal in this case on 18 May 2000. The appellants contended that the National Marine Fisheries Service had complied with the requirements of the International Dolphin Conservation Program Act by commencing the required study in October 1997 and completing the first year of the population abundance survey in 1998. In contrast to those date-specific requirements, other provisions of the Act did not specify the year or years during the five-year study in which other research was to be conducted. Consequently, they argued that the district court erred in finding that the Act mandated that the Service obtain results from the necropsy study and the chase and recapture experiment before March 1999. The Ninth Circuit Court of Appeals heard the case on 11 December 2000. A decision is expected sometime in 2001.

A second lawsuit against the National Marine Fisheries Service challenging certain aspects of the agency's tuna-dolphin program was filed in the U. S. Court of International Trade by environmental groups on 8 February 2000 (*Defenders of Wildlife* v. *Dalton*). The plaintiffs contended that certain provisions of the interim final rule published by the Service on 3 January 2000 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. Based on these alleged violations, the plaintiffs sought to have the court enjoin the importation into the United States of tuna taken from the eastern tropical Pacific under the new program. The plaintiffs filed an amended complaint on 7 April 2000 seeking to maintain the then-existing ban on the importation of yellowfin tuna from Mexico, despite the likely affirmative finding to be made under the new regulations. The defendants sought expedited resolution of this matter by filing a motion for a temporary restraining order or, in the alternative, a preliminary injunction. The court denied that motion in an 18 April 2000 ruling based on the plaintiffs' failure to show that they would suffer irreparable injury without such relief and a strong showing by the agency concerning the public interest in avoiding an injunction, which might result in the unraveling of the International Dolphin Conservation Program. The court specifically indicated that its ruling was not based on a determination of the plain-

tiffs' ultimate likelihood of success on the merits of the case. It is expected that the merits of the case will be heard by the court during the summer of 2001.

Affirmative Findings and Embargoes – As noted earlier, the regulations implementing the International Dolphin Conservation Program Act set forth the procedures and criteria for making affirmative findings for tuna-harvesting nations. Only countries with such a finding are permitted to import yellowfin tuna and yellowfin tuna products into the United States. During 2000 the National Marine Fisheries Service received applications for findings from Mexico, Ecuador, Panama, Spain, and Costa Rica. Affirmative findings were issued for Mexico and Ecuador, respectively, on 12 April and 31 May 2000. On 3 October 2000 the Service published a notice in the *Federal Register* indicating that embargoes applied to yellowfin tuna harvested by purse seine vessels in the eastern tropical Pacific from Belize, Bolivia, Colombia, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Vanuatu, and Venezuela. A subsequent notice published on 16 October indicated that yellowfin tuna harvested by Spain was also embargoed. Although Spain had submitted an appli-cation seeking authorization of imports, the Service determined that the documentation submitted by Spain was insufficient to support an affirmative finding. Costa Rica was informed that it did not need a finding because it currently did not have any purse seine vessels with greater than 400 short tons of carrying capacity that fish in the eastern tropical Pacific Ocean.

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. Based on a "lack of sufficient documentary evidence" that Costa Rica, Japan, and Italy were importing tuna products from nations subject to a U.S. embargo, the National Marine Fisheries Service, on 19 August 2000, lifted intermediary nation embargoes against tuna from these countries. Before that action, intermediary nation embargoes had been in place for these nations since 1992.

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 on the west coast and in the Gulf of Maine on the east coast.

To address 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 the formation of pinniped-fishery interaction task forces to identify research and management needs. Where nonlethal management alternatives prove ineffective, the section provides procedures to authorize lethal removal of individual seals or sea lions contributing to the problem. To address other concerns, section 120 also directs that various analyses and reports be completed to help assess appropriate responsive measures.

A summary of past actions by the Commission and others, and recent developments regarding pinniped-fishery interactions are provided below.

Authorizations to Remove Pinnipeds

To date, only the State of Washington has requested authority to lethally remove pinnipeds under section 120. As discussed below, however, it has not yet had to use that authority. Oregon is also monitoring an interaction problem at Willamette Falls, but is trying to address it using nonlethal means.

Ballard Locks – Winter-run steelhead salmon that reproduce in streams emptying into Lake Washington and then into Puget Sound must pass through the Chittenden, or Ballard, Locks in Seattle. From the early 1980s to 1994 the number of returning steelhead declined from nearly 3,000 to fewer than 100.

During that period, increasing numbers of California sea lions were observed congregating at the locks to prey on the steelhead. The State of Washington and the National Marine Fisheries Service attempted various nonlethal methods to reduce sea lion predation, but were initially unsuccessful. The Washington Department of Fish and Wildlife therefore sought authority from the Service to lethally take individually identified California sea lions known to prey on the steelhead. The Department's application prompted the Service to establish in 1994 a pinniped-fishery interaction task force under section 120(c). Based on recommendations of the task force, the National Marine Fisheries Service authorized the Department to lethally remove individual sea lions provided (1) the animals had been observed taking steelhead at the site, (2) nonlethal means had failed, and (3) the identified animals were present during the run. The authorization was initially valid to 30 June 1997, but was extended until 30 June 2001. As discussed in past annual reports, the Commission provided comments to the Service at various steps in this process.

No sea lions were killed during the 1994–1995 winter run, but three were captured, held in captivity until the end of the run, and then released in the Strait of Juan de Fuca. No sea lions were lethally removed during the 1995–1996 winter run, but three were captured and removed to permanent captivity at Sea World in Orlando, Florida. In addition, an acoustic array was installed around the locks to deter sea lions that might approach the locks to forage on steelhead and other salmon, and measures were taken to enhance the fish passageways. No sea lions have been observed foraging on steelhead at the locks since then. Pending new developments, review by the Ballard Locks Task Force has been suspended, and no further action is planned. The State of Washington and the National Marine Fisheries Service have continued to monitor the situation. Steelhead escapement increased from 70 in 1994 to 126 in 1995, 234 in 1996, 620 in 1997, and 584 in 1998. In 1999, however, salmon escapement dipped to about 220 and in 2000 it fell to a record low of 48. Since no sea lion predation was observed in 1999 or 2000, the recent decline appears to be due to factors other than sea lion predation at the locks.

Willamette River – In recent years, California sea lions have been observed in the lower Willamette River in Oregon during the winter and spring migration of chinook and steelhead salmon. Observers from the Oregon Department of Fish and Wildlife also have documented sea lions foraging on salmon near fishway entrances at Willamette Falls during the peak salmon runs. During this period, the river's spring chinook and winter steelhead populations— he only native salmonid populations occurring above the falls—have declined, raising concern about the potential effects of sea lion predation on those stocks.

On 13 March 1997 the National Marine Fisheries Service published a *Federal Register* notice requesting comments on a draft environmental assessment concerning interactions between California sea lions and salmonids at Willamette Falls. The draft assessment addressed the potential consequences of a joint proposal by the Service and the Oregon Department of Fish and Wildlife for the nonlethal removal of sea lions at the Willamette Falls site. The joint proposal included plans for monitoring the extent of sea lion predation and identifying additional deterrence meas-ures. On 2 January 1998 the Service published a notice in the *Federal Register* announcing the availability of an environmental assessment and finding of no significant impact on its proposal to use nonlethal measures to prevent sea lion predation on salmonid stocks at Willamette Falls.

During 1998 the Service and the Oregon Department of Fish and Wildlife continued a joint monitoring program to document sea lion predation at the site. At its annual meeting on 19–21 October 1999 the Commission was advised by representatives of the Department that a growing number of sea lions had been observed at Willamette Falls during the winter/spring salmon run, and that the Department was concerned that the level of sea lion predation would increase. The Department, however, did not have adequate information to identify individual problem animals, as is required to authorize lethal removals.

In 2000 the Department continued its observations of sea lion predation at Willamette Falls and began preparation of a report summarizing their observations over the last several years, including fish lost, predator behavior, and efforts to trap animals. The Department also hired a biometrician to estimate the level of take from 1997 to 2000. Funding for this and related research has been provided by the State of Oregon and

the National Marine Fisheries Service. Recent work also has included the tagging of sea lions near Astoria, at the mouth of the Columbia River. Such tagging provides a reliable means of identifying individual animals. In recent years, three tagged animals have been observed at Willamette Falls, one of which was observed in more than one year. The number of sea lions at Willamette Falls appears to have increased slowly in the 1990s, but was lower in 2000, perhaps as a result of a northward shift in the winter distribution of sea lions.

Investigation of Possible Pinniped Impacts on Endangered West Coast Salmonid Stocks

Section 120(f) of the Marine Mammal Protection Act directed the Secretary of Commerce to investigate whether California sea lions and Pacific harbor seals are having significant negative impacts on the recovery of endangered and threatened salmonid stocks or other components of coastal ecosystems in Washington, Oregon, and California. The Service constituted a working group to address this directive and, based on the group's report, prepared a draft report to Congress. The draft report was forwarded to the Marine Mammal Commission and others for comment on 3 April 1997. A discussion of the draft report's findings and recommendations, along with the Commission's comments, is included in previous annual reports. Among other things, the draft report proposed amending the Marine Mammal Protection Act to authorize state and federal officials to kill California sea lions and harbor seals seen eating salmonids from stocks listed as endangered or threatened or from other depressed salmon stocks if nonlethal deterrence methods have been determined to be ineffective or impractical.

In its comments on the Service's draft report, the Commission recommended, among other things, that the Service revise the report to request that Congress authorize such steps as may be needed to reduce pinniped predation under the following conditions: (1) the proposed action is part of a comprehensive plan to restore one or more specific salmonid stocks, (2) the plan has been made available for public review and has been approved by the Service, and (3) there is an adequate monitoring program to verify that the management actions are contributing as expected to the recovery of the salmonid stocks. The Commission also recommended that the Service either explain the rationale for its criteria to identify problem pinnipeds and decide when nonlethal deterrents are ineffective, or defer its proposal for authorizing the killing of pinnipeds until it can be shown with greater certainty that pinniped predation cannot be addressed effectively by practical, nonlethal means.

On 10 February 1999 the Service submitted its Report to Congress on Impacts of California Sea Lions and Pacific Harbor Seals on Salmonids and West Coast Ecosystems. The report concluded that although the nature and extent of conflicts between pinnipeds and other elements of west coast ecosystems are unclear, these conflicts do exist and appear to be increasing. The report identified a high potential for pinniped impacts on salmonid populations at a number of sites along the west coast. In addition, the report noted, pinnipeds also conflict with commercial and recreational fisheries, cause damage to docks and boats, and create human safety issues.

In response to the Commission's recommendation that the Service defer its proposal to authorize lethal taking of pinnipeds, the Service's report concluded that, in cases where enough is known about pinniped effects on other living marine resources to raise valid concerns, management action should not be delayed to obtain additional information. Accordingly, the report recommended that Congress amend the Marine Mammal Protection Act to give federal and state agencies a general authorization in certain instances to lethally remove California sea lions and Pacific harbor seals to resolve apparent conflicts that pose a risk to depleted salmonid stocks. The Service concurred with the Commission's recommendation that a salmon conservation or recovery plan be in place or in development before the lethal removal of pinnipeds is authorized.

In its 29 June 1999 testimony before the House Subcommittee on Fisheries Conservation, Wildlife and Oceans, the Commission stated that it shared the National Marine Fisheries Service's view that resource agencies should be given authority to stop pinniped predation that is preventing or impeding the recovery of depleted salmonid stocks, and that lethal measures are appropriate when nonlethal measures are neither practical nor effective. The Commission underscored

its belief that such authority should be available only in those instances when a conservation or recovery plan that appropriately addresses all factors responsible for the salmonid stock's depressed status is in place, the plan has been made available for review by interested parties and approved by the Service, and procedures have been established to verify that the authorized management actions have the expected results.

As discussed in Chapter II, Congress is expected to give further consideration to pinniped-fishery interactions when reauthorization of the Marine Mammal Protection Act is considered, possibly in 2001.

Gulf of Maine Task Force on Aquaculture-Pinniped Interactions

Marine mammals may adversely affect aquaculture operations by preying upon raised fish or shellfish and damaging aquaculture nets or other equipment. One area of particular concern is the northeastern United States, where both the salmon aquaculture industry and local populations of harbor seals and gray seals have increased in recent years. Operators of aquaculture facilities in the area have complained of a corresponding increase in pinniped predation on penned fish. In response, Congress amended the Marine Mammal Protection Act in 1994 by adding section 120(h). That section directed the Secretary of Commerce to establish a task force to examine situations in which "pinnipeds interact in a dangerous or damaging manner with aquaculture resources in the Gulf of Maine."

After consulting the Marine Mammal Commission and others, the National Marine Fisheries Service established a seven-member task force, including representatives of industry, state government, the scientific community, and conservation organizations. In August 1997 the Service provided Congress with a report of the task force findings, including recommendations for mitigating such interactions. The task force and the recommendations have been discussed in detail in previous annual reports.

In its 29 June 1999 testimony on possible amendments to the Marine Mammal Protection Act the Marine Mammal Commission noted that, although economic losses resulting from pinniped predation on penned fish may be substantial, the Service's report concluded that better data are needed on the nature and extent of damage being caused by seals. The report placed the responsibility for collecting such data and developing seal deterrence technologies on the aquaculture industry. The report suggested, however, that when a seal has entered a fish pen despite all efforts to prevent it from doing so and its removal could jeopardize human safety, lethal removal authority should be provided. In its testimony, the Commission concurred with this conclusion, but stressed that aquaculture operators should be required to meet certain standards with respect to pen design and construction before being given such authority.

Since completion of the Service's report in 1997 the Commission is aware of no further efforts to assess or resolve pinniped interactions with aquaculture operations in the Gulf of Maine.

Review of Pinniped-Fishery Interactions

At its 19–21 October 1999 annual meeting in Seaside, California, the Commission reviewed issues related to interactions between pinnipeds and fisheries. Seals and sea lions not only prey on endangered and threatened salmonid stocks, but also remove caught fish from salmon trollers and commercial passenger fishing vessels along the U.S. west coast. At the meeting, representatives of the National Marine Fisheries Service and the California Department of Fish and Game briefed the Commission on the Service's contract with the Pacific States Marine Fisheries Commission to develop and test a pulsed-power device to reduce sea lion predation on fish caught by recreational fishermen on commercial passenger fishing vessels. The representatives also briefed the Commission on a draft environmental assessment prepared for the testing of the device.

In a 23 November 1999 letter the Commission informed the Service that it recognizes that sea lion predation has an economic impact on commercial passenger and salmon troll fisheries in California and that nonlethal means for preventing or reducing such predation are needed. However, while recognizing the potential utility of the pulsed-power device, the Commission expressed concern that the environmental assessment for field testing the device did not adequately evaluate its possible environmental impacts. The Commission further suggested that the draft environmental assessment did not identify the full

range of possible alternatives, nor did it necessarily identify the best of the possible alternatives. Specifically, the Commission noted that the emissions of the pulsed-power device are likely to exceed the pain threshold of sea lions and that previous tests of high-intensity sounds failed because the animals became accustomed to the sounds, learned to avoid them, or were deafened by the sounds. The Commission recommended that before field testing of the unit, studies be conducted to determine if a desired conditioned response can be elicited and maintained with a potentially less damaging signal. Based on concerns that sea lions in the wild could be seriously injured by testing of the pulsed-power device, the Commission also recommended that captive studies be conducted to address uncertainties before any field studies are initiated. Finally, the Commission noted that the probability of sea lion predation on caught fish may be enhanced by the behavior of operators or passengers of such vessels. The Commission therefore recommended that experienced sea lion trainers be employed to observe fishing operations, identify human behaviors that may be contributing to the inter-actions, and suggest methods to reduce such behaviors.

In a 26 March 2000 reply to the Commission's letter of 23 November 1999 the Service indicated that the California Coastal Commission did not concur with the Service's consistency determination for field testing of a pulsed-power deterrence device. The Service recognized the need for research on captive animals to provide information on potential detrimental effects of such a device and has provided funds for such research. The principal objective of the research is to determine if the device can be used safely (i.e., without the risk of permanent hearing loss) on California sea lions. The research is ongoing and results were not available at the end of 2000. If the device can be used without the risk of permanent hearing loss, then the Service stated that it may proceed with field testing. The Service also stated that if the results of captive testing indicate that it could cause mortality or serious injury to sea lions, then use of the device would be prohibited through regulation required by the Marine Mammal Protection Act. The Service did not reply to the Commission's recom-mendations regarding the potential use of a less damaging signal and the employment of trainers to identify human behaviors that might increase the likelihood of detrimental interactions. In a follow-up letter of 20 April 2000 the Commission again requested a response to these two recommendations, but none had been received as of the end of 2000.

Table 11. Annual number of reported strandings of California sea lions along the California coast, including those with gunshot wounds, 1995–1999

Year	Total	Number gunshot	Percent of total
1995	791	31	3.9
1996	724	33	4.6
1997	1,262	53	4.2
1998	2,576	74	2.9
1999	596	19	3.2

Source: Southwest Region, National Marine Fisheries Service

Before amendment of the Marine Mammal Protection Act in 1994, commercial fishermen were authorized to take marine mammals lethally to protect their gear and catch when nonlethal means had proven ineffective. The 1994 amendments prohibited such taking, but it may be continuing in some locations. At its 1999 annual meeting, the Commission was advised by representatives from the Marine Mammal Center that along the California coast considerable numbers of seals and sea lions are found stranded every year with gunshot wounds. Records submitted to the Service's Southwest Region by the California Marine Mammal Stranding Network (Table11) indicate that approximately 3 to 4 percent of stranded California sea lions have been gunshot. It has been suggested that many, if not most, of these animals are shot by commercial fishermen attempting to stop animals from taking fish.

In response to this information, the Commission wrote to the National Marine Fisheries Service on 30 November 1999. The letter noted that the number of animals being shot each year is probably much greater than documented through stranding programs because many animals shot and killed are likely not recovered. Nevertheless, the Commission believes that the illegal shooting of pinnipeds as indicated by the stranding data constitutes a significant enforcement problem that the

Service needs to address. For that reason, the Commission recommended that the Service increase efforts to educate fishermen about legal deterrence measures and give higher priority to identification of those responsible for the shooting.

Although recognizing the potential for pinniped predation to have adverse economic effects, the Commission expressed its greater concern that pinniped predation might prevent the recovery of depleted salmonid stocks or contribute to their extinction. The Commission recommended that the Service continue to work with the states to identify situations where lethal removal of pinnipeds may be necessary. Nonetheless, in its 30 November letter the Commission also noted that funds provided to the Service and the Pacific States Marine Fisheries Commission to study west coast pinniped-fishery interactions have been directed primarily at documenting the extent and nature of interaction problems, without adequate attention to development of nonlethal ways to deter seals and sea lions from engaging in such interactions. Accordingly, the Commission recommended that the Service convene a workshop of fishery specialists, marine mammal behaviorists, trainers, and other appropriate experts to recommend a program of specific studies aimed at identifying safe and effective deterrence measures.

In a 10 February 2000 reply to the Commission's letter of 30 November 1999 the Service agreed that pinniped predation may affect recovery of salmonid populations protected under the Endangered Species Act, and that lethal removal of pinnipeds in such cases is consistent with the Marine Mammal Protection Act. The Service noted that it, along with west coast states and the Pacific States Marine Fisheries Commission, had agreed to a research and management plan that recognized pinniped predation on endangered salmonids as the highest priority conflict and directed resources accordingly. The Service stated that it would discuss the need for a workshop on deterrence technologies with the west coast states and the Pacific States Marine Fisheries Commission, and that it has contacted Sea World about testing of sea lions previously exposed to acoustic harassment. However, the Service also suggested that provisions of section 120 are complicated and time-consuming, and require considerable resources that may not be available. As a consequence the Service recommended to Congress that a new framework be developed for addressing pinniped conflicts. Finally the Service noted that due to lack of resources, it was unlikely that it would be able to address the recommendations in the Marine Mammal Commission's 30 November 1999 letter.

Chapter V

INTERNATIONAL ASPECTS OF MARINE MAMMAL PROTECTION AND CONSERVATION

Section 108 of the Marine Mammal Protection Act directs the Departments of Commerce, the Interior, and State, in consultation with the Marine Mammal Commission, to take such actions as may be appropriate or necessary to protect and conserve marine mammals under existing international agreements. It also directs them to negotiate additional agreements required to achieve the purposes of the Act. In addition, section 202 of the Act directs that the Marine Mammal Commission recommend to the Secretary of State and other federal officials appropriate policies regarding international arrangements for protecting and conserving marine mammals.

During 2000 the Commission completed and published the second update to the compendium of international treaties and agreements bearing on the conservation of marine wildlife. The Commission also continued to devote attention to providing advice on the International Whaling Commission, conservation of marine mammals and marine ecosystems in the Arctic, and regulation of international trade in marine mammals under the Convention on International Trade in Endangered Species of Wild Fauna and Flora. These activities are discussed below.

The Compendium of Treaties and International Agreements

In 1994 the Marine Mammal Commission published *The Marine Mammal Commission Compendium of Selected Treaties, International Agreements, and Other Relevant Documents on Marine Resources, Wildlife, and the Environment*. The three-volume, 3,500-page *Compendium*, current through 1992, contains the complete texts of more than 400 international agreements, including more than 100 multilateral and 90 bilateral treaties, agreements, accords, and memoranda of understanding. It also includes numerous amendments and protocols to these documents, several nonbinding international documents, and a number of significant documents to which the United States is not a party.

The *Compendium* is divided into two sections comprising multilateral and bilateral documents, many of which were made publicly available for the first time. Subject areas include Antarctica, environment and natural resources, fisheries, marine mammals, marine pollution, marine sciences and exploration, and others. The *Compendium* also contains background information for each document, including primary source citations, the depositary nation or organization, the city in which the document was concluded, the date it was concluded, and, where applicable, the date on which it entered into force.

In 1997 the Commission published the *First Update* to the *Compendium*, which contains documents that were concluded between 1 January 1993 and 31 December 1995, as well as a number of older documents not included in the original *Compendium*. The revised edition contains more than 25 additional multilateral and 50 additional bilateral documents in the same subject areas as the original.

In 2000 the Commission completed work on the *Second Update* to the *Compendium*, which covers the period between 1 January 1996 and 31 December 1998. The *Second Update* includes 48 additional multilateral and 36 additional bilateral agreements, as well as older documents not listed in the original *Compendium* or *First Update*. Like its predecessor volumes, the *Second Update* is focused on legal instruments that specifically address natural resource conservation,

pollution, or protection of the marine environment. The subject areas have been altered slightly to reinforce this focus. The volume is expected to be published in early spring 2001.

The *Compendium* and its updates continue to serve the environmental, legal, and academic communities by providing easy access to documents that define and establish international legal commitments of the United States and other nations in the field of environmental protection.

International Whaling Commission

The failure of the International Whaling Commission (IWC) to regulate commercial whaling effectively before the 1970s allowed many whale stocks to be reduced to levels approaching biological extinction. This was one of the factors that led to passage of the Marine Mammal Protection Act and establishment of the Marine Mammal Commission. Since it was established, the Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, has continued to provide advice to the Department of Commerce and the Department of State on measures necessary to restore depleted whale stocks and to ensure that commercial and aboriginal subsistence whaling does not cause any whale stock to be reduced or maintained below its optimum sustainable level. Activities related to the 2000 annual meeting of the IWC are described below.

Preparations for the 2000 IWC Meeting

To prepare for the IWC's annual meeting in 2000 the National Oceanic and Atmospheric Administration, which serves as the lead agency representing the United States at IWC meetings, convened meetings of a public/interagency committee early in 2000 to help develop and review U.S. positions on major issues scheduled for discussion. A representative of the Marine Mammal Commission attended these meetings as part of the Commission's efforts to work with officials of the National Oceanic and Atmospheric Administration, the Department of State, and the Department of the Interior. Among the principal issues facing the IWC and its Scientific Committee at their 2000 meetings were the following:

- development of a Revised Management Scheme for commercial whaling;
- development of a new Aboriginal Whaling Management regime;
- commercial whaling being conducted by Norway without IWC authorization;
- continued whaling for research by Japan in the Southern Ocean Sanctuary and in the North Pacific, as well as Japan's plan to expand the North Pacific operation to include taking of Bryde's whales and sperm whales;
- a request by Japan for authorization for coastal community-based whalers to catch 50 minke whales;
- the effects of climate change and environmental contaminants on cetaceans;
- the need to conserve highly endangered whale populations;
- the future of the IWC; and
- a proposal by Australia and New Zealand to create a whale sanctuary in the South Pacific.

The 2000 Meetings of the IWC and Its Scientific Committee

The 52nd annual meeting of the IWC was held in Adelaide, Australia, on 3–6 July 2000. It was preceded by four days of working group meetings and two weeks of Scientific Committee meetings.

The Moratorium on Commercial Whaling – In 1982 the IWC adopted a moratorium on commercial whaling that entered into effect during the 1985 pelagic and 1986 coastal whaling seasons. Although several nations filed formal objections to the moratorium, only Norway and Russia continue to maintain their objections. Under the International Convention for the Regulation of Whaling, nations that file objections within a specified period after a measure is approved are not obligated to comply with its provisions. As discussed below, the IWC is working on developing a Revised Management Scheme, which would provide a framework for limited commercial whaling, should the moratorium be lifted.

As it has at each meeting for the past 12 years, Japan submitted a proposal at the IWC's 2000 annual meeting requesting a quota of 50 minke whales to allow four coastal communities to engage in "small-type"

whaling operations. Japan again contended that whaling at this level would have no adverse impact on the stock and that the quota was needed to alleviate economic distress in these communities resulting from the moratorium on commercial whaling. Opponents to the proposal again pointed to the commercial aspects involved in Japan's request and contended that the integrity of the moratorium should be sustained unless and until the Revised Management Scheme is adopted and the moratorium lifted. As in the past 12 years, the IWC again rejected Japan's proposal. The vote on the proposal was 18 against, 12 for, and 2 abstentions. The IWC did, however, pass a resolution by a vote of 16 to 13 with 3 abstentions, reaffirming its commitment to work to alleviate the distress caused to the four coastal communities by cessation of whaling. The United States voted against both proposals.

The Revised Management Scheme – Before adoption of the moratorium on commercial whaling, excessive catch quotas authorized by the IWC contributed to the overexploitation and depletion of whale stocks. At its 1986 meeting the IWC asked its Scientific Committee to develop a scientifically based method for determining commercial whaling catch quotas that would have a low probability of adversely affecting harvested whale stocks. The Committee subsequently did so, and the revised management procedure setting forth a new formula for calculating whaling quotas was accepted in principle at the 1994 IWC meeting as part of a Revised Management Scheme being developed to regulate any resumption of commercial whaling. The IWC recognized that determining catch limits that have a low probability of adversely affecting exploited stocks, however, is only part of an effective management program. In this regard, work has continued to develop other essential components of the Revised Management Scheme, including mechanisms for compliance monitoring and enforcement and requirements for conducting whale surveys and data analyses.

The urgency for developing a Revised Management Scheme was increased by deliberations at the 2000 meeting of the parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). That body considered a request by Japan to change the listing of certain whale populations from Appendix I to Appendix II, an action that would ease restrictions on the international trade of whale meat (see the CITES section of this chapter). Although the request was denied, the parties urged the IWC to complete its work on the Revised Management Scheme before the next CITES meeting in 2002.

The IWC's working group on the Revised Management Scheme therefore met before the IWC meeting to develop a text for a new supervision and control scheme to replace the current text contained in the IWC Schedule of Regulations. Although the revised text resolved some issues, it highlighted several remaining areas of disagreement. Among the areas of major dispute were the following: whether every whaling operation must have an international observer, whether the scheme should include DNA testing of whale meat to track and verify that whale products sold commercially come from authorized whale harvests, whether observer reports should be filed daily or at the end of a whaling trip, whether an IWC committee should be established to address compliance issues, and whether the costs of the scheme should be borne by the whaling nations or by the IWC.

The IWC Scientific Committee also continued to review aspects of the revised management system. In this regard, it established a working group to estimate other human-induced mortality, including the incidental catch of whales in commercial fishing gear, that should be considered when calculating whaling catch quotas. Most of its work, however, concentrated on simulation trials to predict population trends for North Pacific minke whales. These trials, carried out before determining a catch quota, include test cases representing the full range of uncertainty in such matters as range occupied, stock structure, and possible mixing of multiple stocks in some areas. For North Pacific minke whales the major factors being considered relate to stock identity and levels of human-caused removals other than by direct whaling (e.g., bycatch in fishing gear).

During consideration of the Revised Management Scheme at the 2000 annual meeting, Japan submitted a draft Schedule amendment proposing to lift the moratorium on commercial whaling immediately. The proposal, however, was withdrawn without coming to a vote after considerable opposition was expressed. Instead, the IWC passed a resolution by consensus calling for the expeditious completion of the Revised

Management Scheme and requesting the IWC Secretariat to draft an amendment incorporating the structure and elements of the Revised Management Scheme into the IWC Schedule. The resolution instructed the Secretary to circulate the draft text and called for a meeting of the working group on the Revised Management Scheme by the end of February 2001. The resolution noted that three elements remain to be completed: (1) an effective observation and enforcement scheme, (2) arrangements to ensure that total catches over time are within the limits set under the system, and (3) incorporation of revised text into the Schedule. In carrying out the directive, the IWC Secretariat was instructed to consult with the IWC Chairman and to use such independent legal advice as was necessary to prepare a draft amendment incorporating the structure and elements of the revised management system into the Schedule.

On a related matter, a resolution was proposed asking the Scientific Committee for advice on developing a system for DNA analyses to monitor illegal sales of whale meat in markets and to help track whale meat taken in legal catches. Many pro-whaling members of the IWC noted that the matter concerned trade and therefore should be addressed by parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora. As a result, the resolution failed by a vote of 13 against, 11 for, and 8 abstentions.

The Future of the IWC – At the 1997 IWC meeting Ireland expressed the view that, unless progress was made to complete the Revised Management Scheme, there was a risk that the IWC could collapse and that commercial whaling would then take place outside IWC control. Noting that the revised formula for calculating catch quotas had been accepted in principle and that work was proceeding on inspection and control schemes, Ireland offered a proposal to break the impasse that has existed between nations supporting a resumption of commercial whaling and those that oppose it. Under the Irish proposal, the IWC would complete and adopt the Revised Management Scheme and issue quotas for certain coastal whaling activities, such as those conducted by Norway and proposed by Japan. All other waters would be declared a global whale sanctuary. Products from authorized whaling could be used only for local consumption, with no international trade allowed. In addition, lethal scientific research whaling would be phased out.

Discussions of the Irish proposal continued at the 2000 meeting, but there was no progress on developing a consensus. Nevertheless, several commissioners expressed interest in continuing discussions, and agreement was reached to keep the matter on the IWC agenda for the 2001 meeting.

Aboriginal Subsistence Whaling – In addition to including catch limits for commercial whaling (currently set at zero under the moratorium), the IWC Schedule includes catch limits for aboriginal subsistence whaling by various Native groups. In 1997 the IWC adopted new subsistence quotas for the take of bowhead whales from the Bering–Chukchi–Beaufort Seas stock and eastern North Pacific gray whales by Natives in the United States and Russia. The quota for bowhead whales was set at 280 whales over a five-year period extending through 2002. Under that quota, no more than 67 whales may be struck in any one year, and up to 15 unused strikes remaining from the 1995–1997 quota may be added to the strike quota for any year under the current quota. Thus, the IWC bowhead quota for 2000 authorized 67 strikes plus 15 strikes carried over from 1999 for a total strike limit of 82. The quota for gray whales set a catch level of 620 whales over the same five-year period with no more than 140 whales taken in any one year. Those catch limits, to be shared by U.S. and Russian Native whalers, were not changed during the 2000 IWC meeting.

The hunt of bowhead whales by Alaska Native whalers is managed under a cooperative agreement between the National Oceanic and Atmospheric Administration and the Eskimo Whaling Commission (a Native organization established to represent and oversee whaling by Alaska Native whalers). Under that agreement, catch levels consistent with IWC catch limits are allocated by the Eskimo Whaling Commission among whaling villages in Alaska. Under an agreement between the United States and Russia, the IWC's bowhead whale quota for 2000 was shared by allocating 75 strikes to Alaska Natives and 7 strikes to Russian Natives. During the year, Alaska whalers landed 35 bowhead whales and struck and lost 12 for a total of 47 whales struck. Russian whalers struck and

landed one whale; no other whales were struck. Catch levels by Alaska Natives under current and earlier IWC quotas are shown in Table 12.

As discussed in the gray whale section of Chapter III, the Makah Indian Tribe in the state of Washington reinitiated subsistence whaling for gray whales in 1999. Under a bilateral agreement between the United States and Russia, up to five whales per year may be taken by Makah whalers under the IWC quota and 135 whales per year will remain available for use by Russian Natives. In 1999 Makah whalers took one gray whale and in 2000 none were taken due to legal interventions under which whaling activity was suspended. Russian whalers took 113 gray whales during 2000. At the 2000 IWC meeting the United States reported the 1999 take of a gray whale by the Makah Tribe. The Russian Federation reported that 10 of the gray whales harvested in Russia in 1999 had a strong medicine-like smell and were deemed unsuitable for human consumption. The Russian Commissioner therefore advised the IWC that Russia may seek an increase in the quota in 2002 if unusable animals continue to be taken.

With regard to both bowhead whales and gray whales, the Scientific Committee strongly recommended that further research be undertaken to assess the status of the stocks subject to aboriginal subsistence whaling. It recommended that a census be attempted in 2001 for the Bering–Chukchi–Beaufort Seas stock of bowhead whales, and that additional monitoring be carried out for the eastern North Pacific stock of gray whales. Particular concern was raised about gray whales, which may be approaching carrying capacity, because of an increase in the number of dead whale strandings and a decrease in the number of calves observed in 1999 and 2000 (see the gray whale section in Chapter III).

On behalf of its Bequian whalers, the nation of St. Vincent and The Grenadines also has sought and received IWC aboriginal subsistence whaling quotas for humpback whales. The current catch limit, which was approved at the 1999 IWC meeting and which allows a take of two whales per year for the 2000 to 2002 whaling seasons, expressly forbids the take of calves or any humpback whale accompanied by a calf. During the 2000 IWC meeting, the Commissioner for St. Vincent and The Grenadines reported that two hump-

Table 12. IWC quotas and number of bowhead whales taken by Alaska Natives, 1973–2000

Year	Quotas[1] (Landed/ Struck)	No. Landed	Struck but not Landed	Total Struck	% Struck and Landed
1973	–	39	20	59	66
1974	–	20	34	55	36
1975	–	15	28	43	35
1976	–	48	43	91	53
1977	–	29	82	111	26
1978	14/20	12	6	18	67
1979	18/27	12	15	27	44
1980	18/26	16	28	44	36
1981	17/27	17	11	28	61
1982	17/27	8	11	19	42
1983	17/27	9	9	18	50
1984	–/43	12	13	25	48
1985	–/26	11	6	17	65
1986	–/26	20	8	28	71
1987	–/32	22	9	31	71
1988	–/35	23	6	29	79
1989	41/44	18	8	26	69
1990	41/47	30	14	44	68
1991	41/44	28	19	47	60
1992	41/54	38	12	50	76
1993	41/54	41	11	52	79
1994	41/52	34	12	46	74
1995	–/68	43	14	57	75
1996	–/77	39	5	44	89
1997	–/76	48	18	66	73
1998	–/82[2]	41	13	54	76
1999	–/82[2]	42	5	47	89
2000	–/82[2]	35	12	47	74

[1] Whaling is to cease whenever the number of whales landed or the number of strikes made reaches the specified number, whichever comes first. Since 1995 IWC quotas have been set for strikes only.

[2] Subject to a U.S.-Russian agreement, U.S. Natives are allocated no more than 75 strikes and Russian Natives are allocated no more than 7.

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

Information for the years 1994 through 2000 was provided by the National Marine Fisheries Service.

back whales were taken in 1999 and denied reports that the whales taken were a mother-calf pair. Several delegations, however, voiced their beliefs that the smaller whale taken was a calf and the take should have been reported as an infraction. In addition, several delegations expressed concern that St. Vincent and The Grenadines had not adopted domestic legislation or regulations to govern its whale hunt. This led to considerable discussion and expression of concern, and the IWC agreed to reexamine the issue at its 2001 meeting.

Aboriginal subsistence catch limits for fin whales and minke whales taken by Natives in Greenland also remained unchanged in 2000. The five-year catch limit for North Atlantic minke whales, which extends through 2002, is set at 175 whales per year, with up to 15 strikes unused in any year available to be added to a subsequent year's limit. The catch limit for North Atlantic fin whales is 19 whales per year.

Finally, the Scientific Committee's standing working group on the development of an aboriginal whaling management procedure met in November 1999 in Seattle. The working group continued to develop a new aboriginal whaling management procedure, with a particular emphasis on aboriginal whaling for bowhead whales and gray whales. The working group hopes to present a formal recommendation to the IWC on all scientific aspects of a management scheme for bowhead and gray whales by the 2002 annual meeting.

Assessment of Whale Stocks – As part of the comprehensive assessment of whale stocks called for under the commercial moratorium, the IWC Scientific Committee has for the past decade focused attention on assessing the status of various stocks. At the 2000 meeting priority was given to Southern Hemisphere humpback whales, with considerable progress made toward completing the assessment.

The Committee also discussed abundance estimates for Southern Hemisphere minke whales. It concluded that the 1990 estimate of 760,000 whales was no longer valid and that preliminary assessments of new data suggest that the stock size is appreciably lower than the previous estimate. The Scientific Committee is planning a major review of the matter for 2001. This has important implications for any future use of the revised procedure for calculating commercial catch limits, and for evaluating the effect of Japan's research whaling programs on target whale stocks.

The Scientific Committee also considered Southern Hemisphere blue whales. Reexamining field data and analyses for the extent to which they distinguished between blue whales and pygmy blue whales, the Committee agreed that a negatively biased estimate of blue whale abundance south of 60°S during the period 1980 to 2000 was 400 (CV = 0.4) to 1,100 (CV = 0.4).

The Scientific Committee also expressed extreme concern about the status of North Atlantic right whales (see also the North Atlantic right whale section in Chapter III). The Committee considered this population to be in serious danger and advised the IWC that, by any management criteria applied by the IWC, including those for both commercial whaling and aboriginal subsistence whaling, it was of the utmost urgency that steps be taken to reduce all anthropogenic mortality in this population to zero. In this regard, the IWC passed a resolution by consensus commending ongoing efforts to protect this species and encouraging further efforts.

Research Whaling – The International Convention for the Regulation of Whaling allows member nations to issue permits to its citizens to kill whales for scientific research purposes, provided that research plans are submitted to the IWC Scientific Committee for review and comment before the permits are issued. Since 1988 Japan has issued permits to its citizens for research whaling. The value of this research has been much debated, and the IWC has adopted a series of nonbinding resolutions calling on Japan to refrain from issuing permits authorizing lethal research.

At its 2000 meeting the IWC Scientific Committee reviewed proposals by Japan to continue its research whaling for minke whales in the Southern Hemisphere and to expand its research program in the North Pacific Ocean. The Scientific Committee directed most of its discussion to the latter proposal, which would expand Japan's take of minke whales to include two other species. The proposal calls for the killing of 100 minke whales, 50 Bryde's whales, and 10 sperm whales per year. The stated goal of the research program is to obtain information to contribute to the

conservation and sustainable use of the region's marine living resources. There was considerable disagreement within the Committee over most aspects of the proposed program, including its objectives, methodology, likelihood of success, and effect on stocks. The plan to take sperm whales was particularly controversial.

When the proposals came before the IWC, two resolutions were adopted. The first noted that Japan's North Pacific program did not address any priority issues, had many methodological problems, and could be done just as well using nonlethal methods. The resolution therefore called on Japan to refrain from issuing the required research permit. It passed by a vote of 19 for, 12 against, and 2 abstentions. The second resolution addressed Japan's research in the Southern Hemisphere. In part, it pointed out that the killing of minke whales for research purposes was contrary to the spirit of the Southern Ocean Sanctuary, which prohibits commercial whaling in all waters around Antarctica. It also noted that, based on preliminary analyses of new data, the Scientific Committee had concluded that the size of the Southern Ocean minke whale population was appreciably smaller than previous estimates. The resolution therefore called on Japan not to issue any further permits for whaling in the Southern Ocean until a new population estimate for Southern Hemisphere minke whales is accepted. This resolution was passed by a vote of 20 for, 10 against, and 3 abstentions.

Environmental Effects – For more than a decade, the IWC has expressed concern about the potential effects of habitat degradation on whales. At its 1992 meeting the IWC directed its Scientific Committee to consider the impact of environmental changes on whale stocks on a regular basis. Since then, the IWC has sponsored workshops to plan and examine studies to investigate the effects of chemical pollution, climate change, and other environmental changes on cetaceans.

Over a period of several years the Scientific Committee had developed two multinational, multidisciplinary research proposals. One of these, "Pollution 2000+," has two objectives: determining whether predictive and quantitative relationships exist between biomarkers of exposure to or effect of PCBs and levels of these pollutants in certain whale tissues; and validating/calibrating samples and analytic techniques. The other program, "SOWER 2000" is examining temporal and spatial variability in the physical and biological environment and its effects on the distribution, abundance, and migration of whales.

At the 2000 meeting the Committee discussed progress on these two initiatives. It also considered a future initiative in the Arctic, the development of an annual report providing an overview of regional environmental concerns, and workshops on habitat degradation and competition between cetaceans and fisheries. The Committee also briefly considered linking environmental measures and cetacean demography, with health effects from consumption of cetacean products. During January and February 2000, the IWC and the Commission for the Conservation of Antarctic Marine Living Resources completed their first collaborative field program for the SOWER 2000 project. The work included completion of a multivessel survey of whales, krill, and their environment in the South Atlantic sector of the Southern Ocean.

The IWC adopted two related resolutions by consensus. One resolution encouraged IWC member governments to sign or ratify the protocols on international actions on persistent organic pollutants and heavy metals under the Convention on Long-Range Transboundary Air Pollution. The other resolution reiterated the importance of further research on the effects of environmental change on cetaceans and commended the Scientific Committee for its progress on the two major initiatives.

Small Cetaceans – For several years there has been debate within the IWC as to whether the International Convention for the Regulation of Whaling confers jurisdiction over small cetaceans as well as large whales. As in past years, no consensus was reached on this issue. Despite the lack of consensus, it has been agreed that the Scientific Committee can study and provide advice on small cetaceans.

At its 2000 meeting the Committee focused on a review of the status of freshwater cetaceans, particularly the boto, tucuxi, Indus susu, Ganges susu, Irrawaddy dolphin, finless porpoise, and baiji. It was noted that there is an urgent need for more research on the status of these populations and for implementing practical conservation measures. Most populations face serious near-term threats from human activities. Particular concern was expressed over the baiji, which

occurs only in China's Yangtze River and may number only a few tens of individuals.

During its 1999 meeting the Committee had expressed concern over the status of various stocks of white whales (also called beluga whales), including those in three areas of the Okhotsk Sea. At the 2000 meeting the committee was troubled to learn that about 36 white whales had been taken in Russian Federation waters in the Okhotsk Sea.

A number of other small cetacean issues also were considered more briefly. The Scientific Committee received a summary of work by the International Committee for Recovery of the Vaquita and commended the Government of Mexico for its continuing efforts to conserve this small population, which is limited to upper reaches of the Gulf of California. The Committee also reviewed information on various measures to reduce the incidental bycatch of small cetaceans in commercial fishing nets, including time/area closures, modifications to fishing gear, and alternative fishing methods.

Sanctuaries – Japan offered an amendment to the section of the IWC Schedule on the Southern Ocean Sanctuary. The change would have made the section's ban on commercial whaling in waters off Antarctica conditional upon advice of the Scientific Committee. A number of countries opposed the amendment and it was withdrawn.

Australia and New Zealand vigorously put forth a proposal for a new South Pacific sanctuary to protect whales in that area. The proposal was strongly opposed by Japan, Norway, and other countries. Changes to the IWC Schedule require approval by a three-fourths majority, and the measure was defeated by a vote of 18 for, 11 against, and 4 abstentions.

Whale Killing Methods – The United Kingdom tabled papers that discussed killing methods in a Japanese drive fishery for dolphins. Japan objected to the papers, but the United Kingdom declined to withdraw them. Denmark reported on efforts to hold training courses for Greenland hunters. The United States presented information on the Makah Tribe's kill of a gray whale. The Russian Federation reported on its gray whale hunt, which was characterized as hampered by poor equipment. Norway reported on the development of a new penthrite grenade, which reduces the survival time of struck minke whales.

Whale Watching – Before the IWC meeting the Scientific Committee held a workshop to assess the potential for biologically significant long-term effects on cetaceans from whalewatching. The Committee identified areas for further research, including a number of promising data types that could be collected from whale-watching operations to help assess possible impacts. The Scientific Committee also reviewed national whale-watching guidelines and considered dolphin feeding and swim-with-the-dolphin programs. It reiterated its view that feeding wild cetaceans should be prohibited and that swim-with-the-dolphin programs could be considered invasive but should be examined on a case-by-case basis.

The IWC also received the report of a whale-watching workshop held in Tuscany, Italy, in February 2000. The workshop was the sixth and last of a series of meetings sponsored by the International Fund for Animal Welfare to promote whale-watching operations worldwide and to help ensure that rapidly expanding operations do not harm whales.

U.S. Response to Japanese Research Whaling

The United States has considered failure of nations to follow advice in IWC resolutions as actions that diminish the effectiveness of the IWC and thereby grounds for certifying an offending nation and imposing sanctions under two provisions of domestic law: the Packwood-Magnuson Amendment to the Magnuson-Stevens Fishery Conservation and Management Act and the Pelly Amendment to the Fishermen's Protective Act. The former authorizes an immediate reduction in any authorized fishery catch level from U.S. waters by the offending nation, and the latter authorizes the President to impose restrictions on imports of fish and fish products into the United States from the certified nation.

Upon learning of Japan's proposal to expand its research whaling in the North Pacific, the President joined the Prime Minister of the United Kingdom and the Prime Minister of New Zealand in a strong and unprecedented attempt to dissuade Japan from implementing its lethal research program on new species. Japan responded by noting that it would await review of its proposal at the IWC's annual meeting in early July. As already noted, the IWC Scientific Committee questioned the need for the proposed research

and identified many problems. As a result, the IWC passed a resolution asking Japan to refrain from issuing permits for the expanded research program. Japan dismissed the IWC's advice and, in early August, Japanese whalers began killing Bryde's whales in the North Pacific Ocean.

In August 2000 the United States joined 14 other IWC members in signing a letter of protest to Japan's Foreign Minister asking that the research program be stopped. Japan refused to do so. The State Department also advised Japan that, because of its actions, the United States would not participate in a ministerial meeting of the Economic and Social Commission for Asia Pacific scheduled for the end of August in Japan, that the United States was canceling a fisheries bilateral meeting with Japan originally scheduled for September in Washington, and that it was opposing the siting of an upcoming IWC intersessional meeting in Japan.

These actions failed to alter Japan's commitment to its lethal whale research program and, on 13 September 2000, after confirming that Japanese whalers had killed both Bryde's whales and sperm whales in the North Pacific, the Secretary of Commerce certified to the President pursuant to provisions of the Pelly Amendment that Japan was acting in a manner that was diminishing the effectiveness of the International Whaling Commission. This was the third time Japan had been certified under the Pelly Amendment for its research whaling activities. The first was when Japan initiated lethal whale research on minke whales in the Southern Ocean in 1988 and the second was when Japan initiated lethal research on minke whales in the North Pacific Ocean in 1995. In neither case did Japan terminate its lethal whale research programs.

In making his new certification finding, the Secretary noted a general suspicion that Japan's motivation in expanding its research program has less to do with validation of scientific hypotheses and more to do with paving the way for resumption of commercial whaling. He advised the President that he was authorized to prohibit the import of any products from Japan for any duration to the extent that such prohibitions are sanctioned by the World Trade Organization. The Secretary also advised that an interagency group had been formed to consider recommendations on possible sanctions against Japan, and that all available diplomatic, economic, and trade options were under review.

The Pelly Amendment requires that the President report to Congress within 90 days on what, if any, actions are being taken in response to any certification under its provisions. On 29 December 2000 the President submitted his report to Congress. The report noted that the President remained very concerned about Japan's decision to expand its research whaling program to two additional species, and that the United States and many other IWC members believe that Japan's research program has dubious scientific validity and should be curtailed.

In addition to taking the actions noted above, the President advised Congress that he had personally raised the matter with Japan's Prime Minister and that the United States had intensified its engagement with Japan on the issue. He noted that bilateral consultations were held with Japan in November, at which time Japan said that it planned to conduct two nonlethal scientific whale programs during the next year to improve the scientific value of its program. The President also noted that he expected the results of the bilateral meeting to lead to an IWC Scientific Committee workshop on methods for whale research. In this regard he noted that the United States would continue to urge vigorously that Japan substitute nonlethal research techniques in its research program.

Finally, the President expressed concern that the take of additional species would increase the risk of illegal whale meat entering international commerce. In this regard he noted that steps would be taken to address the issue under the Convention on International Trade in Endangered Species of Wild Fauna and Flora, and that an interagency team would continue to consider additional measures to enforce international and national prohibitions on trade in whale products. He advised that the Secretaries of Commerce and the Treasury would take additional measures if warranted.

The Arctic Council

Many species of marine mammals live seasonally or year-round in the Arctic Ocean and adjacent seas and coastal areas. They include polar bears; walruses; ringed, bearded, harp, hooded, ribbon, and spotted

seals; narwhals; and bowhead, minke, fin, gray, and beluga whales. The ranges of most of these species cross international borders. Consequently, effective conservation of these species and their habitats requires cooperation among the Arctic nations.

Some species of marine mammals are important components of the cultures and diets of Alaska Natives and other Arctic residents. Congress recognized the importance of marine mammals to Alaska Natives when it enacted the Marine Mammal Protection Act of 1972. Section 101(b) of the Act exempts Alaska Natives from the Act's moratorium on the taking of marine mammals, provided the taking is not wasteful and is done for subsistence purposes or to create and sell authentic Native articles of handicraft and clothing. In 1994 Congress added section 119 to the Act, explicitly authorizing and encouraging the Secretaries of Commerce and the Interior to develop agreements with Alaska Native groups to cooperatively manage species and populations of marine mammals that are important to Native subsistence and cultures. Legislation reauthorizing the Act was considered during 2000 but not acted upon (see Chapter II). The Administration provided a comprehensive amendment package to Congress for its consideration, which, among other things, includes the establishment of a framework for co-management of marine mammal populations by federal agencies and Alaska Native organizations. It is expected that the reauthorization of the Act will again be considered by Congress in 2001.

Some species of marine mammals that occur in the Arctic, such as polar bears, walruses, harp seals, and bowhead whales, have been hunted commercially as well as for subsistence. Commercial hunting was, in some cases, poorly regulated and resulted in over-exploitation and depletion of many stocks.

Other human activities in the Arctic, such as coastal and offshore oil and gas development, also may have adverse effects on marine mammals and their habitats. In addition, marine mammals and other components of Arctic food webs, including people who rely on fish and wildlife for subsistence, may be affected by human activities outside the Arctic. For example, recent studies indicate that a variety of persistent organic compounds and other pollutants originating from human activities in the middle latitudes are being transported by air and water currents to the Arctic and may be adversely affecting humans, marine mammals, and other components of Arctic ecosystems.

This section provides background information and describes the Commission's efforts in 2000 to facilitate the work of the Arctic Council, established by the Arctic nations in 1996 as a successor to the Arctic Environmental Protection Strategy adopted in 1991.

Establishment of the Council

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 (later the Russian Federation) address a number of environmental problems that had become evident.

In June 1991 ministers from the eight Arctic countries signed the Declaration on the Protection of the Arctic Environment and adopted the Arctic Environmental Protection Strategy. The goals of the strategy were to preserve the environmental quality and natural resources of the Arctic, monitor and reduce pollution affecting the Arctic environment, and accommodate the traditional subsistence and cultural needs and practices of indigenous people insofar as these relate to the environment and natural resources of the Arctic.

The strategy called for cooperation in four program areas: assessment and monitoring of environmental pollutants; conservation of Arctic flora and fauna; emergency prevention, preparedness, and response; and protection of the Arctic marine environment. Working groups were established to recommend and oversee cooperative activities in these four program areas. In 1994 a task force was established to address issues of sustainable development and utilization of Arctic resources.

Senior government officials from the eight Arctic countries have met periodically to review the actions of the working groups and to identify additional cooperative efforts necessary to effectively implement the Arctic Environmental Protection Strategy.

Ministerial-level meetings were held in 1993, 1996, and 1997 to receive reports from the working groups and the senior Arctic officials and to provide direction.

As noted in previous Commission reports, some of the Arctic countries believed that a more formal intergovernmental organization was needed to effectively implement the Arctic Environmental Protection Strategy and to provide a forum for addressing other issues of regional concern, such as health, education, and economic development. In March 1995 Canada proposed the establishment of an intergovernmental Arctic Council. The other Arctic countries agreed that a high-level intergovernmental forum would help to implement the Arctic Environmental Protection Strategy and to address other issues of mutual interest, but there was no consensus at that time that a formal intergovernmental organization was necessary.

Subsequently, however, representatives of the Arctic countries met in 1995 and 1996 to draft a declaration establishing the Arctic Council, as has been described in previous Commission reports. The Declaration on the Establishment of the Arctic Council was concluded and signed in September 1996. The declaration states that the Arctic Council is established as a high-level forum to (a) provide a means for promoting cooperation, coordination, and interaction among the Arctic countries, with the involvement of Arctic indigenous people and other Arctic residents on issues of common interest and concern, in particular issues related to environmental protection and sustainable development in the Arctic; (b) oversee and coordinate the programs established under the Arctic Environmental Protection Strategy; (c) adopt terms of reference for and oversee and coordinate a sustainable development program; and (d) disseminate information, encourage education, and promote interest in Arctic-related issues. Among other things, the declaration specifies that:

- the Council should normally meet biennially, with meetings of senior officials taking place more frequently to provide for liaison and coordination;
- responsibility for hosting meetings of the Council, including provision of secretarial support, should rotate sequentially among the Arctic countries;
- as its first order of business, the Council should adopt rules of procedure for its meetings and those of its working groups; and
- decisions of the Council are to be made by consensus (i.e., all eight Arctic nations).

Three organizations representing Arctic indigenous people were recognized as permanent participants under the Arctic Environmental Protection Strategy and were entitled to send representatives to all ministerial, senior official, and working group meetings. They are given the same status under the Arctic Council as they were under the Arctic Environmental Protection Strategy. These organizations are the Inuit Circumpolar Conference, the Saami Council, and the Association of Indigenous Peoples of the North, Siberia, and the Far East of the Russian Federation. The Arctic Council also provides for other organizations to be granted the same status, and at the first meeting of the Council, held in Iqaluit, Canada, in September 1998, the Aleut International Association was recognized as a permanent participant. At the second meeting of the Council, held in Barrow, Alaska, in October 2000, the Gwich'in Council International and the Arctic Athabaskan Council were recognized as additional permanent participants.

Arctic Council Activities in 2000

The United States assumed chairmanship of the Council in September 1998. In 2000 three meetings of the senior Arctic officials were held, one in Fairbanks, Alaska, in April, one in London in September, and one in Barrow, Alaska, in October, immediately preceding the second meeting of the Arctic Council. At the second meeting of the Arctic Council, Finland assumed the chairmanship for a two-year term. The Marine Mammal Commission worked with the Department of State, other federal agencies, and the Alaska Governor's office to develop U.S. positions for these meetings. The United States was able, during its chairmanship, to develop a more productive system of operation for the Council, particularly with regard to facilitating programs to address pressing issues on such matters as human health and pollution control in the Arctic. Some issues, however, will require more time to resolve, particularly regarding the appropriateness of Arctic Council involvement in the take of marine mammals

and other living resources and trade in products made from them.

The Sustainable Development Program – The Sustainable Development Working Group was established by the Council in 1998 following adoption of terms of reference for the Sustainable Development Program. The working group, composed of the senior Arctic officials designated by the eight Arctic nations, is responsible for (1) facilitating preparation of development-related proposals for consideration by the Council, (2) recommending to the Council projects that appear to merit consideration, and (3) overseeing implementation of projects approved by the Council.

At the Arctic Council ministerial meeting in September 1998 three sustainable development projects were approved and are being carried out under the aegis of the Sustainable Development Working Group. They are (1) a U.S.-led project on the development of a telemedicine network throughout the Arctic; (2) a Saami Council–led project on freshwater and coastal fisheries; and (3) a Canadian-led project on the future of youth and children in the Arctic.

During 2000 negotiations concerning a "chapeau," or framework statement, for the Sustainable Development Program were concluded, and the language was adopted at the second meeting of the Council. Two issues were contentious. First, several countries, led by Denmark, favored an extensive and prescriptive document that would define the program and outline specific activities to be undertaken, as well as emphasizing certain philosophical points of view, particularly concerning the appropriateness of using 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.

Second, Norway tried to include material concerning three workshops it had held and that it wanted to be included as part of the Sustainable Development Program. Because the Arctic Council had not approved the workshops as part of its work-plan, the United States rejected this approach, considering the workshops as sources of information but not official activities of the Council. Norway's attempt to include language in the chapeau concerning the workshops was vigorously opposed by the Commission and other federal agencies. The United States was able to negotiate a compromise in which the workshops were recognized in the declaration arising from the Arctic Council's meeting in Barrow, Alaska, but were not mentioned in the chapeau.

The Arctic Monitoring and Assessment Program – The Working Group for the Arctic Monitoring and Assessment Program (AMAP) is charged with reporting on levels, effects, and sources of environmental pollutants in the Arctic. The National Oceanic and Atmospheric Administration has lead responsibility for U.S. participation in the working group.

In 1997 the working group delivered a report, entitled *Arctic Pollution Issues*, to the ministers of the Arctic Environmental Protection Strategy at their meeting in Alta, Norway. The report was a non-technical 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. The full scientific report was delivered to the Arctic Council in September 1998. This report, *The AMAP Assessment Report*, is a comprehensive summary of pollution issues in the Arctic through 1997.

In response to the recommendations contained in the published reports, the working group was instructed by the Arctic Council to produce assessments on a number of specific pollution-related subjects. The assessments will update information on the topics covered in the initial reports and also address emerging topics, such as use of the antifouling paint additive tributyltin, that were not covered in the initial reports. A representative of the Commission participated in meetings of the working group to plan for and organize the production of these assessments, which are expected to be completed in 2002–2004.

Activities of the Arctic Monitoring and Assessment Program are of interest to the Commission because pollutant levels in several marine mammal species found in the Arctic appear high and may be affecting the health and well-being of both the animals themselves and the Alaska Natives who rely on them for subsistence.

Conservation of Arctic Flora and Fauna – The Working Group on Conservation of Arctic Flora and Fauna (CAFF) provides a distinct 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 Alaska Office of the U.S. Fish and Wildlife Service has lead responsibility for U.S. participation in the working group.

As noted in previous annual reports, the working group has made significant progress in a number of areas. Its efforts to develop a more cohesive approach to its work through the use of its "Strategic Plan for the Conservation of Arctic Biological Diversity" appear to be paying off. This plan emphasizes five objectives: enhancing efforts to monitor Arctic biodiversity; conserving Arctic genetic resources, species, and their habitats; establishing protected areas as needed; managing activities outside protected areas; and providing conservation information to those making socioeconomic decisions.

A representative of the Commission, who participated in the 2000 working group meeting, noted that the efficiency and effectiveness of the working group have benefitted greatly from changes made in the past few years, and that its plans for further activities are better coordinated than in the past. As directed by the Arctic Council ministers, the working group is preparing a report on the status of Arctic flora and fauna that will highlight key issues and provide background information necessary for identifying conservation needs, planning conservation measures, and assessing their effectiveness. The report will be published in 2001.

As noted in its previous annual report, the Commission wrote to the National Marine Fisheries Service on 23 December 1997 recommending that the Service consider asking the working group to develop a plan for assessing and monitoring the status and trends of ringed and bearded seals throughout the Arctic. In response, the Service prepared a discussion paper outlining steps that possibly could be taken collectively by the Arctic countries to better determine and monitor the status of these species. The working group is in the process of creating monitoring networks for nine species or species groups, one of which will focus on ringed seals.

Arctic Climate Impact Assessment – Another topic of great concern to the Commission is climate change and its possible effects on the Arctic environment. Alaska Natives have expressed concerns about observed changes in sea ice and the condition of marine mammals in the Arctic. As described in detail in Chapter IX, the Commission worked with representatives of Alaska Native communities to convene a workshop, which was held in Alaska in February 2000, to evaluate information on the nature and causes of sea ice change and how it may affect Native communities in Alaska and elsewhere that depend on marine resources. The final report from the workshop provides a series of recommendations that identify possible avenues for addressing issues associated with environmental change in the Arctic.

The Arctic Council has directed the AMAP working group to work with the CAFF working group 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 is scheduled to be presented to the Council in 2004. A representative of the Commission is participating in the assessment.

Arctic Council Action Plan to Eliminate Pollution – Based on the findings of the AMAP reports in 1997 and 1998, the Arctic Council began development of an action plan to reduce and eliminate pollution in the Arctic. The intent of the program is to follow the scientific work of the AMAP reports with substantive action to address the root causes of the problem. U.S. involvement has been led by the Environmental Protection Agency, which proposed projects to address polychlorinated biphenyls (PCBs) in the Russian Arctic as a first step under the Arctic Council Action Plan to Eliminate Pollution. Other priorities under the plan are dioxins and furans, heavy metals, radionuclides, and ozone depletion. In addition to site-specific remediation projects such as the one on PCBs, the action plan is intended to serve as a means by which Council members can raise Arctic issues in international pollution programs and negotiations.

Coordinating U.S. Involvement in Arctic Activities

In the United States, the Department of State has lead responsibility for developing and overseeing implementation of U.S. policy regarding the Arctic. To help meet this responsibility, U.S. positions regarding policy-related matters to be considered at meetings of

the working groups, senior Arctic officials, or ministers are developed through an interagency Arctic Policy Group chaired by the Department of State. This group includes representatives of the Marine Mammal Commission, the Arctic Research Commission, the Environmental Protection Agency, the National Science Foundation, and the Departments of Commerce, Defense, Energy, the Interior, and Transportation. 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 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 and the increased visibility associated with the United States hosting and chairing the Council. The Commission will continue to take part in domestic discussions of Arctic Council issues, to send representatives to working group and other meetings under the aegis of the Arctic Council bearing on marine mammals and to make recommendations as appropriate concerning the organization and content of work of the Arctic Council.

Convention on International Trade in Endangered Species of Wild Fauna and Flora

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) provides an international framework for regulating trade in animals and plants that are or may become threatened with extinction. The Convention entered into force in 1975 and at the beginning of 2000, 146 countries had become parties to the Convention. During 2000 Ukraine, Iceland, Kazakhstan, Slovenia, Croatia, and the Republic of Macedonia became signatories to the Convention, bringing the number of CITES members to 152. Within the United States, the Fish and Wildlife Service is the lead agency for federal actions under the Convention. The National Marine Fisheries Service provides technical expertise on marine species and participates in CITES meetings, including Conferences of the Parties and technical meetings, such as the Animals Committee.

The Convention provides for three levels of trade control. Depending on the conservation status of a species, it may be included on one of three appendices to the Convention. Appendix I includes those species considered to be threatened with extinction and that are or may be affected by trade. Appendix II includes species that are not necessarily threatened with extinction but could become so unless trade in them is strictly controlled. Species may also be included on Appendix II if they 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.

The 11th Conference of Parties was held 10–20 April 2000 at the United Nations Environment Programme headquarters in Gigiri (Nairobi), Kenya.

Proposed Changes to the Appendices

Before a meeting of the CITES parties, any party may propose adding or deleting species to the appendices or transferring species from one appendix to another. At the 10th meeting of the CITES parties in 1997, Japan and Norway put forth five proposals to downlist certain stocks of minke whales, gray whales, and Bryde's whales from Appendix I to Appendix II. Approval of such a move would have been significant because it would open the door for commercial export or import of meat or other parts from these species, provided that the necessary permits are obtained. At the 1997 meeting, CITES members rejected the four proposals involving minke and gray whales, and Japan subsequently withdrew the fifth proposal to downlist Bryde's whales.

Before the 2000 meeting in Nairobi, Japan again submitted proposals to downlist the eastern Pacific stock of gray whales (*Eschrichtius robustus*) and the Okhotsk Sea/western Pacific and Southern Hemisphere stocks of minke whales (*Balaenoptera acutorostrata*). Likewise, Norway resubmitted proposals to downlist

the northeastern and central North Atlantic stocks of minke whales from Appendix I to Appendix II. Japan did not resubmit its proposal to downlist Bryde's whales.

In 1997 and again in 2000 the United States strongly opposed downlisting any species or population of whales subject to the International Whaling Commission (IWC) moratorium on commercial whaling. In the opinion of the United States and several other CITES parties, it is inappropriate to consider downlisting any whale species or population until the IWC has completed the revision of its management regime, which would bring all whaling under effective IWC control.

Two additional proposed changes to the CITES appendices involving marine mammals were submitted before the meeting in Nairobi. These included a joint proposal by the United States and Georgia to transfer the Black Sea bottlenose dolphin (*Tursiops truncatus ponticus*) from Appendix II to Appendix I. This subspecies, which is isolated from other populations of bottlenose dolphins, is found only in the Black Sea, and 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, and no estimates exist of sustainable levels of take. Thus, the proposal noted, any take for purposes of exhibit or export are potentially detrimental to the population.

In addition, Australia proposed transferring the Australian population of dugongs (*Dugong dugon*) from Appendix II to Appendix I to eliminate potential enforcement problems caused by the current split listing. Dugongs, once widely distributed in the tropical and subtropical coastal areas of the Indian Ocean and southwestern Pacific, have been exterminated or are now extremely rare in much of their former range. With the exception of the Australian population, before the 11th Conference of Parties the species was listed on Appendix I. Although the Australian population is estimated to total 85,000 animals or more and is not considered to be endangered, its transfer to Appendix I would place all dugong populations on the same appendix, eliminating the possibility of permits being issued based on falsified applications. Permit applicants would not be able to claim that an animal was from an Appendix II (Australian) population when it was actually from an Appendix I population.

Actions Taken at the 2000 CITES Meeting

Consideration of the Japanese and Norwegian proposals to downlist various stocks of gray and minke whales resulted in protracted deliberations during the Nairobi meeting. CITES parties first considered and rejected Japan's proposal to downlist the eastern Pacific stock of gray whales. Subsequently, Japan amended its proposals to downlist two stocks of minke whales to include a provision, similar to the one included in the Norwegian proposals, to establish a forensic DNA inventory system for use in identifying meat or other parts from legally taken whales. After extended deliberations, the measures eventually were defeated. CITES parties then considered Norway's proposals to downlist two other stocks of minke whales. The measures were initially defeated; however, under CITES procedures, Norway was able to reopen consideration of its proposals in plenary session on the following day, and a second vote was taken. Although the measures did not receive the required two-thirds majority vote, they did receive a simple majority, thus bringing Norway one step closer to getting the appendices amended to allow for commercial trade in whale meat or other parts.

The joint U.S.-Georgia proposal to transfer the Black Sea bottlenose dolphin from Appendix II to Appendix I was withdrawn by the United States pending collection and evaluation of additional information. (Georgia was unable to attend the meeting for logistical reasons.) To this end, the CITES Secretariat will request that the range states for the subspecies provide information on the number of dolphins taken from the wild each year (including age, sex, capture methods, and capture mortality), the number of dolphins exported each year, the population status (if available), any nondetriment findings issued for this species under its Appendix II status, and, if available, the number of dolphins killed incidental to fishing operations. Such information is to be provided to the CITES Animals Committee, which was directed to review the issues pertaining to the conservation and trade of the species, evaluate the information received, and request that the range states cooperate with experts to examine the genetics of this population and evaluate

its distinctiveness through the collection and analysis of tissues samples. The Animals Committee was asked to submit recommendations to the next CITES meeting.

Australia's proposal to transfer the Australian population of dugongs from Appendix II to Appendix I was adopted by the CITES parties by show of hands. The United States supported this proposal.

CITES' Relationship to the International Whaling Commission

In recent years there has been an ongoing debate among various CITES parties concerning the relationship between CITES and the IWC. 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, and it 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, have stated support for the IWC request and opposition to any proposals to revise appendix designations for whales before the IWC has adopted a Revised Management Scheme for commercial whaling. Other parties 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.

At the 10th Conference of Parties in 1997 Japan introduced a proposed resolution to repeal a long-standing CITES resolution that recommends that parties not issue permits for harvest or trade for primarily commercial purposes of any species or stock protected from commercial whaling by the IWC. After lengthy debate, Japan's proposed resolution was defeated by a vote of 51 to 27. The discussion, however, resulted in a clarification from the CITES Secretariat stating that, although consul-tation was essential under CITES and other con-ventions, such as that implementing the IWC, this did not mean that it was obligatory for there to be strict adherence in one convention to decisions made within another.

The CITES Convention stipulates, however, that when a proposal for a marine species is received for consideration by the CITES parties, the CITES Secretariat must consult "intergovernmental bodies having a function in relation to those species" for their comments. In apparent anticipation of such a request, the IWC, at its 23–27 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 for species of whales managed by the IWC.

Two relevant proposed resolutions were submitted for consideration at the April 2000 CITES meeting: one from the United States and one submitted jointly by Japan and Norway. The U.S. proposal was put forth as a means to reaffirm and strengthen the cooperation and synergy between CITES and the IWC. It called on the CITES parties to acknowledge the directives and provisions of the IWC's May 1999 resolution, endorsed the cooper-ation between CITES and the IWC on matters of international trade in and management of whales, and urged all CITES parties to make every effort to ensure that this cooperation continues.

The Japanese–Norwegian proposed resolution acknowledged that the IWC Scientific Committee has accumulated a great deal of scientific knowledge that would contribute to the proper conservation and management of whales, but further acknowledged that other sources, such as the North Atlantic Marine Mammal Commission, can also provide a substantial amount of scientific information about whales. Expressing the view that the IWC's moratorium was a political decision not supported by scientific information, Japan and Norway called on CITES parties to decide on amendments to the CITES appendices on the basis of CITES' own criteria, taking into account scientific information from the IWC and other sources.

At the meeting in Nairobi, CITES parties first considered the Japanese–Norwegian proposal to break the link between CITES and the IWC. The proposal was defeated by a vote of 49 to 31. As a result of CITES reaffirmation of the continued cooperation and coordination between the two conventions, the United States withdrew its proposed resolution.

After the CITES meeting, and before the 2000 meeting of the IWC, the CITES Secretary General wrote to the Chairman of the IWC expressing concern about the IWC's lack of progress toward adoption of a Revised Management Scheme and the resulting

impact on CITES. In his 4 July 2000 letter, the Secretary General noted "the escalating and increasingly divisive conflict within . . . CITES concerning issues related to the conservation and use of cetaceans, in particular the listing of whale stocks on Appendix I of CITES that may in a number of cases be contrary to the biological criteria for including species or populations in that appendix." According to the Secretary General, the result has been the transfer of the IWC debate to CITES and a polarization of decision-making within the organi-zation. The Secretary General noted therefore that it is crucial that the IWC soon make important progress toward the adoption of a Revised Management Scheme so that CITES parties can adopt the appro-priate management regime for whale stocks in the CITES appendices.

The United States and several other countries considered this intervention of the CITES Secretary General in IWC decisionmaking to be inappropriate and communicated those concerns to the IWC Secretariat.

Illegal Trade in Whale Meat

Since 1979 CITES parties have cooperated with the IWC to prevent trade in whale meat from any species or stock protected from commercial whaling by the IWC. As discussed in previous annual reports, in 1994 the CITES parties adopted a reso-lution recognizing the need for the IWC and the CITES Secretariats to cooperate and exchange infor-mation on international trade in whale products. The resolution urged countries to report any incidents of illegal trade in whale products to the CITES Secretariat.

Despite the cooperation that has resulted from the resolutions adopted by both CITES parties and the IWC, illegal trade in meat from whale species listed under Appendix I remains a significant concern. At the June 1997 CITES meeting, a consensus document was adopted as a formal decision addressing cooperation in monitoring illegal trade in whale meat. The decision encourages CITES parties to inventory frozen whale products possessed in commercial quantities and to collect samples for DNA identification from all inventoried stocks, as well as from baleen whales taken incidentally in fisheries and, where practicable, from aboriginal and incidental takes. It further invites all concerned countries to cooperate in determining sources of whale meat in cases of smuggling, or unknown identity, and to make relevant information available to the CITES Secretariat for dissemination to interested parties.

As already noted in the discussion of the International Whaling Commission, Japanese whalers have continued to kill minke whales under scientific research permits issued by the government of Japan. Although the IWC has repeatedly adopted resolutions calling on Japan to cease its lethal research, these resolutions are nonbinding. Meat from whales taken as part of the research program is sold on the Japanese market to help defray the costs of the program. During 2000 the Tokyo-based Institute of Cetacean Research tested samples of whale meat available for purchase in Japan and purported to be from minke whales taken under the research program. According to reports, DNA tests showed that just over 50 percent of the meat sampled could be identified as coming from minke whales. Other samples were identified as being from protected whale species, including blue, fin, humpback, and sperm whales, or from smaller cetacean species not protected by the IWC.

On 16 November 2000 the Humane Society of the United States petitioned the Department of the Interior to certify Japan under the Pelly Amendment to the Fishermen's Protective Act. The petition alleges that Japan is diminishing the effectiveness of CITES by engaging in trade in whale meat from species listed on CITES Appendix I. This certification would be in addition to that issued by the Secretary of Commerce on 13 September 2000, which found that Japan had acted in a manner that diminished the effectiveness of the IWC (see previous section). As of the end of 2000 the Interior Department had not responded to the Humane Society petition.

Chapter VI

MARINE MAMMAL MORTALITY EVENTS

The frequency and scale of unusual mortality events involving marine mammals appear to have increased over the past several decades. Unexplained population declines (such as sea otters in Alaska) also appear to be more common, and more and more dead marine mammals have been washing ashore in some coastal areas. In the southeastern United States, for example, the number of dead marine mammals found on beaches has doubled since the mid-1980s. These observations may reflect actual increases in the number of deaths, more extensive observation, better reporting, or some combination of these factors.

Such unusual mortality events have been documented around the world for a wide range of species. More than 17,000 harbor seals died in the North Sea late 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. Such events can have devastating impacts on marine mammal populations, particularly those that are threatened or endangered.

Mortality events may occur for a variety of reasons, both natural and human-related. At least three recent events were caused by naturally occurring toxins. In November 1987 at least 13 humpback whales, 2 minke whales, and 1 fin whale died in Cape Cod Bay, Massachusetts, after eating mackerel containing saxitoxin, a neurotoxin produced by the dinoflagellate that causes paralytic shellfish poisoning in humans. In 1996 manatees along the southwestern coast of Florida died after exposure to brevetoxin, a toxin produced by *Gymnodinium breve*, the organism that causes red tides. 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 also appears to have been caused by one or more blooms of toxic algae. Toxic algal blooms appear to be occurring more frequently in many parts of the world, perhaps triggered by pollution or other environmental changes.

Several other recent mortality events (e.g., those involving Mediterranean monk seals, harbor seals, bottlenose dolphins, and striped dolphins) are believed to have been caused by morbilliviruses, congeners of which cause distemper in dogs, measles in humans, and rinderpest in hoofed mammals. Cetaceans and pinnipeds succumbing to these viruses may have been exposed to them only recently, and thus have acquired no immunity to them, or more virulent forms of the viruses may have evolved. Animals in the affected populations also may have been stressed in ways that compromised their immune systems. In addition, such viral infections may appear more common due to better methods for detecting viruses and better reporting of unusual mortality events.

High levels of several environmental contaminants were found in the blubber, livers, and other tissues of some of the bottlenose and striped dolphins that died during the events noted above. Available information is insufficient to determine how, at what levels, or in what combinations contaminants may have compromised the animals' immune systems, making them more vulnerable to disease. As noted in its previous annual report, the Commission, in cooperation with the National Marine Fisheries Service, the U.S. Geological Survey, the Environmental Protection

Agency, and the National Fish and Wildlife Foundation, held a workshop in October 1998 to better document and determine how to resolve the most critical uncertainties concerning contaminant effects. The Commission has provided the workshop report to scientists and organizations with related interests and responsibilities worldwide and has recommended that the National Oceanic and Atmospheric Administration establish an interagency working group to promote and coordinate efforts necessary to resolve the uncertainties (see Chapter VII on the effects of marine pollution).

Unusual Mortality Events in 2000

Two unusual mortality events are known to have occurred outside the United States during 2000. One involved a major die-off of Caspian seals in the Caspian Sea, and the second involved several species of cetaceans in the Bahamas. Four other events occurred wholly or partially in U.S. waters in 2000. They involved harbor seals and California sea lions on the California coast, gray whales along the west coast, and bottlenose dolphins along the panhandle of Florida. In addition, the Alaska sea otter population in the Aleutian Islands experienced a considerable decline.

Caspian Seals

In late April 2000 high numbers of dying Caspian seals were reported near the mouth of the Ural River in Kazakhstan at the northern end of the Caspian Sea. The die-off then spread south to Azerbaijan and Turkmenistan . More than 10,000 seals are estimated to have died along the Kazakhstan coast alone. Clinical signs were primarily related to respiratory function. Microscopic findings included pneumonia and lymphoid depletion. Viral DNA identical to that of canine distemper virus detected from a Caspian seal in 1997 was identified in nine seals in 2000. Although the origin of the virus is unclear, inoculation from a terrestrial source is possible. Caspian seals, believed to number several hundred thousand animals, also are affected by chemical pollution, oil and gas development, and continued harvest.

Bahamas Mortality Event

On 15 and 16 March 2000 at least 17 cetaceans, including 14 beaked whales, 2 minke whales, and 1 spotted dolphin, stranded on beaches in the northern Bahama Islands (Abaco, Grand Bahama, and Eleuthera Islands). Most of the animals were alive when they stranded and both minke whales and six of the beaked whales were returned to the sea and presumably survived. As discussed in greater detail in Chapter VII of this report (Effects of Noise), these strandings occurred near and at about the time that seven U.S. Navy surface ships and three submarines were transmitting and using their sonar systems in the New Providence Channel. Investigations being conducted cooperatively by the Navy and the National Marine Fisheries Service suggest that due to unusual environmental conditions the sonar transmissions could have been a factor in the strandings.

California Sea Lions

In May and June 2000 about 130 dead California sea lions washed up on beaches in Ventura County in various degrees of decomposition. The cause of this die-off was not determined.

Between 23 June and 1 December 2000, 219 distressed California sea lions stranded alive along the central and southern California coast from Marin County to Ventura County. Of these, 184 were taken to the Marine Mammal Center, a rehabilitation facility in Sausalito, California. Most animals were found at three beaches in San Luis Obispo County (Ocean Dunes, Pismo Beach, and around Morro Bay). Nearly 80 percent of the treated animals (147 of 184) were adult females; of the remainder, 9 were adult males, 15 were juvenile or subadult males, 10 were juvenile or subadult females, and 3 were yearling females. Eighty-three of the sea lions (45 percent) stranded during the first two weeks of the event, with another cluster of animals stranding in the last week of July.

These 219 stranded animals all exhibited clinical signs of domoic acid toxicity (e.g., neurological problems including seizures, ataxia, nystagmus, scratching, and muscle tremors). Domoic acid, a naturally occurring biotoxin produced by *P. australis*, was detected in serum, urine, and fecal samples submitted to the National Ocean Service laboratory in Charleston, South Carolina, and the National Marine Fisheries Service laboratory in Seattle. Despite treatment, 81 of 184 (44 percent) animals died or were euthanized. Examination of formalin-fixed tissues from animals that died revealed lesions compatible with excitotoxin-mediated damage (i.e., damage from continuous stimulation of nervous tissues, such as occurs from exposure to domoic acid). The severity and exact nature of the lesions varied with the duration of clinical signs before

death. The sea lions that died within 48 hours of stranding had the same symptoms as those observed in sea lions that stranded during an unusual mortality event in 1998 (e.g., acute nerve damage involving the dentate gyrus and pyramidal cells in the hippocampus of the brain). During this sea lion mortality event, several California sea otter deaths also occurred. Preliminary data indicate that domoic acid may also have caused their deaths.

Algal blooms were observed regularly along the coast of central California during 2000. The extent and duration of the blooms were monitored through the National Ocean Service's Harmful Algal Bloom program. In contrast to the 1998 event, the 2000 sea lion stranding pattern did not appear to coincide closely with the observed algal blooms. The apparent lack of association is perplexing in view of the ostensible role of domoic acid toxicity in the strandings.

Harbor Seals

An increase in adult harbor seal mortality was observed at Point Reyes, California, in May 2000. Dead adult seals are rarely observed in this area although a similar pulse in adult mortality was observed in May 1997 when 90 animals died. Twenty-seven animals died in 2000, of which 21 were adults in good body condition with no external lesions. The bacteria *Pseudomonas aeruginosa* was obtained in pure culture from three affected animals. Because this bacteria is rarely a primary pathogen, an underlying viral cause is suspected but has not been confirmed.

Gray Whales

In 1999 a total of 273 gray whales was found stranded along the west coast of North America. Most were found dead and in various stages of decomposition. The majority of those for which gender could be determined were female. In Alaska most strandings were north of the Aleutian chain. In Washington and California an increased number of dead whales were observed in Puget Sound and in San Francisco Bay, respectively, during the whales' northward migration.

For the preceding decade, the highest number of strandings recorded in any one year was 87. Nevertheless, the Marine Mammal Commission anticipated a possible continuation of the unusual gray whale mortalities in 2000 and was concerned that an appropriate response might not be feasible without adequate planning and preparation. Therefore, on 10 December 1999 the Commission wrote the National Marine Fisheries Service to recommend that it take such steps as necessary to have a die-off response plan in place by the end of the year. The Service responded on 9 February 2000, stating that it did not have a specific contingency plan to respond to a die-off of gray whales, should the high stranding rate continue in 2000. The Service noted that the National Marine Mammal Laboratory was finalizing a necropsy and response protocol for stranded gray whales to be used in FY 2000 and that it would be circulated to the Commission for comments. As of the end of 2000 the Commission had not received a necropsy and response protocol. The Service also noted that it had asked its stranding coordinators to secure areas for conducting necropsies in the event of additional strandings. Finally, the Service noted that the U.S. stranding network would be receiving reports from the stranding network in Mexico and would be prepared to step up their efforts off the U.S. Pacific coasts as circumstances indicated.

In 2000 gray whale strandings continued in high numbers. A total of 355 dead whales was reported along the U.S., Canadian, and Mexican coasts. Of these, 206 were in Mexico, 60 in California, 2 in Oregon, 23 in Washington, 7 in Canada, and 57 in Alaska. In Alaska, most strandings were in the Gulf of Alaska rather than north of the Aleutian Islands, as observed in 1999. Also in 2000, the majority of animals for which gender could be determined was male, rather than female as observed in 1999. In 1999 and 2000 combined most stranded animals were subadults or adults, whereas in previous years they were mostly calves or juveniles.

A number of the stranded whales were emaciated, suggesting a nutritional problem. Blubber thicknesses in 37 animals examined varied from 4.6 to 17 cm.

Figure18: Carcass of an adult male gray whale on Agate Beach, Marin County, California, 15 April 2000 (photo courtesy of The Marine Mammal Center, Sausalito CA).

Concentrations of PCBs and DDT found in the blubber of the animals sampled were highly variable, ranging from 47 to 2,100 ng/g for total PCBs and 15 to 770 ng/g for DDT and its derivatives. Some live animals photographed offshore during the fall southward migration also appeared to be emaciated. In addition, calf production, estimated from observations of cow-calf pairs migrating north in spring, decreased in 1999 and 2000. In 2000 only 96 calves were sighted on the northward migration, the lowest number since counts were begun. Based on the sightings data and a correction factor for cow-calf pairs not seen, the total number of calves in 2000 was estimated at 282—only 1 percent of the total population.

The principal gray whale feeding grounds are the shallow shelf waters of the eastern Bering Sea, and amphipods are the primary prey. One hypothesis for the poor condition of the whales is that their growing population may be reaching the limit of available food resources, precipitating an increase in density-dependent mortality. At the same time environmental chang es in the Bering Sea and North Pacific may have reduced available food supplies and lowered the carrying capacity, perhaps exacerbating density-dependent responses. However, as pointed out in a 20 April 2000 letter from the Working Group on Marine Mammal Unusual Mortality Events (see later in this chapter) to the National Oceanic and Atmospheric Administration, many of the stranded whales were not emaciated or in poor nutritional condition, and other potential causes could be masked by the presumption that these deaths are simply a function of the environmental carrying capacity.

To facilitate work on these and related questions, the working group's letter described the need for greater access to carcasses and for more detailed necropsy of carcasses. The working group recommended that (1) the National Marine Fisheries Service increase efforts to locate carcasses and conduct detailed necropsies; (2) the National Oceanic and Atmospheric Administration secure areas for necropsies and provide for disposal of carcasses after the necropsies; (3) managers of the National Ocean Service's national marine sanctuaries on the Pacific Coast, the Department of the Interior's coastal national parks and wildlife refuges, and the Environmental Protection Agency's national estuarine sanctuaries all be informed of the need to cooperate with stranding response teams to facilitate necropsies; and (4) the National Marine Fisheries Service Southwest Region continue to provide full support to investigations of this ongoing unusual mortality event.

In response to the working group's recommendations, the National Marine Fisheries Service wrote to the National Park Service and communicated with the Navy to enlist their cooperation in securing necropsy sites. The Navy provided one site, the National Park Service promised cooperation, and funding was made available to increase the ability to respond to strandings.

Bottlenose Dolphins

From August 1999 until February 2000, approximately 120 bottlenose dolphins stranded dead along the coast of five counties in the Florida panhandle (i.e., Okaloosa, Walton, Bay, Gulf, and Franklin Counties). These strandings occurred at a rate four times higher than the historic average for this species and region, and were concurrent with a harmful algal bloom of *Gymnodinium breve*. Examination of minimally to mildly decomposed animals showed significant upper respiratory tract problems, and tests for brevetoxin in two fresh dead animals showed positive immuno-reactivity in the tissues examined. Brevetoxin also was quantified in the livers of 9 of 18 animals tested, in the kidneys of 6 of 10 animals, and in the stomach contents of 3 animals. The highest brevetoxin levels were found in the stomach contents, which consisted principally of fish. Tests for morbillivirus were negative.

The rates at which dolphins may have been exposed to brevetoxin during the mortality event are unknown. In addition, the effects of cumulative chronic exposure to brevetoxin, as opposed to acute short-term exposure, are unknown.

On 16–17 January 2000, 150 bottlenose dolphins of the putative offshore stock stranded in the Florida Keys. Thirty-one animals are known to have died, and one live calf was taken into rehabilitation. Necropsies were performed on 10 males and 11 females in fair-to-good body condition. Results were inconclusive and the cause of the stranding could not be determined.

Alaska Sea Otters

Aerial surveys of the Aleutian Islands sea otter population in 2000 revealed a 70 percent decline in the population over the last eight years. The primary hypothesis for the decline is predation by killer whales. No additional causes have been identified, but other factors (e.g., food availability and contaminants) still need to be evaluated (see also the sea otter section in Chapter III). On 22 August 2000 the Fish and Wildlife Service designated sea otters from Unimak Pass to Attu Island a candidate species under the Endangered Species Act, making it eligible for listing as threatened or endangered..

Working Group on Marine Mammal Unusual Mortality Events

As noted in previous Commission reports, the deaths of hundreds of 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 response to such events; (3) establish a fund to compensate persons for certain costs incurred in responding to unusual mortality events; (4) develop objective criteria for determining when 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.

The Secretary delegated responsibility for these activities to the National Marine Fisheries Service. In response, the Service, in consultation with the Marine Mammal Commission and the Fish and Wildlife Service, in 1993 established the Working Group on Marine Mammal Unusual Mortality Events composed of marine mammal experts from around the country. 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) stranding of animals at an unusual time of year; (3) an increase in 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 normally occurs in the area or time of year; (5) the appearance of similar or unusual pathologic findings in the stranding animals or differences in the general condition (e.g., blubber thickness) of stranded animals compared with what is seen normally; (6) abnormal behavior in living animals in the area where mortality is occurring; and (7) the stranding of critically endangered species. The working group assisted in the preparation of the Na-

tional 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 18–19 April 2000 to review information on the gray whale strandings described earlier. At the meeting, the group also discussed the Marine Mammal Health and Stranding Response Program, reauthorization of the Marine Mammal Protection Act, mortalities in 1999 (harbor porpoises in the mid-Atlantic, bottlenose dolphins in the mid-Atlantic, and bottlenose dolphins in the Florida Keys), unusual mortality events in 2000 before the meeting (beaked whales in the Bahamas, bottlenose dolphins in the Gulf of Mexico), and recent sea otter trends in California and the Aleutian Islands. The group expressed concern about poor cooperation among federal agencies responding to gray whale strandings and prepared a letter to encourage cooperation, particularly between the National Ocean Service marine sanctuaries program and the stranding network. The group noted that its previous executive secretary had resigned his position over a year before, and expressed concern that the National Marine Fisheries Service still had not assigned a staff member to that position and provided sufficient resources to carry out related work.

Marine Mammal Rescue Assistance Act of 2000

In December 2000 Congress passed the Marine Mammal Rescue Assistance Act of 2000. The Act amends Title IV of the Marine Mammal Protection Act of 1972 by inserting a new section 408. The new section 408 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 purpose of the program is to provide grants to eligible stranding network participants for the recovery or treatment of marine mammals, the collection of scientific data from living or dead stranded marine mammals for scientific research regarding marine mammal health, and facility operation costs that are directly related to those purposes. 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 strandings and mortality events, and the size of marine mammal populations inhabiting a geographic area within a region. Preference will be given to facilities with established records for rescuing and rehabilitating sick and stranded marine mammals.

To develop criteria for awarding grants, the Secretary is to consult with the Marine Mammal Commission, representatives from each designated stranding region, and other individuals representing public and private organizations that are actively involved in rescue, rehabilitation, release, scientific research, marine conservation, and the application of forensic science to stranded marine mammals. Applicants for such grants must apply to the respective Secretary. Grants are to be limited to no more than $100,000, and 25 percent of the costs of an activity conducted under a grant must be provided by non-federal sources. A total of $5 million was appropriated for each of fiscal years 2001 through 2003, to remain available until expended. Of this amount, $4 million is available to the Secretary of Commerce and $1 million to the Secretary of the Interior.

The Act also instructs the Secretary of Commerce to initiate a study of the environmental and biological factors responsible for the significant increase in mortality of the eastern gray whale population and other potential factors that may affect the population. The Secretary is directed to ensure, to the extent feasible, that information from current and future studies of the western gray whale population is also considered to better understand the dynamics of both populations. Funds in the amounts of $290,000 for 2001 and $500,000 for each of fiscal years 2002 through 2004 were authorized for gray whale studies.

Chapter VII

EFFECTS OF POLLUTION ON MARINE MAMMALS

Marine mammals can be affected directly and indirectly by a variety of environmental contaminants of human origin. These include persistent organic compounds and toxic metals from point and nonpoint sources, lost and discarded fishing gear and other marine debris, and noise from a variety of anthropogenic sources. Direct effects include but are not limited to mortality from toxic chemical spills, injuries from the resonance or pressure waves of very large sound sources, entanglement in lost and discarded fishing gear, disorientation, and hearing loss or masking of communication sounds by sounds from human sources. Indirect effects include decreased survival and productivity due to contaminant-caused decreases in essential prey.

The following sections of this chapter provide background information and describe efforts by the Commission, in consultation with its Committee of Scientific Advisors, to identify and precipitate actions necessary to minimize threats posed by marine debris, chemical pollution, and noise from various sources.

Effects of Noise

The behavior and in some circumstances the survival and productivity of marine mammal populations may be affected by sounds of human origin in the world's oceans. The nature and magnitude of the effects depend on a number of variables. They include the frequency, duration, and intensity of the sound; whether the source is stationary or moving; and the species, age, sex, reproductive status, hearing ability, activity, and previous experience of the exposed animals. For example, some animals exposed frequently to a particular sound may become accustomed and stop responding to the sound, but others may become sensitized and respond. 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 embayments versus the open ocean. Further, currently available information is insufficient in many cases to accurately predict cause-effect relationships.

The Marine Mammal Protection Act has been amended several times to provide more effective and streamlined means for dealing with noise-related issues. For example, the additions to the Act of sections 101(a)(5)(A) and 101(a)(5)(D), described in Chapter IX, were made, in part, to facilitate authorizing the taking of small numbers of marine mammals incidental to offshore oil and gas development and other sound-producing activities. As noted, available information often is insufficient to identify and make prudent judgments regarding the effects and the adequacy of measures proposed to minimize or mitigate the effects of such activities on marine mammals or habitats essential to their well-being.

Therefore, the Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, maintains a continuous overview of sound-producing activities that may affect marine mammals and provides recommendations to the responsible regulatory agencies on measures needed to meet the intent and provisions of the Act. Although the Navy is responsible for only a fraction of the anthropogenic (human-caused) noise in the marine environment, circumstances were such that during 2000 the Commission's attention was directed primarily toward Navy-related noise issues. Background information and the Commission's actions regarding particular sound-producing activities that could affect marine mammals are described in this section. The Commission's actions with regard to requests for small-take authorizations relating to offshore oil and gas development and other sound-producing activities are described in Chapter IX.

Acoustic Thermometry of Ocean Climate Program

In 1991 oceanographers from the United States and several other countries conducted an experiment to determine if available technology could be used to transmit and accurately measure the travel times of low-frequency sounds across ocean basins. The experiment, referred to as the Heard Island Feasibility Study, involved placing a portable sound generator in the deep-ocean sound channel off Heard Island, south of Australia. Over a two-week period, pulses of high-intensity, low-frequency sound (21 dB re 1 *u* Pascal @ 1 m, with a center frequency of 57 Hz) were generated and attempts were made to detect and determine the travel times of the pulses at receiving hydrophones in Alaska, California, Bermuda, and elsewhere. The experiment demonstrated that available technology was capable of propagating and measuring travel times of low-frequency sounds over ocean basins.

In 1993 the Defense Department's Advanced Research Projects Agency provided funding to Scripps Institution of Oceanography to conduct a follow-up, proof-of-concept study to determine if low-frequency sound generators and receivers could be used to detect changes in ocean temperatures possibly indicative of global warming. The study, entitled the Acoustic Thermometry of Ocean Climate (ATOC) Program, was based on knowledge that the speed of sound through water varies with temperature. It ultimately involved installation and periodic operation of low-frequency sound generators off the north coast of Kauai, Hawaii, and on the Pioneer Seamount off central California. Available information was insufficient to determine whether the sound transmissions would affect marine mammals adversely. The program therefore was expanded to include a marine mammal research component. A program advisory board, made up of scientists not associated with the program, was also established to provide advice on the design of the marine mammal–related studies. In addition, the Advanced Research Projects Agency and the National Marine Fisheries Service cooperatively prepared environmental impact statements assessing the possible environmental impacts of the proposed actions in accordance with the National Environmental Policy Act. The principal investigator also applied for and received permits from the National Marine Fisheries Service authorizing the taking of marine mammals in the course of the associated marine mammal studies. These activities and the Marine Mammal Commission's comments and recommendations concerning them are described in previous annual reports.

The proof-of-concept study was completed in 1999. The results, published in part in the 28 August 1998 edition of *Science*, indicated that low-frequency sound transmissions can in fact provide a useful tool for detecting and measuring variability and trends in deep ocean temperature. Further, although some of the data analyses have yet to be completed and subjected to peer review, the marine mammal component of the research program found only subtle, apparently nonsignificant changes in the distribution and behavior of marine mammals in the vicinity of the sound sources. (See the discussion later in this chapter of the National Research Council's May 2000 report entitled "Marine Mammals ane Low-Frequency Sound: Progress Since 1994," for additional information concerning the ATOC Marine Mammal Research Program.)

In light of the results of the proof-of-concept study, the Office of Naval Research provided funding to the North Pacific Acoustic Laboratory to continue operation of the Kauai sound source during the next five years. The Office of Naval Research, in cooperation with Scripps Institution of Oceanography, prepared and in May 2000 circulated for comment a draft environmental impact statement concerning the proposed action and an alternative — installing and operating an ATOC sound source offshore Midway Island. The Commission, in consultation with its Committee of Scientific Advisors, reviewed the draft and provided comments to the principal investigator by letter of 24 July 2000. The Commission indicated that it concurred with the conclusion that the best available information suggested that the preferred alternative—continued operation of the existing ATOC sound source offshore Kauai—was unlikely to have significant short-term effects on any species or population of marine mammal. The Commission noted, however, that the available information was insufficient to be confident that there would be no long-term effects on the distribution, abundance, or productivity of any of the potentially affected species and populations. Consequently, the Commission expressed the view that a monitoring program capable of detecting possible project-related changes in those variables should be a component of the project and that, among other things,

the environmental impact statement should be expanded to indicate the changes in the distribution, abundance, and productivity of marine mammals that, if observed, would trigger review and suspension or termination of the project.

With regard to monitoring, the Commission noted that the draft impact statement stated that four aerial surveys would be conducted each year during the "humpback whale season," but provided no indication of what area(s) would be surveyed, how and by whom the surveys would be conducted, or what changes in the parameters being monitored would be viewed as cause for concern. The Commission also noted that a number of independent groups have been conducting studies of humpback whales and other marine mammals in Hawaiian waters and that representatives of those groups meet periodically to review and consider ways to coordinate their activities. The Commission recommended that the authors of the proposal consult with the National Marine Fisheries Service to determine whether these coordinating meetings could be used as a means for obtaining independent expert review of the design and results of the proposed monitoring plan.

On 24 August 2000 the National Marine Fisheries Service published in the *Federal Register* notice of receipt and an advance notice of proposed rulemaking regarding a request from the Scripps Institution of Oceanography for authorization, in accordance with section 101(a)(5)(A) of the Marine Mammal Protection Act, to take marine mammals incidental to the continued operation of the Kauai sound source for five more years. In response, the Commission forwarded to the Service its previously described comments on the draft environmental impact statement. In its transmittal letter, dated 22 September 2000, the Commission noted that it was not clear whether the ATOC program would be terminated in five years, as indicated in both the draft impact statement and the request for incidental taking authorization, or be continued indefinitely. Also, the Commission reiterated its views concerning possible long-term, population-level effects and the need for a monitoring program capable of detecting possible project-related changes in the distribution, abundance, and productivity of the potentially affected marine mammal stocks. In addition, the Commission indicated its view that such a monitoring program should be made a condition of any incidental taking authorization that may be issued. The Commission recommended that (1) the Service consult with the applicant and scientists familiar with the demography and behavior of marine mammals that possibly could be affected adversely by the proposed continued operation of the Kauai sound source to determine the types of baseline information and monitoring that would be required to detect possible long-term effects on distribution, abundance, and productivity; and (2) any proposal to issue the requested authorization include a description of the monitoring that would be required, in sufficient detail to enable the Commission and others to judge the likelihood that it would be capable of detecting biologically significant long-term effects in time to avoid or reverse them.

On 22 December 2000 the National Marine Fisheries Service published in the *Federal Register* a notice of proposed rulemaking regarding the Scripps Institution of Oceanography's request for taking authorization. At the end of the year the Commission, in consultation with its Committee of Scientific Advisors, was reviewing the proposal and expects to provide comments to the Service before the end of January 2001.

The Navy's Proposed Operational Use of Low-Frequency Active 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 worked to develop submarines that operate quietly and that are difficult to locate and track from great distances. Recognizing that the development of quiet submarines would obviate the use of passive listening systems, both countries also began investigating alternative systems that would allow detection of possibly hostile submarines at distances beyond which they pose an immediate threat. One such alternative investigated by the United States was low-frequency active sonar.

In July 1996 the Department of the Navy published a *Federal Register* notice announcing its intent to prepare an environmental impact statement on operational deployment of a low-frequency active sonar to enhance U.S. antisubmarine warfare capability. In July 1999 the Department made available for public review and comment its Draft Overseas Environmental Impact Statement and Environmental Impact Statement

for [the] Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) Sonar. These actions and the Commission's responses to them are described in previous annual reports.

Among other things the Commission provided to the Navy by letter of 27 October 1999 its comments on and recommendations for improving the environmental impact statement. The Commission pointed out that available information on the effects of low-frequency sounds on marine mammals was sparse and that the conclusion that the proposed action would have negligible effects on marine mammals consequently was based on a number of assumptions. The Commission also pointed out that the conclusion would be valid only if the assumptions were valid and that it should be possible to design and carry out a monitoring program capable of confirming that the proposed action does in fact have negligible effects. Toward this end, the Commission recommended that the Navy consult with the National Marine Fisheries Service to determine the monitoring that would be required to confirm the validity of the assumptions on which the "negligible effects" conclusion was based. The Commission also recommended that the final environmental impact statement be expanded to (1) describe more clearly both the assumptions and the monitoring that would be done to validate the assumptions upon which the negligible effects conclusion is based, and (2) reflect more clearly and appropriately the Marine Mammal Protection Act's definitions of Level A and Level B harassment.

In August 1999 the Navy submitted to the National Marine Fisheries Service a request for a letter of authorization pursuant to section 101(a)(5)(A) of the Marine Mammal Protection Act to take marine mammals incidental to the proposed operational use of the SURTASS LFA. On 22 October 1999 the Service published notice of this request and an advance notice of proposed rulemaking in the *Federal Register*. At that time, it was the Commission's understanding that the Navy would publish its final environmental impact statement early in 2000 and that the National Marine Fisheries Service would then publish for review and comment its proposed regulations to authorize and govern the taking of small numbers of marine mammals incidental to the operational use of the SURTASS LFA. However, neither of these anticipated actions occurred during the year.

The Navy's proposal has generated much public concern, precipitated largely by three things: (1) the beaked whale strandings in the Bahamas (see below); (2) the sparseness of data concerning the effects of low-frequency sounds on marine mammals; and (3) uncertainty as to whether the monitoring and mitigation efforts planned by the Navy will be sufficient to ensure that operational use of the SURTASS LFA does in fact have no more than negligible impacts on marine mammals and other marine organisms. In response to media reports and concerns raised by constituents, 26 members of Congress signed a 19 July 2000 letter to the Secretary of Defense requesting that the Navy reassess its conclusion that the proposed action would pose no threat to the marine environment and postpone efforts to obtain a small-take authorization from the National Marine Fisheries Service until the Service has established "scientifically-based noise standards for marine mammals." The Navy subsequently prepared and forwarded to the chairman of the House Committee on Resources a summary of the data and analyses used to arrive at the conclusion that the proposed action was unlikely to have significant adverse effects on the marine environment. In his transmittal letter, dated 24 August 2000, the Secretary of the Navy indicated that the Navy was in the process of reviewing and revising the environmental impact statement to address the public's comments and concerns, that the impact statement was expected to be completed in the next few months, and that none of the comments or information provided by the public appeared likely to change the conclusions in the draft statement.

On a related matter, in a 26 October 1999 letter to the Navy commenting on the draft impact statement, the California Coastal Commission reiterated its previously stated view that operation of the SURTASS LFA in areas offshore California could have impacts inconsistent with the state's coastal zone management plan. Subsequently, the Navy prepared and submitted a consistency determination to the Coastal Commission for consideration. The matter was included on the agenda for the Commission's 12 December 2000 meeting. However, consideration of the matter was deferred pending finalization of the impact statement and responses to additional questions forwarded to the Navy by letter of 29 November 2000 from the Coastal Commission's federal consistency supervisor.

The Marine Mammal Commission shares the Navy's view that the best available information indicates that, with the proposed mitigation measures, the operational deployment of the SURTASS LFA is unlikely to have significant adverse effects on the distribution, abundance, or productivity of any marine mammal species or stock. However, available information is insufficient to be confident that there would, in fact, be no significant adverse effects. Further, there is good reason to believe that at least small numbers of some species will be taken by harassment incidental to the proposed action. Consequently, the Commission believes that taking authorization in accordance with section 101(a)(5) of the Marine Mammal Protection Act is required and that a monitoring program capable of detecting non-negligible effects should be a condition of any authorization issued.

The Bahamas Beaked Whale Stranding

On 15 and 16 March 2000 at least 17 cetaceans, including 14 beaked whales, 2 minke whales, and 1 spotted dolphin, stranded on beaches in the northern Bahama Islands (Abaco, Grand Bahama, and Eleuthera). Most of the animals were alive when they stranded, and both minke whales and six of the beaked whales were returned to the sea and are presumed to have survived.

Scientists from the Bahamas Marine Mammal Survey and the Center for Whale Research in Friday Harbor, Washington, were conducting studies of beaked whales in the Bahamas when the strandings occurred and were among the first to report and respond to them. After learning of the strandings, Bahamian authorities requested that the National Marine Fisheries Service assist in the investigation of possible causes. In response, the Service sent to the scene three individuals with expertise in investigating marine mammal strandings. Those individuals conducted postmortem examinations and collected samples for histopathology studies from six of the animals that died, including four Cuvier's beaked whales and one Blainville's beaked whale. The postmortem examinations and preliminary histopathology studies found evidence of pre-death bleeding and other trauma, principally in organs and tissues associated with hearing. Such trauma is commonly seen in animals exposed to high-intensity sounds and rapid pressure changes, suggesting that the strandings might have been triggered by a loud sound or explosion.

On 22 March 2000 the *Washington Post* published an article indicating that the strandings and two earlier ones had coincided with U.S. Navy activities. On the same day, the Commission received a copy of a 21 March 2000 letter to the Navy from the Natural Resources Defense Council and the Humane Society of the United States expressing concern that the strandings could have been caused by acoustic devices being tested as part of the Navy's Littoral Warfare Advanced Development (LWAD) Program. The letter urged that the LWAD program be suspended pending completion of the investigation of the Bahamas strandings. (See the following section for additional information concerning the LWAD program.)

The Navy provided funding and personnel to assist in the investigation initiated by the National Marine Fisheries Service in response to the request from Bahamian authorities. On 4 April 2000 representatives of the Navy and the National Marine Fisheries Service met to discuss the elements and preliminary results of the ongoing investigation. Commission representatives were invited and attended the meeting. During the meeting it was noted that several of the strandings apparently occurred before the LWAD tests, and that none of the sound sources involved in the tests could have caused the kinds of tissue and organ damage found during the postmortem examinations. It also was noted that a routine anti-submarine warfare training exercise, involving several submarines and surface vessels, was being carried out near the areas and time that the strandings occurred. The exercises involved the use of standard tactical sonars and, although similar exercises using such sonars have been carried out previously with no indication of harmful effects on marine mammals or other marine organisms, the investigation was looking into the possibility that the strandings may somehow have been related to the training exercise.

On 21 April 2000 the Navy issued a press release indicating that it was working with the National Marine Fisheries Service to try to determine the cause of the strandings and that, based on the initial investigation, it had concluded that the LWAD tests in March could not have been a factor. The press release also indicated that the Navy was reviewing the transit of seven surface ships and three submarines near the area where the

strandings occurred to determine if any action by those vessels could have caused or contributed to the strandings.

On 10 May 2000 representatives of the Animal Welfare Institute, the Humane Society of the United States, the Ocean Mammal Institute, and the Natural Resources Defense Council held a press conference in which they alleged that the Bahamas strandings had been precipitated by the March LWAD tests and called on the Navy to halt both further tests of the LWAD program and operational deployment of the SURTASS LFA. Later that day, the Navy issued a press release indicating that the strandings had begun more than four hours before and were 35 miles distant from the site of the March LWAD tests and therefore could not have been caused by the tests. The press release also indicated that the Navy was continuing to work with the National Marine Fisheries Service to assess possible causes of the strandings and as part of that process was conducting a review to determine if other naval activities might have been responsible.

In light of these developments, the Commission advised the Navy by letter of 19 May 2000 that it was not clear whether all appropriate steps were being taken to determine the cause of the strandings and, if Navy activities were implicated, steps that could be taken to avoid such occurrences in the future. The Commission pointed out that, unless the uncertainties were addressed satisfactorily, efforts to stop the development and use of high-energy sound sources for national defense and other purposes were likely to intensify. The Commission recommended that the Navy and the National Marine Fisheries Service hold a workshop as soon as possible to review what was being done and to identify what more could be done to determine the cause and factors that may have contributed to the strandings and, if Navy activities were implicated, steps that could be taken to avoid such situations in the future. The Commission further recommended that the workshop involve both appropriate experts from the Navy and the Service and acousticians, oceanographers, marine mammalogists, and behavioral biologists with no ties to either agency. The Commission also pointed out that it would be inadvisable to proceed with the planned LWAD tests off New Jersey (see the discussion in the next section) before the investigation of the Bahamas stranding was completed and the results made public.

On 5 June 2000 representatives of the Navy, the National Marine Fisheries Service, and the Commission met to review the preliminary results of the ongoing investigation of the strandings. The results of that meeting were summarized in a 9 June letter from the Navy to the National Marine Fisheries Service. Among other things, the letter indicated that the Navy was conducting a complete reconstruction of the sound field produced by the hull-mounted sonars on the ships involved in the previously noted training exercise. The letter noted that this assessment would be peer reviewed by leading acousticians from outside the Navy and that the preliminary results of the assessment indicated that there had been a "surface duct" about 100 to 200 feet below the ocean's surface at the time the exercise was being conducted, meaning received levels of the sonar transmissions at distances from the source could have been higher than what normally occurs. The letter also indicated the Navy's concurrence that the necropsies of the dead animals indicated that the whales had endured a pressure-related or auditory trauma before stranding. It indicated that the Navy was committed to working with the Service to determine the cause of the strandings and, if Navy sonars are implicated, to examine steps that can be taken to avoid such occurrences in the future.

The Navy and the National Marine Fisheries Service have continued to consult and to work together to try to determine the cause of the Bahamas strandings. In this regard, the Service and the Navy issued press releases on 15 and 21 November 2000, respectively, indicating that analysis of acoustic conditions in the New Providence Channel in the Bahamas at the time the strandings occurred suggested that a surface duct may have been present and allowed transmissions from tactical sonars being used on vessels transiting the area to be carried farther than normal with little attenuation. They also indicated that the related histopathology studies being done by the National Marine Fisheries Service were not scheduled to be completed until the summer of 2001 and, if the study results confirm that the stranded animals could have been traumatized by the sonar transmissions, the Navy will assess its use of sonars during peacetime training to determine steps that can be taken to avoid such situations in the future.

The Littoral Warfare Advanced Development (LWAD) Program

As noted earlier, on 22 March 2000, the day the *Washington Post* published the article concerning the cetacean strandings in the Bahamas, the Commission received a copy of a 21 March 2000 letter to the Navy from the Natural Resources Defense Council and the Humane Society of the United States expressing concern that the strandings could have been caused by sea tests related to the Navy's Littoral Warfare Advanced Development (LWAD) program. The letter urged that the LWAD program be suspended pending completion of the investigation of the Bahamas strandings.

The Commission had no prior knowledge of the LWAD program and accordingly consulted with the Navy to determine the basis of the concerns expressed by the Natural Resources Defense Council and the Humane Society. The Commission learned that the Navy had been conducting LWAD-related sea tests near the time and area that the strandings occurred and was working with the National Marine Fisheries Service to determine whether the tests or other Navy activities could have been responsible for the strandings. The Commission also learned that, in the process of planning the tests, the Navy had prepared an overseas environmental assessment in accordance with Executive Order 12114. It also learned that the Navy had consulted informally with the Southeast Regional Office of the National Marine Fisheries Service in accordance with section 7 of the Endangered Species Act to assure that the tests would not jeopardize or adversely affect habitat critical to the survival of any endangered or threatened species. Further, the Commission learned that the Navy planned to conduct a second series of tests off the coast of New Jersey between 22 May and 7 June 2000 and, with regard to those tests, had prepared an environmental assessment in accordance with Executive Order 12114 and forwarded it to the Northeast Regional Office of the National Marine Fisheries Service to initiate informal consultations pursuant to section 7 of the Endangered Species Act.

The Commission requested and, in consultation with its Committee of Scientific Advisors, reviewed the two environmental assessments. Among other things, the assessments indicated that the LWAD program involved the development and testing of both active and passive acoustic systems to detect and track submarines in shallow nearshore areas where the SURTASS LFA would not be effective. Further, they indicated that the tests would involve surface vessels, submarines, P-C3 Orion aircraft, and a number of active sound sources with source levels greater than 200 dB re 1 μ Pascal at 1 m. They also indicated that the sound sources would be ramped up gradually to avoid sudden impacts to marine mammals and sea turtles, that visual surveys would be conducted from the bridges of the surface vessels to locate marine mammals and sea turtles that might be affected by the tests, and that sonar tests would be suspended if marine mammals or sea turtles were observed within areas where available information suggested that the animals could be affected adversely. The assessments concluded that, with the proposed mitigation measures, the tests were unlikely to have significant adverse effects on any marine mammals or sea turtles, including those listed as endangered or threatened under the Endangered Species Act.

With regard to the last point, the administrator of the National Marine Fisheries Service's Southeast Region indicated in a 13 March 2000 letter to the Office of Naval Research that, given the proposed mitigation measures, the Region concurred with the determination that the sea tests scheduled to be conducted later that month off Florida and South Carolina were unlikely to have significant adverse effects on either marine mammals or sea turtles. The letter also noted that, although the Navy had met its consultation requirements under section 7 of the Endangered Species Act, authorization would be required under section 101(a)(5) of the Marine Mammal Protection Act if taking of marine mammals as defined in the Act was likely to occur.

As noted earlier, the Commission pointed out in its 19 May 2000 letter to the Navy that it would be inadvisable to proceed with the planned LWAD tests off New Jersey before the investigation of the Bahamas stranding was completed and the results made public. Also on 19 May 2000 the administrator of the National Marine Fisheries Service's Northeast Region advised the Office of Naval Research that the region was unable to concur with the Navy's determination that the LWAD tests scheduled to be conducted off New Jersey between 22 May and 7 June 2000 were not likely to adversely affect any species listed under the

Endangered Species Act. Among other things, the letter indicated that the environmental assessment concerning the planned tests was received less than a month before the planned start date and that this had allowed insufficient time to properly assess the information, analyses, and conclusions provided in the assessment. It also indicated that, although a number of listed species are known to occur in and near the planned test area, the methods used to assess the potential effects of the tests on most species appeared to rely on unrealistic and unsupported assumptions. It noted as an example that the descriptions in the environmental assessment of the source levels of some components of the LWAD program were vague and that the assessment appeared to underestimate the potential impacts of high source levels. As another example it pointed out that, although two species of squid are known to occur and to be important prey for sperm whales and other marine mammals in areas off the coast of New Jersey, the environmental assessment made no mention of squid or the possibility that the tests could have indirect food-chain effects on sperm whales and other squid-eating species. It concluded with a recommendation that the Navy initiate formal consultations pursuant to section 7 of the Endangered Species Act.

The Navy considered the Region's determination to be unjustified and, by letter of 26 May 2000 to the Administrator of the National Marine Fisheries Service, requested that the determination be reconsidered. It is the Commission's understanding that, after review, the Service's headquarters concurred with the Region's determination and that the Navy subsequently canceled those parts of the May–June LWAD tests involving the use of high-energy sound sources. The Commission also understands that the Service and the Navy are continuing to consult to determine whether future LWAD tests would require formal section 7 consultations and incidental taking authorizations to meet the intents and provisions of the Endangered Species Act and the Marine Mammal Protection Act.

Shock Testing the USS *Winston S. Churchill*

The National Defense Authorization Act requires that all new designs of hulls and other critical components of Navy ships and submarines be tested under simulated combat conditions before acceptance for service in the fleet. The purpose of the tests is to evaluate the reliability of structural components and electronic systems vital to the performance of the vessels and crews under combat conditions.

In December 1999 the Navy issued for public review and comment the Draft Environmental Impact Statement (DEIS) for the Shock Trial of the *Winston S. Churchill* (DDG 81). The draft assessed the possible environmental impacts of detonating three or four 4,536-kg (10,000-lb.) explosive charges as part of shock trials to be conducted between 1 May and 30 September 2001 in one of three possible areas: the Atlantic Ocean offshore either Mayport, Florida, or Norfolk, Virginia, and the Gulf of Mexico offshore Pascagoula, Mississippi. To minimize possible impacts on marine mammals, the draft indicated that aerial, visual, and acoustic surveys would be conducted to locate marine mammals present in areas where they could be killed or injured by the explosions; charges would not be detonated if marine mammals or other potentially sensitive species were observed within 3 nmi of the detonation site; and tests would not be conducted at times of the day or in weather conditions when it would not be possible to see animals within the 3-nmi buffer zone.

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, reviewed the draft impact statement and commented on it by letter of 30 March 2000. The Commission noted that the draft provided a thorough and objective assessment of the species and numbers of marine mammals likely to be present in and near the three prospective test areas and how the various species could be affected by the trial. Further, the Commission indicated that the proposed monitoring and mitigation measures seemed sufficient to minimize and document to the extent practicable the number of marine mammals killed or injured incidental to the trial. The Commission also pointed out that some aspects of the draft's assessment of potential harassment appeared inconsistent with the definition of harassment in the Marine Mammal Protection Act.

With regard to the last point, the Commission noted that the draft indicated that feeding, breeding, and other behavior of marine mammals could be disrupted at distances from 10 to more than 100 nmi by noise generated by the explosions, but that such disturbance would not constitute harassment as defined by the Marine Mammal Protection Act because it

would be brief and occur no more than four times at weekly intervals. Although recognizing that a small number of short-term disturbances were unlikely to have biologically significant effects and that it would be difficult to accurately estimate the species and numbers of marine mammals whose behavior might be disrupted temporarily by the trials, the Commission noted that such disturbance appeared to constitute Level B harassment as defined in the 1994 amendments to the Act. The Commission advised that the references to harassment should be revised to more clearly and accurately reflect the Act's definitions of Level A and Level B harassment. The Commission also advised that, if available data were insufficient to reliably estimate the species and numbers of marine mammals whose behavior might be disrupted temporarily by the explosions, the environmental impact statement should indicate that such disturbances are unlikely to have biologically significant effects and that no estimates were made of the species or numbers of animals that possibly could be taken by Level B harassment.

Following publication of the draft environmental impact statement, the Navy submitted to the National Marine Fisheries Service an application for a letter of authorization to take marine mammals incidental to the shock trial. The Service published in the *Federal Register* on 3 March 2000 notice of receipt and a request for comments on the application. In response, the Commission forwarded to the Service a copy of its 30 March comments on the draft impact statement.

At the end of the year, the Navy had not yet published its final impact statement. However, on 12 December 2000 the National Marine Fisheries Service published in the *Federal Register* proposed regulations to authorize and govern the taking of marine mammals incidental to the shock trial. At the end of the year, the Commission, in consultation with its Committee of Scientific Advisors, was reviewing the proposed regulations and anticipates providing comments to the Service early in 2001.

National Research Council Reports on Marine Mammals and Low-Frequency Sound

In 1992, after completion of the Heard Island Feasibility Test described earlier, the Defense Department's Advanced Research Projects Agency and the Office of Naval Research requested that the National Research Council (NRC) form a committee to examine the state of knowledge concerning the effects of low-frequency sounds on marine mammals and other marine organisms, and to assess the benefits of low-frequency sound as a research tool relative to its possible harmful effects. The results of that evaluation were published in a 1994 NRC report entitled "Low-Frequency Sound and Marine Mammals: Current Knowledge and Research Needs."

In 1993, before publication of the NRC report, funding was provided by the Advanced Research Projects Agency to Scripps Institution of Oceanography to initiate the follow-up ATOC program. Subsequently, the NRC was asked by the Office of Naval Research to review the results of the marine mammal research component of the program and to ascertain how data acquired since publication of the 1994 report fulfilled the data needs described in the report. The results of the follow-up study were published in May 2000 in a NRC report entitled "Marine Mammals and Low-Frequency Sound: Progress Since 1994." The report notes that, while much has been learned since 1994, there are still substantial uncertainties concerning the possible effects of the ATOC program and other low-frequency sounds on marine mammals. It describes the uncertainties and the types of research required to resolve them. As examples it points out the need for research to determine the basic hearing capabilities of marine mammals, particularly large cetaceans, and how different species use sound for communication and other purposes.

The report also points out that the research will require multidisciplinary efforts and should be supported by agencies with responsibilities for both basic and applied research, including the Navy, the National Oceanic and Atmospheric Administration, the National Science Foundation, the Minerals Management Service, the Biological Resources Division of the U.S. Geological Survey, and the National Institutes of Health. The Marine Mammal Commission shares this view and in 2001 will work with these agencies and the scientific community to both better define and generate the support needed to undertake the most critically needed research.

Effects of Marine Debris

Chemical contaminants and oil spills are widely recognized as serious forms of marine pollution, and billions of dollars are spent to study and prevent their effects. Marine debris can have comparable effects, yet it is largely overlooked as a significant marine pollutant, and almost no funding is provided for research and mitigation. Marine debris can be any type of manufactured item lost or discarded at sea or introduced into the ocean from coastal lands and rivers. Debris items range in size from minute plastic pellets no more than a few millimeters in diameter to derelict fishing nets hundreds or thousands of meters long. Because of their persistence, abundance, and strength, debris items made of plastic and other synthetic materials pose the greatest problems. Because many of these items float, they also can be carried on ocean currents for years and be transported thousands of miles from their source.

Marine debris injures and kills marine life in two ways: entanglement and ingestion. Most entanglements involve lost and discarded fishing gear, such as fishing nets, monofilament line, rope, and strapping bands used to bind bait boxes; however, cargo nets, line, and strapping bands from other maritime sources also contribute to entanglement problems. For some species, particularly seals, the vast majority of entanglements involve young animals whose curiosity or instinct for play apparently attracts them to debris items. Once entangled, animals unable to free themselves quickly are likely to become exhausted and drown or to die from infected wounds caused by the chaffing or constriction of debris or from starvation or predation caused by their restricted mobility.

Most ingestion involves small items—particularly plastic pellets, plastic bags, and plastic sheeting—that can injure or kill animals by puncturing or blocking digestive tracks, or perhaps by transferring toxic chemicals adsorbed on debris surfaces into animal tissues. Sea turtles and seabirds, which confuse marine debris for natural items of prey, appear to be particularly susceptible to ingestion-related impacts. In general, entanglement seems more likely than ingestion to cause serious injury or death; however, a thorough examination of possible effects associated with the transfer of toxic chemicals adhering to debris surfaces into animals has not been undertaken.

Like chemical and oil pollution, marine debris is a broad-scale pollutant that can debilitate and kill individuals of many marine species. As shown in Table 13, compiled by the Marine Mammal Commission, entanglement and ingestion incidents have been reported for at least 267 species of marine life, including at least 43 percent of the world's marine mammal species, at least 44 percent of the world's seabird species, and all but one of the world's sea turtle species. Several of these species are listed as endangered or threatened (e.g., Hawaiian monk seals, West Indian manatees, and all species of sea turtles). Others, such as lobsters, are commercially valuable and may be caught in derelict nets at rates that could affect commercial fisheries.

The serious consequences of marine debris were first recognized early in the 1980s as a result of studies of northern fur seals in the Pribilof Islands, Alaska, by the National Marine Fisheries Service. At that time, the islands' fur seal population had declined more than 50 percent during the preceding 15-year period, and research findings revealed that entanglement in marine debris, particularly trawl netting and strapping bands, was a contributing, if not the major, factor causing the decline. The Marine Mammal Commission and the National Marine Fisheries Service subsequently played major roles in developing a response to this information.

As discussed in past annual reports, the response included several initiatives: the formation of a Marine Entanglement Research Program within the National Marine Fisheries Service; three international conferences on the fate and impact of marine debris organized by the Service in 1984, 1989, and 1994; entry into force of an international provision banning the discharge of plastics and regulating the discharge of other garbage from ships (i.e., Annex V of the International Convention for the Prevention of Pollution from Ships); development of a national marine debris monitoring program funded by the Environmental Protection Agency; annual international marine debris cleanup campaigns organized by the Center for Marine Conservation; and a program to design and install equipment for processing and handling ship-generated garbage aboard U.S. Navy ships.

A cornerstone of these efforts was the National Marine Fisheries Service's Marine Entanglement

Table 13. The number and percentage of marine species worldwide with records of marine debris entanglement and ingestion by species group

Species Group	Total No. of Species Worldwide	Entanglement Records	Ingestion Records	One or Both Types of Records
Sea Turtles	7	6 (86%)	6 (86%)	6 (86%)
Seabirds	312	51 (16%)	111 (36%)	138 (44%)
Sphenisciformes (Penguins)	16	6 (38%)	1 (6%)	6 (38%)
Podicipediformes (Grebes)	19	2 (10%)	0 (0%)	2 (10%)
Procellariiformes (Albatrosses, Petrels, and Shearwaters)	99	10 (10%)	62 (63%)	63 (64%)
Pelicaniformes (Pelicans, Boobies, Gannets, Cormorants, Frigatebirds, and Tropicbirds)	51	11 (22%)	8 (16%)	17 (33%)
Charadriiformes (Shorebirds, Skuas, Gulls, Terns, and Auks)	122	22 (18%)	40 (33%)	50 (41%)
Other Birds	–	5	0	5
Marine Mammals	115	32 (28%)	26 (23%)	49 (43%)
Mysticeti (Baleen Whales)	10	6 (60%)	2 (20%)	6 (60%)
Odontoceti (Toothed Whales)	65	5 (8%)	21 (32%)	22 (34%)
Otariidae (Fur Seals and Sea Lions)	14	11 (79%)	1 (7%)	11 (79%)
Phocidae (True Seals)	19	8 (42%)	1 (5%)	8 (42%)
Sirenia (Manatees and Dugongs)	4	1 (25%)	1 (25%)	1 (25%)
Mustellidae (Sea Otter)	1	1 (100%)	0 (0%)	1 (100%)
Fish	–	34	33	60
Crustaceans	–	8	0	8
Squid	–	0	1	1
Species Total	–	136	177	267

Source: Laist, D.W. 1996a (see Appendix C).

Research Program. Funded at about $600,000 to $650,000 per year, it was the only federal program charged solely with identifying and supporting a comprehensive array of research and management activities to address marine debris pollution. Through cooperative projects, the program coordinated and encouraged related work by other federal agencies. Funding for the program, however, was eliminated in 1996. Although fisheries are the principal source of debris items that can entangle marine wildlife, the Service has had no national-level program to address marine debris pollution since 1996.

Debris Cleanup Activities in the Northwestern Hawaiian Islands

As discussed in Chapter II, entanglement in derelict fishing nets is a major threat to endangered Hawaiian monk seals. Although the Service has not maintained a national-level program to address marine debris pollution, the staff of its Honolulu Laboratory has

Figure 19. Crew members from the Coast Guard cutter *Walnut* recover part of the 57,000 lbs. (26 mt) of marine debris collected from the Northwestern Hawaiian Islands (photo courtesy of U.S. Coast Guard).

continued to disentangle monk seals, remove debris from monk seal pupping beaches, and assess the amounts of hazardous debris in nearshore waters of the Northwestern Hawaiian Islands. As part of that effort, large amounts of derelict trawl and monofilament netting (up to 94 nets per square kilometer in some areas) were found snagged in reef outcrops. Because no net fisheries exist in the Northwestern Hawaiian Islands, it is apparent that virtually all of this material is drifting in from elsewhere in the North Pacific. In addition to threatening monk seals, the debris poses entanglement threats to sea turtles and seabirds and is damaging coral reef formations throughout the chain.

To address the problem, the Service organized a cooperative multiagency reef cleanup program, first carried out in 1997. Since then, the cleanup effort has been conducted each year over a several-week period and is supported by the Fish and Wildlife Service, the Navy, the Coast Guard, the State of Hawaii, the Hawaii Sea Grant College Program, the Center for Marine Conservation, the National Fish and Wildlife Foundation, and others. Because of the remote location of the Northwestern Hawaiian Islands and the size of the area to be cleaned, the scale of the problem is extensive. As of 2000 cooperating groups had removed 125,000 lbs. (56.8 mt) of derelict fishing gear from approximately 10 percent of the chain's reef habitat (Fig 19).

Examination of netting removed from the reefs indicated that its origins include fisheries from around the North Pacific, including Alaska and Asia. In an attempt to address the problem at its source, the Service, in cooperation with other agencies, developed plans for another international conference on marine debris in 2000, with a particular focus on derelict fishing gear in the North Pacific Ocean.

Also, as discussed in the previous annual report, the State Department, in consultation with the Service and the Marine Mammal Commission, contacted U.S. embassies and posts in Russia, China, Japan, Korea, the Philippines, and Taiwan. The State Department asked that debris problems in the Northwestern

Hawaiian Islands be brought to the attention of appropriate government officials in those countries, that the officials be advised of plans for an international conference on marine debris with a focus on derelict fishing gear, and that the officials be asked to review their governments' efforts to implement provisions of Annex V, particularly as they relate to the disposal and loss of fishing gear. At the Service's request, the U.S. Coast Guard also advised the International Maritime Organization (the organization responsible for overseeing the development and implementation of international shipping regulations such as Annex V) of the problem and plans for the international conference. Follow-on actions undertaken in 2000 are discussed below.

International Conference on Marine Debris

On 6–11 August 2000 the Hawaiian Humpback Whale National Marine Sanctuary Program, in consultation with the Service and other agencies and groups, sponsored the fourth International Marine Debris Conference on Derelict Fishing Gear and the Ocean Environment in Honolulu, Hawaii. Funding for the conference was provided by Congress, which earmarked $500,000 in the National Marine Fisheries Service's fiscal year 2000 appropriation for the purpose. The conference objectives were to (1) review sources and impacts of derelict fishing gear, (2) assess and identify new technology for mitigation and prevention, (3) establish international and national partnerships to address marine debris issues, (4) increase international and national public awareness, and (5) develop recommendations for future actions.

To help generate ideas and recommendations on these matters, the Sanctuary Program solicited six issue papers to be distributed to participants in advance of the meeting. The issue papers served as the focus for six separate working groups formed at the start of the conference. These papers and working groups examined legal authorities governing the disposal and loss of fishing gear, the impacts of marine debris, the identification of debris sources, industry involvement, debris removal and monitoring, and public education. The Marine Mammal Commission was asked and agreed to take the lead in preparing the issue paper on impacts of marine debris and related research and management needs.

The resulting paper, prepared with the help of an economist with the Louisiana Sea Grant College Program, noted that there has been a marked decline in efforts to address marine debris pollution since the last International Marine Debris Conference in 1994. In the United States, this decline has been due principally to the elimination of the Service's Marine Entanglement Research Program in 1996. Areas in which progress has been continued, however, include work to develop the national marine debris monitoring program, to continue the volunteer international beach cleanup campaigns, and to assess and remove derelict fishing gear in the Northwestern Hawaiian Islands.

The paper also suggested needed actions, including further work to assess and monitor entanglement and ingestion rates among affected species (e.g., Hawaiian monk seals, northern fur seals, and sea turtles) and to determine whether floating plastics adsorb toxic chemicals that could be transferred to marine species that frequently ingest plastics. The paper also suggested that work, similar to that recently done in the Northwestern Hawaiian Islands, be carried out to assess the amounts, impact, and feasibility of cleaning up derelict fishing gear submerged in other ocean areas, particularly major fishing grounds. The paper also suggested that conference participants consider requirements for reporting when and where fishing gear is lost and for creating economic incentives, such as bounties, taxes, deposits, rebates, and others, to encourage the recovery and proper disposal of old or derelict fishing gear. Finally, the paper suggested that participants consider recommendations for reinstating funding for a national marine debris research and management program and establishing a national marine debris coordinating committee.

Based on the issue papers and other papers presented at the conference, the various working groups developed a list of recommended actions for each of the six focus topics. Among other things, they recommended developing an international action plan and soliciting greater attention to marine debris problems by members of the International Maritime Organization and the various United Nations Regional Seas Programs. They also recommended studies or programs to assess the impacts of derelict fishing gear, establish a debris reference collection for identifying derelict fishing gear sources, and report and record data on when and where fishing gear is lost. To reduce or mitigate impacts, work was recommended in the following areas: retrieval of derelict fishing gear from

Table 14. Recommended actions identified in the Declaration of Resolve by participants in the August 2000 International Marine Debris Conference

1. Establish an international plan of action to prevent the discarding, minimize the loss, and maximize the recovery of fishing gear.
2. Develop mechanisms to improve reporting of lost fishing gear and enhance compliance with domestic and international regulations to prevent and mitigate the effects of fishing gear loss.
3. Identify and quantify adverse effects of ghost nets and other derelict fishing gear and promote ongoing and new efforts to remove debris hazardous to marine life and vessels.
4. Identify sources of derelict fishing gear and use that information to refine and target education and outreach programs for fishing communities.
5. Establish standardized protocols to map locations of commercial fishing and aquaculture activities using geographic information system techniques.
6. Consider "effort-rationalization" management approaches as tools to reduce loss of commercial fishing gear.
7. Develop private-public partnerships to fund derelict fishing gear recovery programs and education and outreach activities, and develop appropriate infrastructures to implement and enforce measures to prevent the discarding and loss of fishing gear.
8. Alert national and international agencies and organizations to the urgency of action to prevent the discarding and loss of fishing gear;
9. Promote the development of education programs to inform stakeholders about derelict fishing gear impacts and programs to prevent, mitigate, and monitor those impacts.

affected ocean areas, investigating financial incentives to encourage recovery and recycling of lost gear, expanding the availability of port facilities to receive and dispose of old and derelict gear, expanding recycling opportunities for fishing vessel wastes, and developing education and outreach programs, including reestablishment of a U.S. marine debris information office, which existed between the mid-1980s and mid-1990s, to disseminate educational materials to fishing communities and other maritime user groups.

These and other recommendations developed by the working groups were reviewed during a plenary session. To help underscore the importance of actions to address the issue, some recommendations were incorporated into a Declaration of Resolve adopted by conference participants at the end of the meeting (see Table 14).

As of the end of 2000 work was underway on a conference proceedings volume that will include papers and working group reports.

Involvement of the International Maritime Organization

As discussed in past annual reports, the International Maritime Organization (IMO) is responsible for developing and overseeing work to implement international regulations and standards governing commercial shipping. In 1988 Annex V of the International Convention for the Prevention of Pollution from Ships, a convention developed by the IMO, entered into force. Annex V sets forth regulations governing the discharge of ship-generated garbage and bans disposal at sea of any materials made of plastic, including old fishing nets and other fishing gear made of synthetic materials. Accidental loss of deployed fishing gear is not subject to the regulation as long as reasonable precautions have been taken to prevent or minimize such losses.

Responsibility for implementing IMO measures falls to the nations that agree to become parties to a convention or measure and thereby commit their res-

pective governments to adopting conforming domestic laws and regulations applicable to their citizens and to foreign vessels within their jurisdictional waters. The IMO and its subgroups are responsible for reviewing the effectiveness of adopted measures and recommending steps to improve them, as warranted. With regard to Annex V, the IMO's Marine Environment Protection Committee has the lead role in reviewing issues related to implementation.

As noted above, participants in the August 2000 International Marine Debris Conference recommended that international bodies, such as the IMO, be advised about the serious problems that continue to be caused by discarded and lost fishing gear. Because of that recommendation and information provided at the conference, the National Oceanic and Atmospheric Administration, the State Department, the Environmental Protection Agency, and the Coast Guard (which serves as the lead agency representing the United States at IMO meetings) began preparation of an information paper on results of the August conference. The paper, which was being drafted at the end of 2000, is expected to be submitted early in 2001 for consideration at the 46th session of the IMO's Marine Environment Protection Committee on 23–27 April 2001.

The paper will review recent information about the nature of marine debris problems, particularly in the Northwestern Hawaiian Islands where there is no evidence that the amount of netting and other debris has decreased since Annex V went into effect. In this regard, it was expected that countries would be asked to share any information they have on other areas of the world where marine debris threatens to become a problem.

The paper also is expected to include a copy of the conference recommendations and to request that countries consider them and provide comments, suggestions, and related information. IMO member governments also will be reminded of the Guidelines for Implementing Annex V, which were adopted by the IMO in 1988, and will be asked if the provisions relating to discarded or lost fishing gear—particularly those related to the reporting and recording of shipboard operational waste—should be integrated into the Annex itself. The paper also will ask IMO member governments to consider working with and through international organizations, such as United Nations Regional Seas Programs, the International Oceanographic Commission, and the Food and Agriculture Organization. Finally, the paper will ask IMO member governments to inform their respective fishing communities, fishery regulatory agencies, and related groups (e.g., fishing gear manufacturers) of the continuing problems being created by derelict fishing gear and other marine debris and the need for increased effort to prevent its loss into the marine environment.

Effects of Chemical Contaminants

Virtually all marine mammals alive today have been exposed to a variety of chemical compounds and trace elements introduced into the marine environment by human activities. Many of these substances enter the marine environment directly as a result of runoff, dumping, and atmospheric transport. They are also dispersed in the environment via food webs. As high-order predators, marine mammals (except the sirenians and some baleen whales) can be exposed to high levels of some contaminants as a result of biomagnification. Like other airbreathers, marine mammals also are exposed to contaminants via atmospheric gas exchange. Studies have confirmed high body burdens of some contaminants in marine mammals, but the physiological processes involved in storage, metabolism, and elimination of contaminant burdens are poorly understood. Also, there is great uncertainty about the mechanisms and pathways of contaminant flux in marine environments and food webs. Thus, it is difficult to verify that high body burdens of contaminants have directly impaired the health and well-being of individuals or populations.

On 6 April 2000 the chairman of the Marine Mammal Commission testified before the House Resources Committee, Subcommittee on Fisheries Conservation, Wildlife and Oceans, on issues facing conservation of marine mammals. He noted that, among other things, the problem of point and nonpoint sources of pollution is becoming increasingly apparent and may be having significant adverse effects on marine mammals and other components of marine ecosystems.

Concern regarding possible effects of chemical contaminants on the health of individual marine mammals and on the welfare of marine mammal populations has received increasing attention over the past three decades and especially during the last few years. The reasons for the concern include (1) the apparently increasing incidence of disease outbreaks

involving many animals with apparently high burdens of organochlorines or other contaminants, and (2) the growing experimental and other evidence that contaminants often found in marine mammal tissues have deleterious effects on reproduction in laboratory animals.

Recognizing the growing significance of the problem, the Marine Mammal Commission, the Biological Resources Division of the U.S. Geological Survey, the National Marine Fisheries Service, the Environmental Protection Agency, and the National Fish and Wildlife Foundation jointly sponsored a Workshop on Marine Mammals and Persistent Ocean Contaminants in October 1998.

The workshop report, published in April 1999, concluded that there is good reason to be concerned that the survival and reproduction of certain marine mammals may have been affected, and are being affected, by persistent contaminants, particularly organochlorines. Concern also was expressed about the effects of eutrophication of coastal waters by excessive inputs of nitrogen and phosphorus, which could diminish the capacity of coastal fish and invertebrate communities to support marine mammal populations and which might lead to more frequent and larger toxic algal blooms, occurrences that are known to kill marine mammals. The workshop is discussed in greater detail in Commission annual reports for 1998 and 1999.

The Commission, in consultation with its Committee of Scientific Advisors, reviewed the findings in the workshop report. It was evident that many federal and state agencies and international and academic institutions are conducting or supporting related research and that much of the research is focused on documenting the types and levels of contaminants present in marine species in different parts of the world. However, little is known about the effects of various contaminants and combinations of contaminants on growth, reproduction, or survival of any marine mammal species, and there is no mechanism in place to coordinate research and monitoring being conducted or supported by different entities. This makes it difficult to avoid duplication and to focus on the subjects of greatest practical importance. Therefore, the Commission recommended on 16 July 1999 to the Under Secretary of Commerce for Oceans and Atmosphere that the National Oceanic and Atmospheric Administration constitute an interagency working group to agree on priorities for contaminants research, review ongoing domestic and international research programs to improve coordination and content, and develop proposals for cooperative domestic budget initiatives to meet priority needs more effectively. The Commission noted that the interagency working group might include representatives of the National Marine Fisheries Service, the National Ocean Service, the Environmental Protection Agency, the Fish and Wildlife Service, the Biological Resources Division of the U.S. Geological Survey, the Minerals Management Service, the National Science Foundation, and the Marine Mammal Commission.

The Under Secretary responded on 1 November 1999, noting that the workshop proceedings were extremely informative, particularly in identifying actions needed to determine the potential impacts of persistent organic pollutants on marine mammals. The Under Secretary also stated that the Commission's recommendation to form an interagency working group was an excellent one and that National Oceanic and Atmospheric Administration staff were pursuing establishing such a group. The Commission responded to the letter on 23 November 1999, agreeing with the utility of the workshop proceedings and noting that, had it not been for the support of the National Marine Fisheries Service, it would not have been able to hold the workshop. The Commission also reiterated the view that the National Oceanic and Atmospheric Administration should move forward with establishing the interagency working group. As of the end of 2000 no action had been taken toward the establishment of an interagency working group for contaminants research.

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 the marine mammal and related research being conducted, supported, and planned by these departments and agencies.

For the 1999 survey, the Commission requested information from 19 federal agencies, departments, and offices. They were the Department of Agriculture; the Department of the Air Force; the Department of the Army's Army Corps of Engineers; the Department of Commerce's National Ocean Service, National Marine Fisheries Service, and National Sea Grant College Program; the Department of Energy; 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 Department of Defense Advanced Research Projects 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 summarized in the Commission-sponsored report "Survey of Federally-Funded Marine Mammal Research and Studies FY94–FY99," which is available from the National Technical Information Service (see Appendix B, Waring 1981 through 1999, for previous surveys).

Workshops and Planning Meetings

In 2000 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 its 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, 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 harbor porpoises, right whales, and other cetaceans;
- facilitate implementation of the Marine Mammal Health and Stranding Response Program;
- prepare for the 2000 meetings of the International Whaling Commission and its Scientific Committee, the Antarctic Treaty Consultative Parties, and the Commission and Scientific Committee for the Conservation of Antarctic Marine Living Resources;
- 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 results of research funded by the Minerals Management Service to determine the species and numbers of marine mammals that might be affected by oil and gas exploration and development in the northern Gulf of Mexico and assess the need for follow-up studies;
- identify uncertainties concerning the effects of chemical contaminants on marine mammals and actions necessary to resolve them;
- 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;
- participate in the International Conference on Arctic Development, Pollution, and Biomarkers of Human Health;
- prepare for and participate in the Workshop on the Cumulative Effects of Ship-based Tourism in the Antarctic Peninsula Area;
- review co-management needs for Cook Inlet beluga whales, and prepare for and participate in the hearing before an administrative law judge on Cook Inlet beluga whale co-management;
- participate in a workshop on Pacific walrus survey techniques;
- prepare for and convene the Commission's February 2000 Workshop on Impacts of Changes in Sea Ice and Other Environmental Parameters in the Arctic; and
- prepare a background paper for and assist in the organization of the fourth International Marine Debris Conference.

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.

Inasmuch as the Commission's research budget was essentially nonexistent during Fiscal Year 2000, the Commission's investment in research continued to be funded through transfers of funds from other federal agencies, particularly the National Marine Fisheries Service, the Fish and Wildlife Service, and the Department of State, or from grants that have been made to the Commission. In the past, when the Commission had a substantial research budget, it occasionally would transfer funds to other agencies along with detailed scopes of work describing precisely what the agency was to do or to have done, including requirements for reporting on progress to the Commission. In many instances, this made it possible for agencies to start needed research sooner than might otherwise have been possible and subsequently to support the projects on their own for as long as necessary. It also helped ensure that work supported by other agencies addressed priority needs in a non-duplicative, cost-effective manner. The Commission believed that it was essential to maintain agency involvement to the

greatest extent possible and that such transfers were a useful means of doing so.

Research and studies supported by the Commission in 2000 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

Workshop on Impacts of Changes in Sea Ice and Other Environmental Parameters in the Arctic (National Fish and Wildlife Foundation, Washington, DC)

It is becoming increasingly clear that the world's climate is changing. Over the past 30 years, the seasonal sea ice in the Bering Sea appears to have been getting thinner, forming later, and breaking up earlier. These sea ice changes may be a product of global climate change. Indigenous residents of the Arctic have observed poor body condition of some marine mammals and a greater frequency of extreme weather concomitant with changes in sea ice conditions. If these environmental changes continue, they will likely affect the distribution, abundance, and productivity of fish and wildlife resources on which many Alaska Natives and communities depend for subsistence. With these observations in mind, and with a desire to bring together scientists and indigenous experts to discuss them, the Marine Mammal Commission held a workshop on Impacts of Changes in Sea Ice and Other Environmental Parameters in the Arctic, funded by the University of Alaska's North Pacific Marine Research Initiative, the National Oceanic and Atmospheric Administration's Office of Oceanic and Atmospheric Research, and the National Marine Fisheries Service. Workshop arrangements were made through the National Fish and Wildlife Foundation.

The purposes of the workshop were to review, from both traditional knowledge and scientific perspectives, how changes in sea ice and other environmental parameters may be affecting Arctic living resources and the Native cultures and practices that depend on those resources, to identify possible measures that can be taken to mitigate the impacts of realized and anticipated changes, and to develop a document that provides a compelling blueprint for action for legislators, Arctic residents, and others. The workshop, which involved representatives of the Native, scientific, and environmental communities, was held in Girdwood, Alaska, 15–17 February 2000. Conclusions and recommendations arising from the workshop are discussed later in this chapter.

The Value of Sanctuaries and Reserves (Protected Areas) as Tools for Conserving Marine Mammals (Randall R. Reeves, Ph.D., Okapi Wildlife Associates, Hudson, Quebec, Canada)

Domestic and international legislation provides for the protection of marine areas to further conservation goals. However, it is not clear whether areas afforded special protection are being selected and managed to optimize their value as conservation tools. It also is not clear whether the statutes and agreements that authorize designation of specially protected areas provide for or appropriately encourage protection and effective management of the full range of areas meriting protection. To evaluate the use of marine sanctuaries and reserves as conservation tools, the contractor (1) identified and described key elements of federal and state statutes and international agreements that provide for the establishment of various types of marine protected areas to meet general or specific conservation goals; and (2) selected and evaluated representative statutes and protected areas as case studies to determine the effectiveness of current management approaches and steps that usefully might be taken to improve their effectiveness, particularly with respect to marine mammals. The contractor's report (see Reeves 2000, Appendix B) concluded that only a small part of the world's marine protected areas have been created for the explicit purpose of conserving marine mammals. In most instances, stated goals are more general, ranging from protection of biological diversity and ecological "health" to improved fish production and direct economic benefit for humans. The report, which includes a series of recommendations, will be made available to appropriate federal and state agencies for use in managing existing marine sanctuaries and reserves and designating new ones, and is available from the Marine Mammal Commission.

Assessment of Proposed Regulations for the Management of Cook Inlet Beluga Whales (Daniel Goodman, Ph.D., Montana State University, Bozeman, Montana)

The National Marine Fisheries Service estimated that the abundance of Cook Inlet beluga whales declined by nearly 50 percent between 1994 and 1998, leading the Service to designate this stock as depleted under the Marine Mammal Protection Act. The population estimate for this stock in 1999 was 357 whales. The Service concluded that the decline was caused by, or at least exacerbated by, the Native subsistence harvest. The Service therefore proposed regulations under the Marine Mammal Protection Act to limit the harvest and use of Cook Inlet beluga whales by Alaska Natives. As part of this process, a hearing before an administrative law judge was held on 5–8 December 2000. The contractor advised the Commission on the scientific merit of the regulations proposed by the Service and represented the Commission as an expert witness at the administrative hearing. Cook Inlet beluga whales, the proposed regulations to limit the subsistence harvest, and the administrative hearing are discussed in greater detail in Chapter III.

GENERAL

Survey of Federally Funded Marine Mammal Research (George H. Waring, Ph.D., Southern Illinois University, Carbondale, Illinois)

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 1999 was forwarded to the contractor, who prepared a draft report synthesizing the information. The draft was sent to the responding agencies to verify the accuracy of the information. The final report was reviewed by the Commission, in consultation with its Committee of Scientific Advisors, to identify possible duplicative research and how research might be planned and carried out cooperatively to avoid duplication. The report is available through the National Technical Information Service.

Assessment of the Activities of the Arctic Council and Its Subsidiary Working Groups (Henry P. Huntington, Ph.D., Huntington Consulting, Eagle River, Alaska)

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 Arctic Council was established by the eight Arctic nations as a high-level forum to build upon the Arctic Environmental Protection Strategy so as 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 two meetings of the senior Arctic officials and at meetings of the Sustainable Development Working Group and the Working Group on Conservation of Arctic Flora and Fauna, as discussed in Chapter V.

Sea Ice Workshop

There are many signs of change in the Arctic environment. Some, such as thinning of sea ice, earlier growing seasons on land, and rising temperatures in permafrost, have been identified through scientific research. Others, such as changes to sea ice characteristics, poor body condition of some marine mammals, and a greater frequency of extreme weather, have been noted by indigenous residents of the Arctic. With these observations in mind, and with a desire to bring together scientists and indigenous experts to discuss them, the Marine Mammal Commission held a workshop on Impacts of Changes in Sea Ice and Other Environmental Parameters in the Arctic, funded by the University of Alaska's North Pacific Marine Research

Initiative, the National Oceanic and Atmospheric Administration's Office of Oceanic and Atmospheric Research, and the National Marine Fisheries Service. Although the workshop focused largely on the Alaskan Arctic, its implications are international in scope, because all Arctic regions face similar challenges related to environmental change (Fig. 20).

The workshop was held 15–17 February 2000 in Girdwood, Alaska. The number of participants in the workshop was limited and chosen to provide a balance between scientists and indigenous experts and among areas of expertise. The purposes of the workshop were:

- to review, from both traditional knowledge and scientific perspectives, how changes in sea ice and other environmental parameters may be affecting Arctic living resources and the indigenous cultures and practices that depend on those resources;
- to identify possible measures that can be taken to mitigate the impacts of realized and anticipated changes; and
- to develop a document that provides a compelling blueprint for action for legislators, conservationists, Arctic residents, and others.

Workshop Context

There are many challenges to the future of Arctic communities. Climate change is one of these, but other aspects of environmental change also are of great concern to residents of northern Alaska. Although the actual and potential impacts of climate change on the environment and on people are important and worthy of a great deal of attention and effort, the workshop considered them in the context of other outside influences on the people, communities, and cultures of the region. These included, but were not limited to, environmental contaminants, industrial activity, overfishing, and other factors that interfere or threaten to interfere with traditional patterns of resource use and the position of Alaska Natives within their ecosystems.

There is a great deal of activity concerning environmental change and global warming. The workshop was designed specifically to look at ways that residents of coastal villages and researchers can work together to document the changes that are occurring, assess the likely magnitude of their impacts, and identify specific actions that can be taken in response. The workshop should be seen in the context of the many workshops that have been held or are planned, the great range of research that has been and is being done, and the many large programs that have been created to look at various aspects of climate change and its impacts.

As the conclusions and recommendations discussed below make clear, communication and trust are essential for true partnerships between the Native and scientific communities. Although those communities are sometimes overlapping, there are nonetheless distinct differences in the ways they view the natural world and the role of people and in the ways they approach research. Recognizing this, the workshop attempted to place equal emphasis on both perspectives.

Conclusions and Observations

Climate change is often seen by the general public as a rather vague possibility rather than as something concrete that is already affecting peoples' lives. In Arctic Alaska, however, there are many indications of significant change over time. Although variability is a characteristic of the Arctic environment, the observed changes tend to move in the same direction, indicating

Figure 20: Map of the region on which the Sea Ice Workshop focused.

trends rather than normal fluctuation. Sea ice typically covers less of the Bering Sea in winter now than in the recent past. Permafrost is warming and in some areas is actually melting. Coastal erosion has become severe in many places. Such changes have severe impacts on the lives of residents of northern Alaska, most of whom are Alaska Natives pursuing traditional ways of life deeply rooted in the local environment. The changes seen in the Arctic also are the early signs of changes in climate that are likely to affect much of the world in the next several decades.

With this in mind, the workshop participants noted that it is difficult or impossible to make accurate predictions about the way in which climate will change and the impacts those changes will have. A range of scenarios can be simulated through computer models, but specific changes in local conditions, much less the interaction between those changes, cannot be foretold. Instead, continued monitoring can assess the degree to which overall predictions match observed changes. Examining potential impacts of various changes can indicate to coastal communities and others the range of possible impacts they may face. Workshop participants acknowledged that uncertainties persist, and that more attention is needed to assess the risks and to

identify actions that can be taken to minimize those risks.

In considering what is known today and what needs to be done, workshop participants made a number of observations on the state of our knowledge and its applicability to the responses that might be made to the impacts of climate change:

- There is a substantial lack of integration among scientific disciplines. For example, there is little integration of the studies of lower trophic levels (e.g., plankton, invertebrates, etc.) in the marine environment with those of the higher trophic levels (fish, mammals, birds) that are used by people along the coast. More attention is needed to the species that affect people directly.
- Policy makers give too little attention to environmental change. Those who want to ignore climate change are able to block serious consideration by pointing to the economic costs of changing our habits. But the costs of ignoring climate change are also real, and those who will pay for the disruptions it causes — such as the insurance industry, consumers, and government relief agencies — should be mobilized to support preventive action.
- Sea ice is particularly important in many respects, from maintaining healthy marine mammal populations to limiting the scope of industrial activity in the Arctic. We do not know enough, however, about specific regional scenarios for changes in sea ice extent and seasonality. To make plans, we need to have more detailed scenarios that can show specific changes in small areas to identify the potential impacts to communities.
- Alaska Natives have a great deal of expertise in observing the environment. This experience, extends back many decades in personal memory and farther, given what has been handed down from past generations. Making systematic use of those observations and that expertise requires dedicated research and can provide a wealth of useful information. This knowledge can also be the basis for local observation networks.
- Subsistence hunting, fishing, and gathering are vital activities for Alaska Native communities, but it is difficult or impossible to express their significance. Attempting to place dollar values on subsistence activities and products implies that they can be replaced by cash payments, whereas subsistence as the basis for Native cultures cannot be replaced.

A common thread to these and other discussions during the workshop was that climate change is a far-reaching threat to coastal communities. Conclusions of the workshop were necessarily selective rather than comprehensive, but participants concurred that more attention should be given to the impacts of climate change on communities in northern Alaska.

In considering how to carry out the recommendations arising from the workshop, participants noted that:

- Collaborative research between members of Arctic communities and outside scientists requires continuity and time to build trust, train personnel, and learn to understand the perspec-tives and expectations of the various partners. This in turn requires funding commitments that allow for the development of long-term projects.
- Community-based programs should be coordi-nated or integrated so that the communities can take best advantage of the programs in which they participate. A local natural resource pro-gram is one way to keep track of the various initiatives and projects in which the community is involved.
- Young people need to be involved, especially through schools. Collaborative projects that apply the science lessons to local experiences can help spark the curiosity of students, perhaps inspiring them to pursue careers in natural resource research and management. A strong grounding in the basics of research and science will also help tomorrow's leaders make better- informed decisions for their communities.
- Progress requires dedicated individuals, not just good ideas. For the recommendations to work, someone must respond to them and work to carry them out. For collaborative research, this includes both scientists and community members.
- Research involving the participation of local researchers often fails to recognize competing demands for the time of local participants, and thus fails to compensate them adequately or at all. Communities need to pay attention to issues of climate change, but they also need reasons for taking part in collaborative programs.

- Using scenarios for future planning often involves "best-case" and "worst-case" pre-dictions, which make statements about the future of real communities. No one likes to imagine bad things happening to one's home and loved ones, and so researchers must be sensitive to the stress caused by predictions of disaster to a village or a region.

Recommendations

Stemming from the conclusions and from the full range of discussions at the workshop, participants listed a number of recommendations in several categories. In addition, two overarching recommen-dations emerged:

- *Promote long-term commitments*. It may take several years for programs to develop and produce results, especially when those programs need to establish working partnerships between researchers and Native communities. Without long-term commitments, it may be difficult to justify the costs of training and to recruit local researchers.
- *Take better advantage of existing programs*. Research on climate change and research involving residents of coastal communities do not take place in a vacuum. There are a number of programs on which community-based research can build. These include a variety of current studies and a number of community monitoring programs, such as those established through co-management groups.

Research – Much of the discussion revolved around the need for more data and the ways in which Arctic residents can become more involved in research, as follows:.

- *Develop a formal plan for recording systematic observations by residents of coastal communities*. Residents of coastal communities can add a great deal to current monitoring efforts regarding environmental change. A team of scientists and local observers should determine which measurements are appropriate for gathering by local observers and which factors are significant from the local perspective. Measurements might include such parameters as snow depth at specific locations and times, the dates of snow cover and snow melt, ice thickness at specific locations and times, data on body condition of harvested animals, the dates of arrival and departure of migratory bird species, and others. A system for recording these observations requires adequate funding for local participants, including proper training. The plan should provide opportunities for cooperative analysis so that local researchers can add their expertise. Community participation could be achieved in cooperation with organizations active in various aspects of environmental monitoring, such as the Alaska Eskimo Whaling Commission, the Alaska Beluga Whale Committee, and the Eskimo Walrus Commission.
- *Develop a system for reporting other noteworthy events*. In addition to observations of regular phenomena, unusual events are worth recording and analyzing. These include strandings or die-offs of marine mammals, birds, and fish; physical abnormalities in harvested animals; and unusual sightings of birds, mammals, fish, and insects. The reporting system for such events could be linked to the observation network, but the analysis of unusual events is likely to require additional expertise. A group of experts should be identified who can be called on when needed to assist in analyzing specimens or observations and in determining what implications such events may have for human and environmental health.
- *Promote the creation of better baselines of data*. Related to the previous two recommendations, existing baseline data are often from too few monitoring sites or over timelines that are too short. For the future, better monitoring systems should be set up to complement those involving Native communities. Effective monitoring requires archiving of data as well as ready access to those data for analyses and comparisons.
- *Document Native observations of environmental change*. As part of extending baselines, it is important to draw on the knowledge of elders and other community members with extensive experience of their local environment. This work is particularly urgent, because when elders pass on they take a tremendous amount of information with them. The systematic documentation of Native knowledge can help identify patterns in the environment over time, helping sort out short- and long-term changes. In addition to documenting Native knowledge, people who are particularly

knowledgeable about certain topics can be identified as resources to assist in further research.

- *Develop more detailed local scenarios for assessing the potential impacts of climate change*. Current models that predict the effects on the Arctic of warmer climates give general trends for sea ice and other parameters, but do not provide details for specific areas. Without such details, it is difficult to determine the range of changes and their likely impacts on Arctic communities. Although firm predictions are beyond our reach, more details about the range of likely effects would help generate more plausible scenarios from which responses could be planned.
- *Make more use of integrative tools for analyzing data*. The data that are gathered are often not used as much as they could be. In part this is a question of data access, but it is also a matter of having tools, such as geographic information systems (GIS), that allow researchers to integrate various data sets to prepare complex analyses.
- *Allow time for the creation of real partnerships between communities and researchers*. Many funding opportunities and requests for proposals allow only a short time to respond. When those opportunities also request partnerships with communities, they often lead to hurried attempts to find Native partners and develop collaborative projects. Where possible, time and perhaps funding for the development of real partnerships should be given. Partnerships can be made formal through the use of memoranda of agreement and other such mechanisms.
- *Explore ways to make use of climate change*. Predictions of climate change indicate a number of effects, including more frequent severe weather and changes in ocean currents and other phenomena. Some of these may provide opportunities for alternative energy resources or for new patterns of resource use.

Policy – The policy implications of the workshop's conclusions were not discussed in great detail. Nonetheless, certain matters remained near the center of attention. These recommendations are thus general, but offer some insight into the thinking that lies behind the other recommendations. For thinking about the impacts of climate change, workshop participants outlined a useful series of questions: What do we know? What do we need to find out? What can we do or change? How can we prepare? How do we communicate with others? How will they be affected and what can they do? How do we pay for it all? These questions allowed the following recommendations to emerge:

- *Address the causes of climate change*. Human actions and the production of greenhouse gases have been identified as major contributors to climate change. Nonetheless, most research tends to examine the effects of climate change rather than tackling the more difficult question of how to control its causes. From a policy perspective, there is a need for greater willingness to examine the range of human actions that affect climate change and to develop means of changing our actions to minimize their impacts.
- *Recognize actual and potential problems*. Uncertainty about the reality of climate change can no longer be used as an excuse to postpone our response to its effects. Real effects are being seen in the Arctic, and a range of potential problems has been identified. Ignoring these warning signs will only lead to far greater costs in the future, when problems become crises.
- *Provide intrinsic valuations for natural resources*. The subsistence cultures of Arctic peoples and the resources on which they depend cannot be replaced. When considering the damage that climate change might cause, how-

ever, dollar figures are the usual way of estimating the effectiveness and necessity of various responses. Other means of valuing natural resources should be developed so that activities such as subsistence that are largely outside the cash economy are properly reflected in damage calculations.

- *Assess institutional cultures that prevent meaningful change*. One of the chief obstacles to effective response is the inertia of established institutions, from industries to government agencies. Understanding the nature of those institutional cultures is essential to identifying ways to bring about effective and timely responses to threats such as those posed by climate change.

Communication – Although Alaska Native communities are among the first to be affected by the impacts of climate change, they are not as involved in these matters as they can and should be. Often, this is a matter of communication, especially during and after projects. In addition to reporting results, researchers should remember to thank communities for their support. The following recommendations were made.

- *Develop better ways to communicate results to Native communities*. Research that has involved Native communities or that has a bearing on community interests is of great interest to people in those communities. Nonetheless, research results often are not provided to the community in appropriate ways. Good communication should take into account Native ways of thinking and communicating, for example through visual and oral media rather than only in writing.
- *Provide training in communication*. Effective communication, especially in cross-cultural settings, is not a simple matter. Researchers can learn from one another and from community members which methods work best and how to convey results and the scientific principles that support them. Communication should stimulate curiosity and convey the excitement of science, which will promote greater interest among community members, especially young people.
- *Consider a variety of means for communicating*. Local radio programs, regional newspapers, public lectures, mailings to community residents, and posters are among the many ways that can be used to announce projects, provide progress reports, and give final reports to communities and regions. Using generalists who have special skills in explaining science is another avenue, especially for large programs.
- *Teach scientists, agency personnel, and others about Native cultures*. For outsiders, Native cultures and ways can be confusing at times. Being sensitive to differences and to particular ways of talking and thinking is essential to working well in community settings. Written materials and in-person orientation sessions are among the ways that newcomers can be introduced to the ways of a community.
- *Teach community members about science and scientists*. Scientists, too, have particular ways of looking at the world. Research partnerships depend on community members' understanding of the principles and practices of science, which may vary among disciplines. In addition to introducing community members to scientists, such training should include an introduction to scientific methods and theories.
- *Review web-based programs to develop new ideas*. Many school districts in northern Alaska use the Internet and World Wide Web to participate in research such as satellite tracking of wildlife. The web can be used for data management and access, and for frequent communication between researchers within and outside the community. Much can be learned from the experiences of schools and other organizations to develop effective ways of stimulating interest and participation in research and monitoring.
- *Promote professional recognition for the importance of communicating*. Many researchers would like to spend time reporting results to communities, but there are often too many competing professional obligations and pressures. Giving professional recognition to efforts to give results back to communities, for example by including such efforts in tenure review for university professors, would help encourage greater effort in communicating effectively and often.

Education – Over the long term, education is the most effective means of improving our ability to understand and address our relationship with the environment and the consequences of environmental change. General curricula can be used nationally or worldwide to teach the basic principles, and local components can help show students how those principles apply to them and their regions, using approaches similar to those outlined in the following recommendations.

- *Develop general curricula on climate change and our connection to the environment*. Public understanding of the potential impacts of climate change requires an understanding of what is involved in climate change as well as how humans depend on the environment for food, water, materials, transportation, and other aspects of our daily lives. Curriculum materials that can help explain and demonstrate both will create a better-informed citizenry.
- *Develop specific curriculum materials to show the local context of climate change*. Generalizations about climate change should be supplemented with specific local information to help students see how climate change may affect them and their home regions. These materials should draw on local customs, for example, by involving elders in school programs. They should also include hands-on opportunities wherever possible, for example through taking weather measurements and recording observations. Science camps can make use of these ideas as well.
- *Promote interactions among schoolchildren from different places*. Sharing local experiences and observations with students from other parts of the country or world can help students learn more about others and more about the different ways that climate change affects various parts of the globe.
- *Make use of existing programs that involve students and teachers in research*. The National Science Foundation and other agencies have programs designed to give schoolteachers and students exposure to science through watching and participating in research. Such programs can help with education as well as communication, helping researchers become more involved in the communities in which they work.

The final report, available from the Marine Mammal Commission, contains the conclusions and recommendations of the workshop, a summary of the discussions held by break-out groups during the workshop, and papers describing various aspects of environmental change in the Arctic.

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 exception to the moratorium provides for the issuance of permits by either the National Marine Fisheries Service or the Fish and Wildlife 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. Permit-related activities involving polar bear trophies and the export of marine mammals to foreign facilities are discussed in Chapters III and X, respectively. Other permit-related activities are discussed here. With the exception of those for the importation of polar bear trophies, the Marine Mammal Commission is responsible for reviewing all permit applications.

Other provisions of the Marine Mammal Protection Act allow the National Marine Fisheries Service and the Fish and Wildlife Service to authorize the take of small numbers of marine mammals incidental to activities other than commercial fisheries, provided 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.

Also discussed in this chapter are steps taken to address interactions between wild marine mammals and members of the public who seek to approach, swim with, photograph, or feed them. For some classes of activities, such interactions clearly constitute harassment as defined under the Marine Mammal Protection Act and its implementing regulations. In other instances the responsible agencies must determine on a case-by-case basis whether marine mammals have been harassed.

Permit-Related Regulations

As noted in previous annual reports, the 1994 amendments to the Marine Mammal Protection Act affected many aspects of a proposed rule published in 1993 by the National Marine Fisheries Service to revise its permit regulations. Proposals concerning public display permits were nullified by the amendments, and certain other parts of the proposed rule were affected to a minor extent. Consequently, the Service determined that it would need to publish a new proposed rule for many elements of its permit regulations. The National Marine Fisheries Service issued a final rule on 10 May 1996 instituting some changes to its permit regulations, but did not address requirements specific to permits for educational and commercial photography or many aspects of the 1994 amendments pertaining to public display. Although it was expected that proposed rules to address these points would be published in 2000, they were not. At the end of 2000 it was the Commission's understanding that proposed revisions to the public display regulations would be published by the Service early in 2001 and that a separate rule for educational and commercial photography permits would be published late in 2001. Pending new regulations, the Service is continuing to process applications for public display and photography permits using existing regulations, interim guidelines, and the applicable statutory provisions.

The Marine Mammal Protection Act, as amended in 1994, includes a general authorization for certain types of scientific research. Under this mechanism, researchers conducting activities that involve taking only by Level B harassment (i.e., activities that may disturb, but not injure, a marine mammal or marine mammal stock in the wild) typically are no longer

required to obtain a permit. However, permits still are required for conducting such activities with marine mammals listed as endangered or threatened under the Endangered Species Act. Interim regulations implementing the general authorization were issued by the National Marine Fisheries Service on 3 October 1994 but, as of the end of 2000, permanent regulations had yet to be issued.

Since enactment of the general authorization in 1994, between 6 and 16 researchers a year have obtained letters confirming that their activities may appropriately be conducted under the general authorization. During 2000, 13 general authorizations were approved. It appears that for certain types of research this streamlined process has alleviated delays associated with issuing permits. One drawback with the general authorization is its inapplicability to activities that may take endangered or threatened marine mammals. To address this shortcoming, the Commission in testimony before the House Resources Committee's Subcommittee on Fisheries Conservation, Wildlife, and Oceans in June 1999 recommended that the general authorization be expanded to apply to such marine mammals. Such a proposal, however, was not included in the recommended bill submitted to Congress by the Secretary of Commerce and the Secretary of the Interior in August 2000. It was thought that an amendment to the Endangered Species Act would be a more appropriate vehicle for implementing such a change. As discussed in previous annual reports, the Fish and Wildlife Service has decided to defer amending its permit regulations until the National Marine Fisheries Service has finished updating its permit regulations. The Fish and Wildlife Service intends to propose its own regulations at that time, drawing on the National Marine Fisheries Service's regulations as appropriate. By taking this approach, the Fish and Wildlife Service has yet to revise its permit regulations to reflect either the changes implemented by the National Marine Fisheries Service or the amendments to the Marine Mammal Protection Act, including those for which the adoption of new regulations was specifically required.

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 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, the views of the Animal and Plant Health Inspection Service on the adequacy of facilities and transportation arrangements is also sought (see also Chapter X).

Once issued, a permit can be amended by 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. Major amendments, such as requests to extend work more than 12 months, to take additional animals, or to take animals in ways not originally authorized, are subject to review by the Commission.

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. During 2000 the Commission, in consultation with its Committee of Scientific Advisors, provided recommendations on 20 permit applications submitted to the National Marine Fisheries Service and 5 applications submitted to the Fish and Wildlife Service. Of these, three awaited final action by the Department of Commerce and one awaited final action by the Department of the Interior at the end of 2000. 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 25 applications on which it commented in 2000 was 31 days (range: 14–58 days). The Commission also made recommendations on 21 requests to amend permits in 2000. The average time for Commission review of these requests was 30 days.

The National Marine Fisheries Service issued 21 permits during 2000, including permits for nine applications received in 1999 and one received in 1998. The average processing time, from the date the application was received by the Service until final action was taken, was 175 days (range: 75–391 days).

The Fish and Wildlife Service issued six permits during 2000, including permits for four applications that had been received in 1999. A seventh permit request received in 1999 was denied in 2000. Two additional permit requests received and reviewed in 1999 were subsequently withdrawn by the applicant in 2000. The Service's average processing time was 174 days (range: 64–297 days). If calculated from the date the Service considered an application to be complete, the average processing times for the National Marine Fisheries Service and the Fish and Wildlife Service in 2000 were 139 and 163 days, respectively, compared with 149 and 121 days in 1999.

Small-Take Authorizations

Section 101(a)(5) of the Marine Mammal Protection Act directs the Secretaries of the Interior and Commerce to authorize the unintentional taking of small numbers of marine mammals by U.S. citizens incidental to activities other than commercial fishing when certain conditions are met. 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 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. Section 101(a)(5) was amended in 1986 to allow the Secretaries to authorize 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)

Requests for small-take authorizations considered by the Commission during 2000 are described below.

Incidental Take of Walruses and Polar Bears – Regulations governing the issuance of letters of authorization to take walruses and polar bears incidental to oil and gas activities in the southern Beaufort Sea and adjacent areas off Alaska were initially promulgated by the Fish and Wildlife Service in November 1993. In August 1995 those regulations were modified and extended through 15 December 1998. As noted in the Commission's previous report, on 28 January 1999 the Service published final regulations to govern authorization of the unintentional take of small numbers of polar bears and Pacific walruses incidental to oil and gas exploration and development activities in the Beaufort Sea and adjacent coastal areas of Alaska through 30 January 2000. The *Federal Register* notice announcing the regulations indicated that the Service, rather than issuing the authorization for an additional five-year period, intended to consider new information associated with subsea pipeline construction and to propose an extension of the regulations for an additional four years early in 2000.

On 9 December 1999 the Service published in the *Federal Register* a proposed negligible impact finding and proposed regulations to govern authorization of the unintentional take of small numbers of polar bears and Pacific walruses incidental to oil and gas activities in the Beaufort Sea and adjacent coastal areas of Alaska for a three-year period, beginning on 31 January 2000. Also, on 3 January 2000 the Service published proposed regulations to extend the existing regulations through 31 March 2000 to allow sufficient time for full consideration and evaluation of public comments on the December 1999 proposed rule. The final rule extending the regulations through 31 March 2000 was published in the *Federal Register* on 3 February 2000.

The Commission, in consultation with its Committee of Scientific Advisors, reviewed the 9 December 1999 proposed rule and provided comments to the Service by letter of 7 January 2000. The Commission noted that, based on information submitted to the National Marine Fisheries Service by BP Exploration (Alaska), Inc., related to the incidental taking of marine mammals under that agency's jurisdiction, it appeared that marine mammals could be taken incidental to a number of activities in addition to pipeline construction and operation (e.g., over-ice road construction), and that the effects of the proposed activities on ringed seals could, in turn, adversely affect polar bears, which rely upon those seals for food. The Commission speculated that such taking would likely be compounded over the long term by changes in ice conditions associated with apparently ongoing climate change and noted that the proposed rule did not consider possible cumulative impacts beyond the three-year period for which the regulations would be in effect, although production activities at the Northstar site are expected to continue for at least 15 years.

In light of these concerns, the Commission recommended that the Service (1) assess the potential direct and indirect effects of the proposed activity on polar bears and include the results of that assessment in any final regulations authorizing the incidental taking at the Northstar site; (2) conduct a power analysis to determine the kinds and levels of changes in the Beaufort Sea polar bear population that could be detected by ongoing and planned tagging-tracing, monitoring, and bio-sampling programs and, if necessary, consult with the scientific community, industry, and Native groups to identify and take steps to ensure that adverse changes can be detected and mitigated before they have long-term or irreversible effects on population size or productivity; and (3) describe the nature and results of the power analysis and any subse-quent changes or additions to the monitoring requirements in any final regulations proposed by the Service.

Concerning the Service's oil spill risk and impact assessment, the Commission noted that, from the information provided, it appeared that the probability of a spill occurring and killing 10 or more polar bears over a 15-year period would be 3 to 10 percent, a probability that the Commission believed could not be considered negligible without better justification. The Commission recommended that, if it had not already done so, the Service review the oil spill contingency plan developed and approved by the Alaska Department of Environmental Conservation, the U.S. Department of Transportation, the U.S. Coast Guard, and the U.S. Minerals Management Service to ensure that the risk of oil spills occurring had been estimated appropriately; that the planned measures for containing and cleaning up spills in both open-ocean and ice-covered areas would likely be effective; that everything feasible would be done to minimize the impacts of any spilled oil and any necessary containment and cleanup operations on polar bears; and that the risk of oil spills occurring and impacting polar bears directly and indirectly would, in fact, be negligible. Further, the Commission recommended that the Fish and Wildlife Service (1) require modification of the contingency plan if everything feasible had not been done to minimize the risk of spills occurring and impacting polar bears; (2) ensure that periodic site inspections be conducted by representatives of the Service or other appropriate government agencies as part of the long-term monitoring program to make certain that the contingency plan can be implemented as and when necessary; and (3) include the assessment of the contingency plan and related monitoring requirements in any final regulations authorizing the taking of marine mammals.

On 30 March 2000 the Service published a negligible impact finding and final regulations for authorizing the unintentional take of small numbers of polar bears and Pacific walruses during the course of oil and gas exploration, development, and production activities in the Beaufort Sea and the adjacent northern coast of Alaska through 31 March 2003. In response to the Commission's recommendations, the Service noted that, based on available information, it had determined

that, even if the operation of the Northstar site influences the distribution of ringed seals and polar bears or increases interactions between humans and polar bears, the magnitude of these changes would not appreciably affect the species' rates of recruitment or survival. As for potential cumulative impacts, the Service stated that it is obligated to assess cumulative impacts only for the duration of the regulation and not to include information beyond that period, which could be speculative, incomplete, or beyond the scope of the regulations.

The Service concurred with the Commission that the concept of conducting a power analysis had merit and would be explored but noted that, due to limited agency resources and other factors, the results of such an effort would not be included in the final regulations. Concerning the potential for oil spills, the Service clarified that the estimated 3 to 10 percent likelihood of one or more spills greater than 1,000 barrels in size occurring in the marine environment was for the three-year period covered by the regulations. The Service stated that its finding of negligible impact was based on the results of a risk assessment analysis that showed that, despite the less-than-remote possibility of a spill occurring, there is a low probability that a large-volume spill, with high polar bear mortality, would occur. The Service expressed its belief that the oil spill contingency plan described feasible techniques for minimizing the impacts of oil spills and that the plan currently did not warrant further review. The Service noted, however, that should further advances in oil spill technology occur during the period of the regulations, additional measures could be incorporated into letters of authorization.

Under the procedures adopted by the Service, letters of authorization are issued for specific activities under the incidental take regulations without opportunity for additional public review or comment. In 2000 the Fish and Wildlife Service issued 56 letters of authorization to take polar bears and walruses incidental to oil and gas exploration and development activities off Alaska. The authorizations were issued to Arco Alaska, Inc. (18); Phillips Alaska, Inc. (13); BP Exploration (Alaska), Inc. (10); Western Geophysical (10); Kuukpik/Fairweather (2); Fairweather Geophysical (1); and Exxon Mobil Company U.S.A. Notices of these authorizations were published in the *Federal Register* on 16 March, 19 April, 18 May, 8 June, 18 August, 28 September, 24 November, and 20 December 2000.

Development of Production Facilities at the Northstar and Liberty Sites in the Beaufort Sea – On 25 November 1998 BP Exploration (Alaska), Inc. requested that the National Marine Fisheries Service promulgate regulations to authorize the taking of small numbers of bowhead whales, gray whales, beluga whales, ringed seals, bearded seals, and spotted seals incidental to the construction and operation of oil and gas production facilities at the Northstar and Liberty sites off the north coast of Alaska. A notice of the application and request for comments were published in the *Federal Register* on 1 March 1999.

The Commission provided comments to the Service on the application by letter of 31 March 1999. These comments are discussed in detail in the previous annual report. The Commission recommended that the Service initiate the requested rulemaking, provided that it was satisfied that the planned monitoring programs would be adequate to verify how and over what distances marine mammals may be affected, that only small numbers of marine mammals would be taken, and that cumulative impacts on the affected species and stocks would be negligible.

On 22 October 1999 the National Marine Fisheries Service published proposed regulations to govern the taking of bowhead whales, ringed seals, and other marine mammals under its jurisdiction incidental to construction and operation of the Northstar site. On 21 December 1999 the Commission, in consultation with its Committee of Scientific Advisors, provided further comments to the Service.

The Commission concurred with the Service's preliminary determination that construction and operation of production facilities at the Northstar site would likely have a negligible impact on marine mammals and no unmitigable adverse impact on the availability of marine mammals for taking by Alaska Natives for subsistence purposes. The Commission noted, however, that available information was insufficient to provide confidence that there would not be significant adverse effects on either marine mammals or their availability to Alaska Natives, particularly over the 15 to 20 years during which production and related activities are expected to occur. In this regard, the Commission noted that it was not clear whether the ongoing and proposed research and monitoring programs would be sufficient to detect any nonnegligible effects in time to take remedial action to ensure that they would not lead to long-term or irreversible population-level effects.

The Commission also pointed out that it was not clear whether (1) the estimated number of bowhead whales that might be affected considered the year-to-year variability of the paths taken by migrating bowhead whales in the fall; (2) the proposed acoustic monitoring of the fall bowhead whale migration would be able to detect changes in behavior or movement patterns that could affect the survival or productivity of the whales or their availability to Alaska Natives for subsistence; (3) the Service had considered the various ways that the planned construction activities could affect polar bears through effects on ringed seals; (4) the proposed surveys for ringed seal breathing holes and pupping lairs would be sufficient to detect any changes in ringed seal distribution, densities, or behavior due to activities such as road and pipeline construction; and (5) required polar bear monitoring programs would be coordinated with the ringed seal monitoring program to be established by the National Marine Fisheries Service in such a way that uncertainties concerning the effects of the proposed activities on marine mammals will be resolved.

The Commission therefore recommended that, if it had not already done so, the National Marine Fisheries Service (1) review data from past bowhead whale surveys conducted by the Minerals Management Service to determine whether such surveys would be likely to provide sufficient information to assess the efficacy of the proposed acoustic monitoring of the fall bowhead migration; and (2) if the Minerals Management Service's surveys are judged unlikely to provide sufficient data, require that additional aerial surveys be done during the Northstar construction phase to document the efficacy of the acoustic monitoring program. In addition, the Commission recommended that the Service, if it had not already done so, consult with the Fish and Wildlife Service to ensure that the monitoring program proposed by BP Exploration (Alaska), Inc., is sufficient to verify that any changes in the distribution, densities, or behavior of ringed seals and polar bears caused by construction and operation of production facilities at the Northstar site are negligible and, if not, that the Service take steps necessary to correct the identified deficiencies in the program.

The Commission also noted that the Service's *Federal Register* notice made no mention of the oil spill contingency plan developed by the applicant and approved by the Alaska Department of Environmental Conservation, the Coast Guard, and the Minerals Management Service. The Commission recommended that the Minerals Management Service (1) review the contingency plan and related information to ensure that the risk of oil spills had been estimated appropriately and that planned measures for containing and cleaning up oil spills in open-ocean and ice-covered areas are likely to be effective; (2) require that the contingency plan be modified if everything feasible had not been done to minimize oil spill risks to marine mammals; and (3) provide for periodic site inspections, as part of the long-term monitoring program, to ensure that the contingency plan could be implemented as necessary. The Commission further recommended that an assessment of the contingency plan and related monitoring programs be included in any *Federal Register* notice published to promulgate final regulations authorizing the taking of marine mammals incidental to construction and operation of production facilities and related activities at the Northstar site.

On 25 May 2000 the Service published final regulations governing authorization of the unintentional take of small numbers of marine mammals during the course of oil and gas exploration, development, and production activities in the Beaufort Sea and adjacent northern coast of Alaska. These regulations will be in effect through 25 May 2005. In response to the Commission's comments and recommendations, the Service noted, among other things, that basing a negligible impact determination on a worst-case scenario would not provide a realistic estimate of harassment take levels, and that calculations based on the best scientific data available indicate that a maximum of 717 bowhead whales annually, or approximately 9 percent of the estimated population, would be harassed by noise associated with the construction and operation of the Northstar facilities during the five-year authorization period. The Service believed that estimates of take levels over the 15- to 20-year lifetime of the Northstar project were unnecessary because the Marine Mammal Protection Act requires only that take levels be considered for each authorization period (i.e., five years or less). Concerning possible impacts on Native subsistence hunting, the Service accepted the information submitted by the applicant, in conjunction with that provided by the Alaska Eskimo Whaling Commission, North Slope Borough, and the U.S. Army Corps of Engineers' final environmental impact statement as the best information available to date on the potential effects on the availability of marine mammals for

subsistence uses in the Beaufort Sea area. Based upon that information, the Service determined that harassment by noise at the Northstar site would have no more than a negligible impact on bowhead whales.

The Service also noted that it was unaware of any evidence to indicate that increased interactions between polar bears and ringed seals are likely to occur as a result of the authorized activities, but that, to the extent practicable, on-ice monitoring of ringed seals and polar bears has been and would continue to be coordinated. Further, the Service indicated that the Commission's concerns with respect to the monitoring of polar bears and ringed seals would be considered at the next on-ice peer review workshop. Regarding the potential for an offshore oil spill, the Service determined that the probability of such a spill is less than 10 percent over a 20- to 30-year period and that the potential for oil from such a spill intercepting whales or seals is only about 1.2 percent. In light of this low potential and the seasonality of occurrence of bowhead whales, the Service determined that the taking of marine mammals incidental to construction and operation of the Northstar oil production facility is unlikely to have more than a negligible impact on this species, and that, because an oil spill response program and other mitigation measures will be in effect, there would not be an unmitigab le adverse impact on subsistence uses.

Shock Testing the USS *Winston S. Churchill* – In December 1999 the Department of the Navy completed a draft environmental impact statement for conducting shock trials of the USS *Winston S. Churchill* (DDG-81) to evaluate the reliability of that vessel's structural components and electronic systems. Following publication of the draft environmental impact statement, the Navy applied to the National Marine Fisheries Service on 12 January 2000 for a letter of authorization to take small numbers of marine mammals incidental to the shock trials in the offshore waters of the Atlantic Ocean off either Mayport, Florida, or Norfolk, Virginia, or in the Gulf of Mexico off Pascagoula, Mississippi. On 12 December 2000 the Service published a notice of the application and request for comments in the *Federal Register*. At the end of the year, the Commission was reviewing the proposed regulation and anticipated providing comments to the Service early in 2001. A summary of the Commission's comments on the draft environmental impact statement is provided in Chapter VII.

Acoustic Thermometry of Ocean Climate Program – 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. Following 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 in the *Federal Register*, followed by the publication of a proposed rule on 22 December 2000. A summary of the ATOC project and the Commission's comments on the draft environmental impact statement and the Service's *Federal Register* notices is provided in Chapter VII.

Authorizations under Section 101(a)(5)(D)

Requests for small-take authorizations considered by the Commission during 2000 are described below.

Taking of Harbor Seals and California Sea Lions Incidental to Rocket Launches from Vandenberg Air Force Base – After section 101(a)(5)(D) was added to the Marine Mammal Protection Act in 1994, the U.S. Air Force requested and received a series of one-year authorizations to take harbor seals and possibly northern elephant seals and northern fur seals incidental to launches of Delta II, Titan II, Titan IV, Taurus, and Lockheed Martin rockets at Vandenberg Air Force Base on the central California coast. As noted in previous reports, the Commission has expressed its view that, if launches of these and other rockets from Vandenberg Air Force Base are expected to continue indefinitely, it would be more appropriate to obtain a five-year authorization under section 101(a)(5)(A) of the Act, rather than annual authorizations for each type of vehicle. The Commission also has questioned whether the monitoring required by the National Marine Fisheries Service has been sufficient to detect possible long-term cumulative adverse effects from the series of launches being conducted.

On 30 September 1997, as suggested by the Commission, the Air Force applied to the National Marine Fisheries Service for a five-year small-take authorization under section 101(a)(5)(A). Notice of receipt of the application and proposed regulations to authorize the unintentional take of Pacific harbor seals

and California sea lions incidental to rocket launches at Vandenberg Air Force Base were published in the *Federal Register* on 21 July 1998, and final regulations were published by the Service on 1 March 1999. The regulations, effective through 31 December 2003, specify measures that must be taken to minimize, to the greatest extent practicable, the adverse impacts of the rocket launches and related activities on marine mammals. They also specify research and monitoring requirements designed to confirm that any impacts on the size and productivity of the potentially affected marine mammal populations are negligible.

On 2 April 1999 the Service issued a letter of authorization to the 30th Space Wing, Department of the Air Force, that was valid until 1 April 2000, and specified the research, monitoring, and reporting to be conducted during the period of authorization. A one-year rather than a longer authorization was issued because the Air Force advised the Service of its intent to modify its request shortly.

On 3 August 1999 the Air Force asked that the letter of authorization be modified to include taking incidental to launches of the Minotaur, a modified Minuteman II rocket not included in the authorization issued on 2 April. Notice of the request was published in the *Federal Register* on 8 August 1999. The Commission, in consultation with its Committee of Scientific Advisors, provided comments to the Service on 8 September 1999 recommending that the request be granted, provided that the Service was satisfied that the proposed marine mammal monitoring program would be able to detect any possible cumulative adverse effects. The Service modified the letter of authorization on 4 October 1999.

On 31 May 2000 the Service published notice in the *Federal Register* that it had issued a new one-year letter of authorization to the 30th Space Wing, Department of the Air Force, to harass small numbers of Pacific harbor seals, California sea lions, northern elephant seals, and northern fur seals incidental to missile and rocket launches, aircraft flight test operations, and helicopter operations at Vandenberg Air Force Base. The Service's letter of authorization was based on a finding that the total takings would have no more than a negligible impact on the seal and sea lion populations in the vicinity.

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, reviewed the request and 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.

Taking Incidental to a Pile Installation Demonstration 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, in consultation with its Committee of Scientific Advisors, reviewed the application and provided comments to the Service on 15 February 2000. The Commission concurred with the Service's preliminary determination that the planned project would not cause more than the incidental harassment of small numbers of seals and sea lions and would have a negligible impact on the affected stocks. The Commission also concurred that the monitoring program proposed by the Service was adequate to verify that only small numbers of marine mammals are taken, that the taking is by harassment only, and that the impacts on the affected species and stocks are negligible.

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.

Taking Incidental to Collecting Marine Seismic-Reflection Data Offshore Southern California – On 24 January 2000 the National Marine Fisheries Service received a request from the U.S. Geological Survey seeking authorization to take several species of marine mammals by harassment incidental to the collection of marine seismic-reflection data off southern California, and that some of the planned work was to be done at night. The data, obtained from seismic surveys, would be used to investigate (1) the hazards posed by landslides and potential earthquake faults in the nearshore region from Santa Barbara to San Diego, and (2) the invasion of seawater into freshwater aquifers. Notice of receipt of the application and a proposed authorization were published in the *Federal Register* on 28 March 2000. The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, provided comments to the Service on 21 April 2000. In its letter, the Commission concurred with the Service's preliminary determination that the seismic surveys would have negligible impacts on the potentially affected species and stocks of marine mammals, provided that (1) mitigation measures are carried out as described in the authorization request, and (2) the planned use of spotlights during nighttime operations would not attract marine mammals and would adequately illuminate the survey area and allow detection of marine mammals entering the zone of influence around the sound source to be used. In this regard, the Commission recommended that the Service consult with the applicant to ensure that any marine mammals approaching or entering the designated safety zone around the sound source could be detected in time to shut down operations so that the animals would not be adversely affected. The Commission also urged the Service to provide a clearer justification for not requiring a shutdown of the minisparker sound source should pinnipeds approach the 30-m safety zone.

On a related matter, the Commission noted that the application provided no information on the species or numbers of marine mammals that approached or entered the designated safety zones during the 1998 and 1999 surveys; neither did it indicate whether those surveys were conducted at night. The Commission therefore recommended that, if data do not support the contention that nighttime operations can be conducted without increasing the risk of killing or injuring marine mammals, the applicant should be required to (1) report every 24 hours on the species and number of marine mammals observed approaching and entering the designated safety zone during the day and night, and (2) suspend nighttime operations if the species or number of animals observed approaching and entering the safety zone at night are significantly different than those observed during the day.

The Commission also noted that the proposed activity involved multiyear efforts and recommended that the Service consult with the applicant to determine whether it would be more appropriate to obtain authorization pursuant to section 101(a)(5)(A) of the Marine Mammal Protection Act, rather than seeking annual authorizations under section 101(a)(5)(D) of the Act.

On 28 June 2000 the Service published a *Federal Register* notice indicating that a one-year letter of authorization had been issued to the U.S. Geological Survey for the requested activity. With regard to the Commission's comments on monitoring and mitigation, the Service's notice advised that, to avoid potential Level A harassment of marine mammals, safety zones were to be established and monitored continuously, and that any operating seismic source was to be shut off whenever the ship and a marine mammal converge within the safety zones. The Service also advised that its determination not to require a shutdown of the sound source if a pinniped approached within the safety zone was based on its belief that seals and sea lions are less likely to be harmed by under-water noise than cetaceans and, in fact, have been observed swimming in the bubbles of seismic airguns. The Service noted that monitoring of pinnipeds would nevertheless be required and that minisparker operations would be terminated if a seal or sea lion exhibited signs of distress. Concerning the possible suspension of nighttime operations, the Service noted that determining differences in the species or number of animals observed approaching and entering the safety zones in daytime versus nighttime operations would be difficult inasmuch as data from 1999 showed that the densities of marine mammals in the survey area are not uniform and that incidents of shutdowns because of animals moving into the designated safety zone followed no apparent daytime or nighttime patterns. With regard to reporting requirements, the Service stated that, due to the lack of satellite communication facilities onboard the vessel and the low number of animals observed entering the safety zone during previous surveys, reports of marine mammal observations would be required only upon completion of the survey, rather than on a daily basis.

Taking Incidental to Offshore Seismic Activities – On 24 April 2000 the National Marine Fisheries Service published a *Federal Register* notice announcing receipt of, and requesting comments on, a request by Western Geophysical seeking authorization to take several species of marine mammals by harassment incidental to seismic surveys in the Beaufort Sea off Alaska. The Commission, in consultation with its Committee of Scientific Advisors, provided comments on the application and the Service's proposal to issue the authorization by letter of 22 May 2000.

The Commission concurred with the Service's determination that the short-term impact of the proposed seismic surveys would result, at most, in the temporary modification of behavior by certain cetaceans and possibly by pinnipeds. It also agreed that monitoring and mitigation measures proposed by the applicant appeared adequate to ensure that the planned surveys would not result in the mortality or serious injury of any marine mammal or have unmitigable adverse effects on their availability to Alaska Natives for subsistence hunting. Further, the Commission concurred with the Service that, although the short-term impacts of the surveys are likely to result in no more than temporary behavioral modifications, there is uncertainty whether there may be long-term, cumulative adverse impacts from the surveys and other activities ongoing or planned in the Beaufort Sea. The Commission therefore recommended that the peer review group established to provide advice on the proposed monitoring and mitigation program be asked for its views as to whether the combination of site-specific and population monitoring is likely to be capable of detecting nonnegligible effects in time to take action to minimize or mitigate them and, if not, to identify what changes are needed to those programs. In addition, the Commission recommended that, inasmuch as the applicant apparently intends to continue conducting seismic surveys in the same general area for several years, the Service should consult with the applicant to determine what further activities are planned for the next five or more years and, if appropriate, (1) request that incidental taking authorization be sought under section 101(a)(5)(A) of the Act, and (2) identify steps to be taken by the applicant and the responsible regulatory agencies to detect, avoid, and mitigate possible cumulative adverse effects.

The Commission understands that Western Geophysical concluded its seismic work before the commencement of the bowhead whale migration, and therefore the Service did not proceed with issuance of the incidental harassment authorization.

Taking Incidental to Exploratory Drilling Activities in the Beaufort Sea – On 11 October 2000 the National Marine Fisheries Service published a *Federal Register* notice announcing receipt of a request from Phillips Alaska, Inc., seeking authorization to take small numbers of marine mammals incidental to oil and gas exploratory drilling activities and ice road construction during the winter offshore Prudhoe Bay, Alaska, in the Beaufort Sea. The Commission, in con-sultation with its Committee of Scientific Advisors, by letter of 7 December 2000 provided comments on the application and the Service's proposal to issue the authorization.

The Commission concurred with the Service's preliminary determination that the short-term impact of exploration drilling and related activities would likely result in no more than a temporary modification of the behavior of ringed seals, and possibly a small number of bearded seals, provided that efforts to locate and avoid seals during construction activities are effective. The Commission supported the Service's proposal to condition the requested authorization by requiring the use of dogs to detect seal lairs in the vicinity of the planned activities, but opposed the suggestion that the Service accept monitoring by humans as an alternative in the event that trained dogs are not available. The Commission also concurred with the Service's preliminary determination that all ice roads be surveyed to a distance of 150 m on each side of the disturbed ice and recommended that this be made a requirement of the authorization. The Commission further recommended that any authorization issued by the Service should specify that if a mortality or serious injury of a seal occurs, operations are to 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) of the Marine Mammal Protection Act to cover such taking is needed.

Although it believed the proposed activities likely would have a negligible impact on marine mammals, the Commission expressed concern that the project, in combination with other ongoing and planned activities in the Beaufort Sea, may have cumulative impacts that may not be negligible. The Commission therefore recommended that the Service consider ways, either

through the monitoring programs established pursuant to incidental take authorizations or otherwise, to determine whether oil and gas exploration, development, production, and related activities are having broader-scale effects on marine mammals that may not be detected by site-specific monitoring programs. Finally, 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.

The Commission understands that the requested authorization is likely to be issued early in 2001.

Interactions with Marine Mammals in the Wild

Direct interactions between members of the public and wild marine mammals are becoming increasingly common. These activities typically involve close approaches to observe, photograph, pose with, touch, swim with, or otherwise interact with the animals. They also can involve feeding. In some cases, commercial tour operators routinely feed particular groups of wild marine mammals to encourage them to approach their vessels, thereby affording paying clients the opportunity to get a closer view of the animals and, in some cases, to swim with them.

Such activities generally are not motivated by a desire to harm the animals; however, 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. Because such human interactions can disturb or injure wild marine mammals, these activities, in many instances, constitute harassment under the Marine Mammal Protection Act. 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 is clearly a prohibited act.

Commonly occurring interactions with marine mammals that the Commission is particularly concerned about are discussed below.

Interactions with Wild Dolphins

One indication of the public's growing interest in interacting with marine mammals in the wild is the increasing number of commercial tours that feature opportunities to swim with dolphins in their natural habitat. In the southeastern United States, such activities occur primarily with bottlenose dolphins in Florida waters and, in many cases, appear to be facilitated by efforts to attract the dolphins using food. As noted above, swimming with, feeding, or otherwise interact-

ing with marine mammals in the wild can be dangerous to the people and the animals involved. 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.

In December 1996 the Commission wrote to the National Marine Fisheries Service concerning the proliferation of recreational and commercial interactions with bottlenose dolphins in the southeastern United States. The Commission recommended that the Service advise both the public and tour operators that interactions that have the potential to disturb the animals by disrupting their behavioral patterns constitute a taking of marine mammals and, unless authorized, are against the law. 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 response to the Commission's recommendations, the Service instructed its enforcement agents to accord greater attention to these violations. Early efforts included coordination with the Florida Marine Patrol for additional enforcement during 1997 and the use of specially assigned federal enforcement officers during 1998.

In 1998 the Commission, in cooperation with the Service, contracted for a pilot study of interactions between humans and bottlenose dolphins near Panama City Beach, Florida. The objectives were to assess interactions between humans and dolphins aimed at designing a more thorough study to evaluate how habitual in-water interactions with humans might be affecting the behavior of wild bottlenose dolphins. A report of the pilot study (see Appendix B, Samuels 1998) described numerous encounters between humans and dolphins and noted the likelihood that virtually all observed interactions between dolphins and humans in the region were based on attracting dolphins with food. To evaluate the possible effects of such interactions further, the Commission in 1998 contracted for a literature review to compile information on human interactions with both marine and terrestrial animals in the wild. The results of that review are discussed later in this section.

During 1999 and 2000 the Service continued to engage in education and outreach efforts. These efforts included increased enforcement patrols, press releases, media interviews, cooperative projects with the Watchable Wildlife Program (a national consortium of government agencies and conservation organizations dedicated to responsible wildlife viewing), and, as part of its "Protect Dolphins" campaign, a redesigned brochure and companion poster entitled "Protect Dolphins: Admire Them from a Distance." In October 2000 the Service's Southeast Region published a brochure that provided the public with a recommended "Code of Conduct," including minimum approach distances, for public viewing of marine mammals in the wild. Also during 2000, the Service successfully prosecuted a Panama City, Florida, boat rental company and its boat operator for illegally feeding wild dolphins during a June 1998 excursion off Panama City's Shell Island.

Despite these efforts, swimming and feeding activities in the southeastern United States have not abated and appear to be increasing. Further, over the past few years, swim programs focusing on Hawaiian spinner dolphins have become established in Hawaii. In contrast to the activities in Florida, however, these swim programs do not appear to involve feeding; rather the tour operators take advantage of the dolphins' use of shallow coves and bays during the day to rest and care for their young. The Commission and others are concerned that disturbance of the animals may interfere with these important activities or cause the dolphins to abandon these sensitive habitats.

In April 2000 the Commission published the final report on the literature review concerning human interactions with marine mammals entitled "A Review of the Literature Pertaining to Swimming with Wild Dolphins" (see Appendix B, Samuels et al. 2000). The report concluded, among other things, that (a) in-water encounters with swimmers can disrupt dolphin behavior; (b) any interactions that habituate dolphins to being near people will disrupt dolphin behavior and increase the risk of the animals being attracted to and being hit and killed or injured by boats; (c) feeding dolphins to promote opportunities for in-water encounters is being done routinely in some areas and can increase the risk of injury or death to people and dolphins; (d) interactions with unhabituated dolphins often take place in areas where dolphins congregate for rest or social activities, and disruptions of these behaviors can have cumulative adverse effects on social structure, reproduction, and population viability; and (e) the risks of behavioral disruptions and deaths and injuries resulting from commercial swim-with-thedolphin programs can

be reduced by careful management of the programs but cannot be eliminated. Based on the results of the literature review and the earlier pilot study, the Commission concluded that there is compelling evidence that any efforts to interact intentionally with dolphins in the wild are likely to result in at least Level B harassment and, in some cases, could result in the death or injury of people or marine mammals. Therefore, on 23 May 2000 the Commission wrote to the Service recommending that it promulgate regulations specifying that any activity intended to enable in-water interactions between humans and dolphins in the wild constitutes a taking and is prohibited. The Service responded on 1 September 2000, indicating that it was considering amending the applicable regulations to address these types of interactions. Although the Service indicated that a proposal could be published by year's end, it had not been published as of the end of 2000.

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 wrote to the Service on 12 December 2000 urging that it move quickly to develop and adopt appropriate and enforceable regulations concerning human-marine mammal interactions, and offering to assist the Service in developing the regulations. The Commission suggested that the Service assess the extent to which inappropriate human interactions with free-ranging dolphins may be encouraged unintentionally by certain types of captive programs, such as petting pools and swim-with programs, and work with facilities conducting such programs to ensure that they provide effective education messages on how people should interact with free-ranging marine mammals. In addition, the Commission recommended that the Service review its enforcement needs with respect to dolphins, turtles, and other protected species and allocate sufficient funds to meet these responsibilities. The Commission commended the Service for taking the lead in efforts to identify risks to marine mammals from human interactions and in developing guidelines to govern these activities and suggested that the Service initiate discussions with the Fish and Wildlife Service to develop consistent guidelines for viewing all marine mammals in the wild. The Commission also suggested that the two agencies con-sider whether their enforcement officers or those from the Florida Division of Enforcement might be available to participate in cooperative efforts to enforce the laws applicable to the conservation of dolphins and other marine mammals in the southeastern United States.

Harassment of Manatees in Crystal River, Florida

During its 10–12 October 2000 annual meeting, the Commission conducted a detailed review of the Florida manatee recovery program, in which representatives of the Fish and Wildlife Service and other partners involved in manatee conservation participated. A discussion of the various issues covered at that meeting are provided in Chapter III. Among other things, the meeting participants discussed interactions between divers and swimmers in the Crystal River area of Florida and manatees. Harassment of manatees at that location was identified by the Commission as an issue requiring urgent remedial action by the Service.

Subsequent to its annual meeting, the Commission wrote to the Service expressing concern about the increasing manatee harassment in the Crystal River area and citing evidence that at least some manatees have altered their behavior to avoid human interference. The 1 December 2000 letter noted that each year tens of thousands of divers are drawn to Kings Bay at the head of Crystal River, Florida, by the opportunity to view wild manatees underwater. In recent years, this activity has spread to a site called "Blue Waters" at the head of the Homosassa River, a few miles south of Crystal River, and it is believed that the number of divers using these two sites may well exceed 100,000 per year in the near future. The Commission acknowledged the Service's efforts to address manatee conservation needs by purchasing islands in Kings Bay in the area frequented by manatees and establishing the Crystal River National Wildlife Refuge in 1980, by working with local dive shops and tour operators to develop public educational materials and programs, and by designating seven small sanctuaries in the Crystal River area from which divers and boats are excluded to provide manatees a refuge from unwanted human attention.

The Commission noted, however, that despite the Service's efforts, reports of manatee harassment have continued to increase and that the lack of enforcement personnel has hindered enforcement efforts in areas where divers and manatees interact. The Commission indicated that the need for increased enforcement effort was pressing and would become even greater if a new manatee sanctuary is designated at Homosassa Spring, as is currently planned. The Commission recom-

mended that the Service assign at least one additional full-time enforcement officer to help address manatee harassment issues at the Crystal River National Wildlife Refuge and at any new sanctuary designated at Homosassa Spring.

In addition, the Commission recommended that the Service take steps to reduce manatee harassment by reviewing and updating educational materials prepared by the Service for distribution by dive tour operators. It noted that, although the Service's current educational materials promote passive observation of manatees, this message is undermined by conflicting advice that condones or even encourages divers to touch and pet manatees if approached. The Commission expressed concern that existing materials may be promoting harassment of manatees by establishing an expectation among divers that they will have an opportunity to touch and play with manatees. Moreover, the Commission noted that, by allowing direct human contact with manatees, the Service may be undermining its efforts to reduce other types of interactions that the Service is attempting to discourage because of potential harm to manatees. The Commission specifically recommended that the Service adopt a policy to inform divers that, to prevent manatees from being conditioned to approach humans and boats, divers should back away from approaching manatees and avoid touching, petting, or scratching them. The Commission noted that such a policy would be consistent with the Watchable Wildlife Program guidelines developed cooperatively by environmental groups, the Fish and Wildlife Service, and the National Marine Fisheries Service to help minimize impacts of viewing on wildlife.

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 various purposes, including public display, scientific research, or enhancing the survival or recovery of a species or stock. Such permits may, among other things, authorize the maintenance of marine mammals in captivity. Under the Animal Welfare Act, the Animal and Plant Health Inspection Service of the Department of Agriculture has responsibility for ensuring that facilities for maintaining marine mammals in captivity meet certain standards. Since its inception, the Marine Mammal Commission has worked with the Service to ensure the safety and well-being of marine mammals in captivity.

Amendments to the Marine Mammal Protection Act enacted in 1994 limited the authority of the National Marine Fisheries Service and the Fish and Wildlife Service over marine mammals once they are removed from the wild and placed in captivity. Although no corresponding amendments to the Animal Welfare Act were enacted, the practical effect was to place greater emphasis on the role of the Animal and Plant Health Inspection Service in matters concerning the care and maintenance of captive marine mammals. Among other things, the Animal and Plant Health Inspection Service assumed sole responsibility for regulating programs that allow humans to interact with captive marine mammals, such as swim-with-the-dolphin programs.

Care and Maintenance Standards

The Animal and Plant Health Inspection Service regulates the humane handling, housing, care, treatment, and transportation of marine mammals and other warm-blooded animals under the Animal Welfare Act. The Service originally adopted standards applicable to marine mammals in 1979 and incorporated amendments in 1984. Although there have been significant advances in marine mammal husbandry and science, the standards—with the exception of the new swim-with-the-dolphin rule discussed below—had not been updated at the end of 2000.

As discussed in previous annual reports, the Animal and Plant Health Inspection Service initiated a negotiated rulemaking in 1995 to review and revise its marine mammal standards and guidelines. The Commission, the National Marine Fisheries Service, and the Fish and Wildlife Service participated as nonvoting observers on the negotiated rulemaking committee, which was composed of representatives of the public display and animal welfare communities in addition to the government agencies.

In 1995 and 1996 at its second and third negotiating sessions, the committee developed consensus language for a proposed modification of existing sections of the regulations concerning feeding, sanitation, employees and attendants, transportation, veterinary care, general facility systems (such as water and power supplies and waste disposal), paragraph (a) of 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. Voting members of the rulemaking committee were not allowed to comment negatively or in opposition to any of the consensus language at the proposed rule stage.

After considering projected costs for additional negotiating sessions and the likelihood of the commit-

tee reaching consensus on the remaining issues, the Animal and Plant Health Inspection Service decided to hold no further negotiating meetings and to develop remaining sections of the proposed rule independently.

Proposed regulations based on the consensus language were published in the *Federal Register* on 23 February 1999. Commission comments on the proposed rule were described in the previous annual report. The docket was cleared for publication at the end of December 2000 and the final rule was expected to be published early in January 2001. The Service continues to work on developing a proposed rule for the nonconsens us sections of the marine mammal care and maintenance regulations under the Animal Welfare Act. Publication of this proposed rule is expected in mid-2001.

Swim-with-the-Dolphin Regulations

As discussed in previous reports, on 4 September 1998 the Animal and Plant Health Inspection Service published a final rule establishing standards for swim-with-the-dolphin programs, which, before enactment of the 1994 Marine Mammal Protection Act amendments, had been regulated by the National Marine Fisheries Service. These programs allow members of the public to enter the water and interact with captive dolphins. The rule, which became effective in October 1998, includes standards for the humane handling, care, and treatment of cetaceans used in swim programs. It also establishes requirements on the size of enclosures in which swim programs can be conducted, veterinary care programs, personnel qualifications, the handling of animals, and record keeping.

On 14 October 1998, in response to industry complaints, the Service published a *Federal Register* notice announcing that, until further notice, it would not apply certain provisions of the swim regulations to facilities offering 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 the Service published a notice in the *Federal Register* suspending enforcement of the rule and seeking public comment on, among other things, the need to regulate wading programs. At the end of 2000 it was the Commission's understanding that the Service intended to publish proposed amendments to the current swim regulations in conjunction with the remaining portions of the marine mammal care and maintenance standards in mid-2001.

Exports of Marine Mammals to Foreign Facilities

Section 102(a)(4) of the Marine Mammal Protection Act, as amended in 1994, prohibits the export of marine mammals taken in violation of the Act or for any purpose other than public display, scientific research, or species enhancement. A foreign facility wishing to obtain marine mammals from the United States for public display must provide documentation to the appropriate regulatory agencies that it meets comparable standards with respect to (a) education or conservation programs and public accessibility under the Marine Mammal Protection Act and (b) care and maintenance of the marine mammals under the Animal Welfare Act. Because foreign facilities are not subject to licensing or registration requirements under the Animal Welfare Act, it is only through the Marine Mammal Protection Act's comparability requirement that adequate care of marine mammals transferred to foreign facilities can be assured. Should a foreign facility not meet the comparability requirements, the National Marine Fisheries Service and the Fish and Wildlife Service are required to ensure that such imports not take place.

Some disagreement exists among the responsible agencies and the public display industry as to how comparability findings for foreign facilities are to be made and for what period the facility must remain comparable. The National Marine Fisheries Service believes that its responsibilities under the Marine Mammal Protection Act, and those of the receiving facility, do not end once an animal has been exported. The Service therefore requires the foreign government with jurisdiction over the facility to certify the accuracy of information submitted by the facility and to afford comity (i.e., agree to recognize and facilitate enforcement of Service actions concerning the animals) to actions the Service may take to enforce the provisions of the Act after animals have been exported. The public display industry believes that there is no contin-

uing U.S. jurisdiction once an animal is exported (i.e., the comparability requirements apply only at the time of export and a comity statement is not required).

In 1994 and 1996 the Commission wrote to the Animal and Plant Health Inspection Service expressing its view that the only reliable way to ascertain whether a foreign facility meets the comparability requirements is to conduct an on-site inspection, as is done for U.S. facilities, and that a foreign facility could and should be required to accept and pay for an inspection as a condition of obtaining marine mammals from the United States. In response, the Service stated that, although it does not have authority under the Animal Welfare Act to compel facilities outside the United States and its territories to agree to an inspection, it would be willing to consider sending inspectors to foreign facilities for purposes of determining comparability with Animal Welfare Act standards if it were invited to do so by the foreign government and if the expenses associated with the inspection were covered. The Service noted that, if a deficiency is found, it does not have authority to compel correction. The Service also questioned the need for on-site inspections of foreign facilities because it was unaware of any problems associated with the care of marine mammals exported in the past.

The Commission also wrote to the National Marine Fisheries Service in 1996 noting that, in light of its responsibilities under section 104 of the Marine Mammal Protection Act, the Service has little choice but to require a comity statement or to implement some other mechanism to ensure continuing jurisdiction over foreign facilities that receive marine mammals from the United States. Nevertheless, the Commission noted that, given existing funding, it is unrealistic to assume that the National Marine Fisheries Service will be able to adequately monitor compliance by foreign facilities or take remedial actions if problems are detected. The Commission therefore suggested that it might make sense to amend the Marine Mammal Protection Act to eliminate continuing jurisdiction over marine mammals once they are exported but to strengthen the mechanisms for ensuring comparability before authorizing an export. In its response, the Service provided strong support for requiring on-site inspections of foreign facilities and agreed that the issue might best be addressed through amendment of the Animal Welfare Act or the Marine Mammal Protection Act. Until this occurs, however, the Service noted that 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, remain reasonable requirements consistent with the provisions of the Marine Mammal Protection Act.

In testimony before the House Subcommittee on Fisheries Conservation, Wildlife, and Oceans in June 1999, the Commission recommended two ways in which the Marine Mammal Protection Act's marine mammal export provisions might be improved. Under the first alternative, as a trade-off to yielding jurisdiction over a marine mammal once it has been exported, the United States could strengthen the reliability of its comparability determination by requiring a physical inspection of the facility before approving an export. Under the second alternative, the United States would not look at the adequacy of individual facilities, but rather would limit exports of marine mammals to those countries that have demonstrated that they have in place a program for overseeing the welfare of captive marine mammals comparable with that established by the United States under the Animal Welfare Act. Therefore, a country would need to demonstrate that it has adopted minimum requirements for facility construction and other aspects of care and maintenance, that those requirements are enforced through periodic inspections, and that it has in place an effective means of preventing exports of marine mammals to facilities in other countries that do not meet certain minimum standards.

On 16 August 2000 the Secretary of Commerce and the Secretary of the Interior, in coordination with the Commission, transmitted to Congress several recommended amendments to the export provisions of the Marine Mammal Protection Act, including a technical amendment to clarify that exports pursuant to a public display permit are authorized only if the requirements of section 104(c)(9) of the Act have been met (i.e., that the receiving facility meets standards that are comparable with those for domestic facilities). Provisions pertaining to comity statements, certification of foreign husbandry programs, or inspections of foreign facilities were not included in the proposed legislation. As discussed in Chapter II, however, no action on the

proposed amendments to the Marine Mammal Protection Act was taken during 2000.

As of the end of 2000 the National Marine Fisheries Service was continuing its work on a proposed rule regarding public display permits, including transfer/transport requirements, to cover both foreign and domestic facilities. The Service expects to publish the proposed rule in early 2001.

Release of Captive Marine Mammals to the Wild

Over the past few years, there has been increased debate over the appropriateness of returning long-term captive marine mammals to the wild. Whether such releases are in the best interests of the animal is questionable, and the procedures for preparing animals for release are still experimental. In addition, such releases could incidentally introduce diseases into wild populations. It is generally thought that release of long-term captive animals should be pursued only with adequate monitoring and in accordance with an appropriate research protocol, pursuant to a scientific research permit.

In 1994 and again in 1996 the Commission wrote to the National Marine Fisheries Service, recommending that the Service refrain from considering any permit application seeking authority to release marine mammals to the wild until (1) objective, generally accepted criteria have been developed for judging when release is appropriate; (2) it has published an unequivocal policy statement or, if necessary, regulations specifying that the release of captive marine mammals to the wild without proper authorization has the potential to injure marine mammals and is considered an illegal taking; and (3) if current authority is lacking, the Marine Mammal Protection Act is amended to provide clear authority to prevent unauthorized releases. Also in 1996, following the unauthorized release of two bottlenose dolphins from a Florida facility, the Commission wrote to the Animal and Plant Health Inspection Service recommending that the Service work with the National Marine Fisheries Service and the Fish and Wildlife Service to review their respective authorities for preventing unauthorized releases of captive marine mammals and consider the need for more decisive enforcement of existing statutory provisions and regulations, issuance of policy statements, and regulatory amendments. The Commission recommended that, if the agencies determined that they do not have sufficient authority to prevent unauthorized releases, they seek such authority through statutory amendment.

In its June 1999 testimony to the Subcommittee on Fisheries Conservation, Wildlife, and Oceans, the Commission recommended that the provisions of the Marine Mammal Protection Act be strengthened to specifically prohibit the release of captive marine mammals, other than those being maintained under the stranding and rehabilitation program, without specific authorization. The Commission also noted the desirability of providing the National Marine Fisheries Service, the Fish and Wildlife Service, and/or the Animal and Plant Health Inspection Service with explicit authority to seek injunctive relief to prevent anticipated violations of the Animal Welfare Act or the Marine Mammal Protection Act when such violations pose risks to the welfare of the animals, the public, or wild marine mammal populations.

On 16 August 2000 the Secretary of Commerce and the Secretary of the Interior, in coordination with the Commission, recommended to Congress that the Marine Mammal Protection Act be amended to expressly prohibit the release of captive marine mammals to the wild unless authorized by a permit under section 104 or under section 109(h), which pertains to the release of rehabilitated stranded marine mammals. As noted in Chapter II, no action was taken to add or amend this or other provisions of the Act in 2000.

Reintroduction of "Keiko" to the Wild

A long-term captive marine mammal currently being considered for release to the wild is Keiko, the killer whale featured in the movie *Free Willy*. Keiko, captured off Iceland in 1979 at the age of two, lived in an Icelandic aquarium for three years before being moved to a facility in Ontario, Canada. In 1985 the animal was sold to a facility in Mexico City. After nearly 20 years in captivity, the animal was moved to the Oregon Coast Aquarium in 1996 where the Free Willy/Keiko Foundation undertook a program to improve his health. In September 1998 Keiko was returned to Iceland under the export provisions of the Marine Mammal Protection Act for public display, for

further rehabilitation, and, if possible, eventual release to the wild.

Both before and after Keiko's export to Iceland in 1998, the National Marine Fisheries Service made it clear to the Free Willy/Keiko Foundation that, because Keiko was moved to Iceland under public display status, the Foundation must apply for a scientific research permit if the whale was to be released to the wild. In this regard, the Service advised the Foundation and the Icelandic government of the need to develop a sound scientific approach for any release that may be considered. That approach would need to be comparable with what would be required to obtain a scientific research permit under the Marine Mammal Protection Act. 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, similar to what would be required to obtain a scientific research permit in the United States. In the interim, the Society chose to maintain Keiko in captivity under public display status.

The Service advised the Society that a sound, peer-reviewed scientific research protocol that addressed Keiko's ability to forage, his health status, and post-release monitoring and rescue was needed. The Service noted that such a protocol was especially important in this instance inasmuch as Keiko (1) is an older animal with a long history of health problems, (2) has been maintained in captivity for approximately 20 years without the company of conspecifics, (3) has been dependent on human care for his survival, and (4) would need to develop a number of skills, including the ability to forage and eat sufficient amounts of live fish, and the ability to integrate himself into the local killer whale population to survive in the wild.

In late May 2000 the Society provided a reintroduction protocol to the Animal Welfare Board of Iceland, the National Marine Fisheries Service, the Marine Mammal Commission, and the Animal and Plant Health Inspection Service, as well to several other experts. A permit authorizing Keiko's release was issued by Iceland on 9 June 2000, before receipt of reviewers' comments. A number of reviewers subsequently provided substantive comments on the protocol. The Commission's comments, provided to the Society by letter of 19 June 2000, noted that the protocol identified most of the relevant issues related to the potential release of Keiko but did not provide a clear description of precisely what has been done or is planned to prepare Keiko for release. The Commission noted that such information would be of value to others who contemplate the release of long-term captive marine mammals in the future.

The Commission recommended, among other things, that the protocol be expanded to describe the additional health screening to be done before Keiko is judged "safe" for release and the criteria to be used to determine that he is healthy, when and how the satellite-linked telemetry system that will be used to track the animal is to be attached and what has been or will be done to ensure that the tag cannot be rubbed off, how Keiko will be monitored after release in light of potentially severe weather and sea state conditions around Iceland, the criteria that will be used to judge whether Keiko is or is not behaving as expected following his release, and the criteria that will be used to decide that Keiko is capable of fending for himself in the wild and that all behaviors that could pose a risk to humans have been fully extinguished. In regard to this last point, the Commission noted that, according to the protocol, only one month of post-release monitoring will be conducted, but that it may take longer than one month for detectable weight loss to occur. Further, the Commission noted that release is planned to occur in the fall or winter when weather conditions are likely to be less favorable, and it questioned whether the Society had considered postponing the release until the following spring.

On 19 July 2000 Ocean Futures provided the Commission with an addendum to the original reintroduction protocol. The addendum set forth revisions based on reviewers' comments and on Ocean Futures' experience with the reintroduction program to that date. Among other things, it stated that Keiko is considered to be healthy with no evidence of papilloma or respiratory infection and that health monitoring would continue by means of visual observation and regular blood sampling. It also noted that a customized tag had been fitted to Keiko's dorsal fin on 7 July, with the expectation that he could be tracked for a period of one year using the satellite and VHF transmitters. In the event of tag loss before the end of the monitoring period, the addendum stated, every effort would be made to monitor Keiko as closely as possible by vessel and

aerial observations subject to environmental and logistical constraints. Monitoring would also be facilitated by using a reporting network being established with local fishermen. The addendum stated that after the release, Keiko's weight and body condition would be monitored visually, and although weight loss may take an extended period to become evident, any physical problem or nutritional deficit should be identifiable quickly through the animal's inability to maintain levels of physical activity necessary to keep up with free-ranging whales.

On 22 December 2000 Ocean Futures advised the National Marine Fisheries Service that it had ceased reintroduction activities for 2000 due to the onset of fall and winter weather conditions and would reinitiate efforts in the spring of 2001.

APPENDIX A

MARINE MAMMAL COMMISSION RECOMMENDATIONS IN 2000

7 January	Interior, commenting to the Fish and Wildlife Service on the proposed rule regarding the taking of polar bears and Pacific walruses incidental to oil and gas activities in the southern Beaufort Sea and adjacent coastal areas of Alaska; noting that the National Marine Fisheries Service has previously provided information related to the possible taking of marine mammals incidental to the construction and operation of production facilities at the Northstar site in the southern Beaufort Sea, and that the effects of these activities on ringed seals could possibly have an indirect effect on polar bear distribution and density; recommending that, if the Fish and Wildlife Service had not already done so, it consider possible effects on polar bears other than pipeline construction and operation at the Northstar site; further recommending that the Service (1) conduct a power analysis to determine the kinds and levels of change in the Beaufort Sea polar bear population that could be detected by tagging/tracking, monitoring, and bio-sampling programs and (2) if the analysis indicates that such programs are unlikely to detect and determine the likely cause of future population changes, work with appropriate groups to ensure that adverse changes can be detected and mitigated before they have long-term or irreversible effects on population size or productivity; and further recommending that the Service review the oil spill contingency plan developed and approved by the involved state and federal agencies to ensure that the risk of oil spills has been estimated appropriately, and is, in fact, negligible, and that planned measures for containing and cleaning up spills are likely to be effective.
12 January	Interior, request for authorization to continue scientific research, Ronald J. Jameson, U.S. Geological Survey, Western Ecological Research Center.
19 January	Interior, public display permit, Izu-Mito Sea Paradise.
19 January	Interior, public display permit, Toba Aquarium.
19 January	Commerce, general authorization for scientific research, Joseph R. Mobley, Jr.
31 January	Interior, commenting to the Fish and Wildlife Service on the death of a southern sea otter under a previously issued scientific research permit; noting that the Commission cannot discount the possibility that the permitted activities contributed to the mortality; and recommending that, should another animal die, permitted activities be suspended pending Service review.
31 January	Interior, scientific research permit, Edmund Gerstein, Leviathan Legacy, Inc.
15 February	Commerce, scientific research permit, Daryl J. Boness, National Zoological Park.
15 February	Commerce, commenting to the National Marine Fisheries Service on a request from the California Department of Transportation for authorization to take small numbers of harbor seals and California sea lions incidental to installation of piles at the San Francisco–Oakland Bay Bridge.
22 February	Commerce, commenting to the National Marine Fisheries Service on the possible effects of the commercial lobster fishery on Hawaiian monk seals; concurring with the Hawaiian Monk Seal Recovery Team's recommendation that the Service close the Northwestern Hawaiian Islands lobster fishery for a minimum of three years; and recommending that the lobster fishery not be reopened until information is sufficient to ensure that its resumption will not impede recovery of the Hawaiian monk seal.
23 February	Commerce, amendment of scientific research permit, Carole Anne Conway.

23 February	Commerce, scientific research permit, Zachary D. Sharp.
28 February	Commerce, scientific research permit, Wayne L. Regelin, Alaska Department of Fish and Game.
28 February	Commerce, scientific research permit, Olga von Ziegesar, North Gulf Oceanic Society.
28 February	Commerce, amendment of scientific research permit, Michael Moore.
29 February	Commerce, scientific research permit, Graham A. J. Worthy, Texas A&M University.
7 March	Commerce, request for authorization to continue scientific research, Roger S. Payne, Ocean Alliance.
7 March	Commerce, request for authorization to continue scientific research, William G. Gilmartin, Hawaii Wildlife Fund.
7 March	Commerce, request for authorization to continue scientific research, Christine Gabriele, Glacier Bay National Park.
7 March	Commerce, commenting to the National Marine Fisheries Service on the preliminary plan for allocating the Service's fiscal year 2000 appropriation for northern right whales; noting that the plan provides a useful basis for seeking constituency views on how best to use the funds to meet recovery objectives; further noting that the plan is so concise that, in most cases, discussion of proposed projects does not clearly describe what work is to be undertaken or how it will contribute to recovery objectives; and recommending, among other things, that the Service prepare and circulate a spending plan that provides a more complete description of the work to be performed, how that work will contribute to meeting recovery goals, how the funds allocated to each task would be used, and the amounts and sources of supplemental funding that the Service expects to be available for the various tasks.
13 March	Interior, amendment of public display permit, The Toledo Zoo.
20 March	Commerce, amendment of scientific research permit, Bradford E. Brown, Southeast Fisheries Science Center.
30 March	U.S. Navy, commenting to Marconi Systems Technologies on the draft environmental impact statement for the shock trial of the *Winston S. Churchill* (DDG 81); noting that the draft statement provides a thorough and objective assessment of the species and numbers of marine mammals likely to be present near the test areas and how they could be affected by the shock trials, and further noting that if described mitigation measures are carried out, the number of marine mammals likely to be killed or injured incidental to the trail will be minimized and documented to the extent practicable.
3 April	Interior, commenting to the Fish and Wildlife Service on the draft revised recovery plan for the southern sea otter; noting that, overall, the draft identifies the range of activities necessary to assess and eliminate or mitigate activities jeopardizing the continued existence of the population and/or damaging habitat critical to its survival and recovery; further noting, however, that the draft revision fails to focus efforts on the most important task, which is identifying and eliminating or mitigating the cause of the apparent ongoing population decline; therefore recommending that the draft be restructured to focus on the research, studies, and regulatory measures necessary to identify and eliminate or mitigate the cause or causes of the decline; further recommending that the Service convene a meeting of representatives of the agencies and organizations identified in the draft revision's implementation schedule to agree on priorities, assign responsibilities, and establish timetables; and further recommending that the Service appoint a full-time sea otter recovery program coordinator.
10 April	Commerce, amendment of scientific research permit, Bruce Carlson, Waikiki Aquarium.
19 April	Commerce, amendment of scientific research permit, Rachel Cartwright.

19 April	Commerce, commenting to the National Marine Fisheries Service on a meeting to be held 25–28 April to discuss the chase/recapture experiment mandated by the International Dolphin Conservation Program Act, suggesting that certain data and information be made available to participants before the meeting, and providing specific comments on the Service's report on the September 1999 meeting on the chase/recapture experiment.
19 April	Commerce, commenting to the National Marine Fisheries Service on the potential use of a pulsed power device as an acoustic deterrent for California sea lion predation on fish caught by recreational fishermen on commercial passenger fishing vessels; reiterating recommendations set forth in the Commission's 23 November 1999 letter to the Service; and restating its opinion that recommended laboratory studies and studies on captive animals be undertaken before field-testing the pulsed power device.
21 April	Commerce, commenting to the National Marine Fisheries Service on a request from the U.S. Geological Survey for authorization to take several species of marine mammals incidental to the collection of seismic-reflection data in waters off southern California; concurring with the Service's preliminary determination that the surveys will have negligible impacts on the potentially affected species and stocks; recommending that, before authorizing taking incidental to nighttime operations, the Service ensure that marine mammals approaching or entering the operational safety zone can be detected in time to stop operations so that animals are not adversely affected; and further recommending that, if available data do not support the contention that nighttime operations can be conducted without increasing the risk of killing or injuring marine mammals, the applicant be required to (1) report every 24 hours on the species and number of marine mammals approaching and entering the designated safety zone during the day and during the night, and (2) suspend nighttime operations if the species or number of animals observed at night are significantly different from the number observed during the day.
8 May	Commerce, photography permit, Clive Lonsdale.
9 May	Commerce, scientific research permit, Sean K. Todd, College of the Atlantic.
9 May	Commerce, scientific research permit, Randall Wells.
12 May	Commerce, commenting to the National Marine Fisheries Service on a draft paper on plans for an experimental lobster fishery in the Northwestern Hawaiian Islands; reiterating the Commission's belief that commercial lobster fishing in the area may have contributed to the decline of the Hawaiian monk seal colony at French Frigate Shoals by depleting important prey species; restating the Commission's strong opposition to any experimental program that is dependent on continued commercial-scale lobster fishing in monk seal foraging areas until (1) there is better information on the importance of lobsters in monk seal diets, and (2) steps have been taken to ensure that future lobster fishing will not adversely affect essential monk seal prey resources; recommending that the Service refrain from authorizing any experimental fishing program in the area in question that is dependent on commercial-scale lobster fishing for at least three years; and further recommending that, if the Service chooses to proceed with an experimental fishery, the plans for such a fishery be reviewed pursuant to section 7 of the Endangered Species Act to determine the risk of the fishery adversely affecting Hawaiian monk seals or their critical habitat.
15 May	Commerce, commenting to the National Marine Fisheries Service on a proposed emergency rule to close the Northwestern Hawaiian Islands lobster fishery and expressing the Commission's support for its adoption.
19 May	Defense, commenting to the Navy on the ongoing joint investigation by the Navy and the National Marine Fisheries Service of the 15–16 March 2000 stranding of beaked whales and other cetaceans in the Bahamas; recommending that the Navy and the Service hold a workshop to review what is or what might be done to determine the cause of the strandings and, if the Navy activities are implicated, the steps that could be taken to avoid similar occurrences in the future; requesting that in the future the Commission be routinely consulted before the testing of new technologies that could directly or indirectly affect marine mammals; and further requesting that the Commission be consulted whenever there are questions as to whether Navy activities may have caused or contributed to an unusual marine mammal mortality event.

22 May	Commerce, commenting to the National Marine Fisheries Service on the application by Western Geophysical for authorization to take small numbers of marine mammals incidental to geophysical seismic surveys in the Beaufort Sea; concurring with a preliminary determination that the short-term impacts of the surveys are likely to result in no more than temporary modification of behavior by certain marine mammal species; noting, however, that there may be long-term, cumulative adverse impacts; questioning whether site-specific monitoring plans are adequate to verify that surveys and activities will have negligible effects on the potentially affected species and populations; and therefore recommending, among other things, that the peer review group to be established under the authorization be asked for its views as to whether combined site-specific and population monitoring is capable of detecting non-negligible effects in time to minimize or mitigate them and, if not, what changes are necessary to provide such assurance.
23 May	Commerce, forwarding to the National Marine Fisheries Service a report summarizing available information on possible adverse effects of swim-with-wild-dolphin programs; noting that the report provides compelling evidence that efforts to interact intentionally with dolphins in the wild are likely to result in at least Level B harassment and, in some cases, the death or injury of both people and marine mammals; and recommending that the Service promulgate regulations specifying that activities intended to enable in-water interactions between humans and dolphins in the wild constitutes a taking that is prohibited without appropriate authorization.
31 May	Commerce, scientific research permit, Paul E. Nachtigall.
31 May	Commerce, amendment of scientific research permit, Douglas P. DeMaster, National Marine Mammal Laboratory.
7 June	Commerce, amendment of scientific research, Douglas P. DeMaster, National Marine Mammal Laboratory.
13 June	Commerce, amendment of scientific research permit, Michael P. Sissenwine, Northeast Fisheries Science Center.
19 June	Ocean Futures Society, commenting on the draft protocol for reintroducing the killer whale Keiko to the wild; noting that the protocol identifies most of the relevant issues related to the whale's release; and recommending that the protocol be expanded to more clearly describe what has been done and is being contemplated to prepare Keiko for release.
30 June	Transportation, commenting to the U.S. Coast Guard on possible regulatory or other action related to high-speed vessel traffic; relaying results of a review initiated by the Commission of collisions between ships and whales that suggest that high-speed vessels may pose a particularly high collision risk; recommending that the Coast Guard expand its review of regulatory options for high-speed vessels to consider navigation risks and environmental impacts associated with collisions with whales; recommending that it consult with the National Marine Fisheries Service pursuant to section 7 of the Endangered Species Act to determine measures needed to prohibit or restrict high-speed vessel operations in areas where whales, particularly endangered northern right whales, are common; and further recommending that the Coast Guard consult with the Service to identify and assess additional measures that may be needed for all large vessels transiting waters where northern right whales are likely to occur.
11 July	Commerce, amendment of scientific research permit, Donald B. Siniff.
11 July	Commerce, scientific research permit, James T. Harvey.
11 July	Commerce, amendment of scientific research permit, Daniel Engelhaupt.
21 July	Energy, commenting on the final environmental impact statement for the JEA Circulating Fluidized Bed Combustor Project with regard to northern right whales and Florida manatees; noting that the project will

involve shipment of materials up the St. Johns River, Florida, and through important habitat for endangered Florida manatees, and the only known calving habitat for endangered northern right whales; further noting that collisions with vessels is the largest source of human-related mortality for both species; recommending that the Department of Energy consult with the Fish and Wildlife Service and the National Marine Fisheries Service to (1) further assess the risks posed to manatees and northern right whales by project-related vessel traffic and (2) determine whether vessels involved in the project should be required to have propeller guards installed to protect manatees and what other mitigation measures might be needed to prevent right whale mortality and injury; and further recommending that vessels servicing the project limit their speeds to less than 14 knots when transiting the right whale critical habitat in winter to reduce collision risks with right whales.

24 July — Scripps Institution of Oceanography, commenting on the draft environmental impact statement for the North Pacific Acoustic Laboratory (Acoustic Thermometry of Ocean Climate Project, Phase II); concurring with certain determinations and conclusions in the draft statement regarding short-term effects on species and populations of marine mammals; noting, however, that data are insufficient to be confident that there will be no long-term effects; further noting the need for a monitoring program to detect possible project-related changes in marine mammal distribution, abundance, or productivity and for reviewing the results of such a program annually; and recommending that the Institution consult with the National Marine Fisheries Service on the possibility of such reviews being carried out in cooperation with the Service's annual meeting of independent researchers.

26 July — Commerce, commenting to the National Marine Fisheries Service on a proposed rule to limit approaches to humpback whales by whale-watching vessels in waters off Alaska to 200 yd (183 m); supporting adoption of proposed limit; recommending that the proposed rule be expanded to prescribe measures that vessel operators should follow if they find themselves closer than 200 yd to a whale; and further recommending that, in light of information on the relationship between vessel speeds and collisions with whales, the Service reconsider incorporating vessel speed restrictions as part of the proposed humpback whale approach regulations.

26 July — Commerce, amendment of scientific research permit, Robert L. Middlebrooks, University of South Mississippi.

26 July — Commerce, amendment of scientific research permit, Graham A. J. Worthy.

28 July — Interior and Commerce, commenting on a Presidential directive to develop recommendations for a new coordinated management regime to increase protection of the Northwestern Hawaiian Islands coral reef ecosystem; noting that the area in question provides habitat for virtually the entire breeding population of the endangered Hawaiian monk seal; further noting that depletion of monk seal prey resources by fishing, particularly lobster, may be contributing to a sharp decline in part of the monk seal population; recommending that the Secretaries of Commerce and the Interior jointly propose that all waters and federally owned bottom lands off the Northwestern Hawaiian Islands out to a distance of 50 nmi be set aside as part of an existing or newly created national wildlife refuge; and further recommending that the National Marine Fisheries Service impose a five-year moratorium on all commercial fishing within the 50-nmi boundary pending (1) assessment of the status of target and nontarget fish stocks potentially affected by commercial fisheries and (2) development of precautionary fishery management measures to ensure protection of Hawaiian monk seals and other wildlife species.

31 July — Commerce, commenting to the National Marine Fisheries Service on a draft proposed rule to regulate the harvest of Cook Inlet beluga whales by Alaska Natives; recommending that the proposed rule be adopted, and suggesting ways to strengthen and clarify the rule.

1 August — Commerce, amendment of scientific research permit, R. Michael Laurs, Southwest Fisheries Science Center.

7 August — Commerce, amendment of scientific research permit, Keith D. Mullin, Southeast Fisheries Science Center.

7 August	Commerce, request for reconsideration of scientific research permit, James H. W. Hain.
14 August	Commerce, commenting to the National Marine Fisheries Service on draft marine mammal stock assessments for the Alaska, Pacific and Atlantic regions; recommending, with respect to the Cook Inlet stock of beluga whales, that a recovery factor of 0.1 be applied to the calculation of the stock's potential biological removal level; recommending, with respect to Hawaiian monk seals, that data on past lobster catch levels and trends be retained as part of the 2000 stock assessment and that the assessment note that the best available information suggests that lobsters are an important component of the monk seal diet; recommending, with respect to the central California stock of harbor porpoises, that the Service take immediate steps to convene a take reduction team to identify measures needed to reduce their bycatch in the halibut set gillnet fishery; and making other suggestions.
21 August	Commerce, scientific research permit, Peter L. Tyack.
22 August	Commerce, scientific research permit, Sarah Allen, Point Reyes Bird Observatory.
28 August	Commerce, amendment of scientific research permit, Robin W. Baird.
28 August	Commerce, amendment of scientific research permit, Jan Straley.
28 August	Commerce, photography permit, Bruce Reitherman, Pandion Enterprises.
29 August	Commerce, amendment of scientific research permit, Marsha L. Green.
29 August	Commerce, amendment of scientific research permit, James T. Harvey, Moss Marine Landing Laboratory.
22 September	Commerce, commenting to the National Marine Fisheries Service on a request from Scripps Institution of Oceanography for authorization to take marine mammals incidental to the Acoustic Thermometry of Ocean Climate Program over the next five years; noting that data are insufficient to ensure that there will be no long-term effects on the distribution, abundance, or productivity of potentially affected marine mammal stocks; and recommending that the Service (1) consult with the applicant and qualified scientists to determine the baseline information and monitoring work that would be required to detect possible long-term effects; and (2) include in any proposal to issue the requested authorization a detailed description of the proposed monitoring program.
25 September	Commerce, scientific research permit, Samuel Ridgway.
25 September	Commerce, scientific research permit, Daniel P. Costa.
25 September	Commerce, scientific research permit, James Darling.
29 September	Commerce, amendment of scientific research permit, Southwest Fisheries Science Center.
6 October	Commerce, scientific research permit, Terrie M. Williams.
6 October	Commerce, scientific research permit, Wayne L. Regelin.
6 October	Interior, amendment of scientific research permit, Alaska Biological Science Center.
30 October	Interior, renewal of scientific research permit, Alaska Science Center.
1 November	Commerce, commenting to the National Marine Fisheries Service on a proposed rule to regulate the taking of Cook Inlet beluga whales by Alaska Natives and advising the Service of the Commission's intent to participate as a party to the hearing on the proposal.
3 November	Interior, public display permit, Brookfield Zoo.

3 November Interior, public display permit, Florida Museum of Natural History.

14 November Commerce, commenting to the National Marine Fisheries Service on a decision to cancel a planned meeting of the Hawaiian Monk Seal Recovery Team; noting the importance of the recovery team in reviewing and advising the Service on planned research activities for the upcoming field season; and recommending that the meeting be held on the dates originally scheduled.

17 November Commerce, commenting to the National Marine Fisheries Service on the status of Gulf of Maine harbor porpoises and efforts to reduce the bycatch of harbor porpoises in gillnet fisheries along the U.S. east coast; noting that alteration or repeal of existing fishing closures in certain areas could lead to an increase in harbor porpoise bycatch levels; and recommending that the Service (1) estimate any increase in harbor porpoise bycatch that might result from proposed changes to fishing closures under fishery management plan provisions and (2) concurrent with any action to adopt such changes, also adopt compensatory bycatch reduction measures to ensure that bycatch levels remain below the calculated potential biological removal level for the stock.

17 November Commerce, commenting to the National Marine Fisheries Service on the northern right whale recovery program; noting that the North Atlantic population may now number fewer than 300 whales and is declining, and recommending that the Service (1) take immediate steps to prevent deployment of potentially hazardous fishing gear in designated right whale critical habitats during periods when right whales are most abundant; (2) update advice in the *United States Coast Pilot* and other mariner education materials to note that speeds below 14 knots are likely to reduce the risk of fatal or serious injuries to whales; (3) provide funding for an economic analysis of alternative vessel management measures currently being developed; (4) conduct a review of domestic and international authorities that could and should be used to implement speed and routing requirements within the various jurisdictional zones; and (5) if it has not already done so, initiate consultations with the Northeast Consortium to develop and agree upon work that should be supported by the Service and the Consortium.

17 November South Florida Water Management District, commenting on efforts to reduce the death and injury of Florida manatees in water control structures and encouraging the District, if it has not already done so, to assign a staff member responsibility for coordinating work to install and evaluate the effectiveness of gate-reversing mechanisms in preventing manatee deaths.

21 November Commerce, scientific research permit, Michael Sissenwine, Northeast Fisheries Science Center.

1 December Commerce, amendment of scientific research permit, Charles A. Mayo.

1 December Commerce, request for authorization to continue scientific research, Dan Salden.

1 December Interior, commenting to the Fish and Wildlife Service on the Florida manatee recovery program; commending the Service for its many efforts to address manatee recovery needs; noting that additional efforts are needed to help ensure the conservation of Florida manatees, particularly in the area of enforcement; recommending that the Service, for at least the next five years, provide at least $1 million annually for use in enforcing boat speed rules and other manatee protection provisions; (2) assign at least four full-time law enforcement officers to manatee-related duties; and (3) convene a manatee enforcement task force to include those staff members with the U.S. Coast Guard and the Florida Division of Law Enforcement who have been assigned lead responsibility for manatee enforcement efforts; further recommending that the Service, in consultation with the Army Corps of Engineers and appropriate state agencies in Florida, use its incidental take rulemaking and permit review process to develop criteria for evaluating the acceptability of risks from proposed boating facilities on manatees and manatee habitat; commending the Service for steps being taken to examine new manatee sanctuary and refuge options and recommending that the Service proceed expeditiously with the rulemaking initiative; recommending that the Service review and revise its diver education materials to advise divers to avoid touching manatees; and further recommending that the Service pursue all possible avenues to acquire property at the Three Sisters Spring, Crystal River National Wildlife Refuge, for use as an education and visitor center.

1 December — Florida Fish and Wildlife Conservation Commission, commenting on efforts to conserve and recover the Florida population of the West Indian manatee; noting that much more needs to be done to reduce the number of manatees killed by watercraft and to increase habitat protection; encouraging the Conservation Commission, along with the U.S. Fish and Wildlife Service, to assume the principal burden of enforcing laws and regulations intended to protect manatees; commending the research contributions made to date by the Conservation Commission's Florida Marine Research Institute; and encouraging the Conservation Commission to provide support for additional manatee-related work in several areas, including study of manatee behavior to help resolve the causes of mortality at water control structures, manatee radio-tracking studies, work to identify essential manatee habitats, and analyses of existing data sets.

1 December — Florida Department of Environmental Protection, commenting on efforts to conserve and recover the Florida population of the West Indian manatee; requesting that the Department participate in interagency efforts to develop criteria for protecting manatees and manatee habitat that could be used both for reviewing permit requests for waterway development proposals and for guiding preparation and approval of county manatee protection plans; and encouraging the Department to fully explore options for opening the spring run at Homosassa Springs State Wildlife Park to wild manatees and proceed with construction of a facility for holding manatees undergoing rehabilitation.

7 December — Commerce, commenting to the National Marine Fisheries Service on the request from Phillips Alaska, Inc., for authorization to take small numbers of marine mammals incidental to offshore oil exploration activities in the Beaufort Sea; concurring with Service's finding that the proposed activities are likely to have a negligible short-term impact on marine mammals; expressing concern that the cumulative impact of this and other ongoing and planned projects in the Beaufort Sea may not be negligible; and recommending that the Service consider ways to determine whether oil and gas and related activities are having broader-scale impacts on marine mammals that may not be detected by site-specific monitoring programs.

12 December — Commerce, commenting to the National Marine Fisheries Service on its decision to close the Northwestern Hawaiian Islands lobster fishery and assess the status of the area's lobster stock; questioning an apparent assumption by the Service that all lobsters released on the sea floor will survive; and recommending that the research protocol be expanded to assess predation levels associated with alternative methods of releasing lobsters.

12 December — Commerce, commenting to the National Marine Fisheries Service on bottlenose dolphins in waters off the southeastern United States; urging that the Service complete its review of the draft bottlenose dolphin conservation plan and establish a take reduction team for the mid-Atlantic coastal population of dolphins; commending the Service for initiating efforts to understand the stock structure and population dynamics of Gulf of Mexico bottlenose dolphin stocks; and recommending that the Service invest sufficient efforts and funding to enable proper enforcement of protective statutes for bottlenose dolphins and other species for which it is responsible.

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 north-west Atlantic. A review and evaluation. Final report for MMC contract MM1301062-1. NTIS PB80-206105. 127 pp. (A07)

Bengtson, J.L. 1978. Review of information regarding the conservation of living resources of the Antarctic marine ecosystem. Final report for MMC contract MM8AD055. NTIS PB-289 496. 148 pp. (A08)

Bishop, J.B. 1985. Summary report of gill and trammel net (set-net) observations in the vicinity of Morro Bay, California, 1 November 1983 - 31 August 1984. Final report for MMC contract MM2629900-2. NTIS PB85-150076. 14 pp. (A02)

Bockstoce, J. 1978. A preliminary estimate of the reduction of the western Arctic bowhead whale (*Balaena mysticetus*) population by the pelagic whaling industry: 1848-1915. Final report for MMC contract MM7AD111. NTIS PB-286 797. 32 pp. (A08)

Brownell, R.L., Jr., C. Schonewald, and R.R. Reeves. 1978. Preliminary report on world catches of marine mammals 1966-1975. Final report for MMC contract MM6AC002. NTIS PB-290 713. 353 pp. (A16)

Buckland, S.T., and K.L. Cattanach. 1990. Review of current population abundance estimates of small cetaceans in the Black Sea. Final report for MMC contract T75133135. NTIS PB91-137257. 5 pp. (A02)

Carr, T. 1994. The manatees and dolphins of the Miskito Coast Protected Area, Nicaragua. Final report for MMC contract T94070376. NTIS PB94-170354. 19 pp. (A03)

Chapman, D.G., L.L. Eberhardt, and J.R. Gilbert. 1977. A review of marine mammal census methods. Final report for MMC contract MM4AC014. NTIS PB-265 547. 55 pp. (A04)

Contos, S.M. 1982. Workshop on marine mammal-fisheries interactions. Final report for MMC contract 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)

[1] Single 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.

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)

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Hofman, R.J. (ed). 1979. A workshop to identify new research that might contribute to the solution of the tuna-porpoi se 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)

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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)

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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 T53699 19 6. 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.

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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 T5370029 2. 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)

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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, 1976-198 2. Final report for MMC contract MM2079357-5. NTIS PB86-200243. 41 pp. (A03)

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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)

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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)

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Lentfer, J.W. (ed). 1988. Selected marine mammals of A-laska: species accounts with research and management recommendations. Final report for MMC contract MM2910798-4. NTIS PB88-178462. 275 pp. (A013)

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APPENDIX C

SELECTED LITERATURE PUBLISHED ELSEWHERE RESULTING FROM COMMISSION-SPONSORED ACTIVITIES

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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
6 April 2000

Thank you, Mr. Chairman and Members of the Committee. The Marine Mammal Commission is grateful for the opportunity to provide information and share its views on the status of efforts to develop and implement take reduction plans to reduce the incidental mortality and serious injury of marine mammals in commercial fishing operations as prescribed by the 1994 Marine Mammal Protection Act amendments. The Commission has been represented on two of the five take reduction teams established to date and has closely followed the development of the other take reduction plans. My comments today will focus principally on the effectiveness of the Atlantic Large Whale Take Reduction Plan and the Gulf of Maine Harbor Porpoise Take Reduction Plan, the plans developed by the take reduction teams on which a member of the Commission staff participates.

Current Requirements

The requirements pertaining to take reduction plans are set forth in section 118(f) of the Marine Mammal Protection Act. That provision requires the Secretary of Commerce to develop and implement take reduction plans to reduce the incidental taking of marine mammals from "strategic" marine mammal stocks by commercial fisheries. Such plans are required for all fisheries classified as frequently (Category I) or occasionally (Category II) killing or seriously injuring marine mammals from strategic stocks. Strategic stocks are defined in the Act as those (1) for which the level of human-caused mortality from fisheries and/or other causes exceeds the stock's potential biological removal level, (2) that are designated as depleted under the Marine Mammal Protection Act, or (3) that are listed or likely to be listed as endangered or threatened under the Endangered Species Act. The National Marine Fisheries Service has classified 6 U.S. fisheries as Category I fisheries and 26 as Category II fisheries. The immediate goal of each take reduction plan, as specified in section 118(f)(2), is to reduce incidental fishing-related mortality and serious injury to levels below the potential biological removal levels of the affected stocks within six months of plan implementation. The long-term goal is to reduce incidental fishery-related mortality and serious injury to levels approaching zero within five years of the plan's implementation.

To assist in the preparation of a take reduction plan, section 118(f)(6) requires that the Secretary of Commerce establish a take reduction team to develop a draft plan. Take reduction teams are to be composed of members representing all fisheries groups and gear types that incidentally take marine mammals from the stocks of concern, relevant federal and state agencies, regional fishery management councils, environmental groups, academic and scientific organizations, and, when applicable, interstate fishery commissions and Alaska Native organizations. The time frame for developing a take reduction plan depends on the magnitude of fishery-related mortality and serious injury from the affected stocks.

For strategic stocks with fishery-related mortality and serious injury that exceed the stock's potential biological removal level, section 118(f)(7) requires that a take reduction team, once established, submit a draft take reduction plan to the Secretary within six months. The draft plan is to include recommended regulatory and voluntary measures for reducing fishery-related mortality and serious injury to less than the stock's potential biological removal level within six months of its implementation. Within 60 days of receiving a team's draft plan, the Secretary is required to publish it for public comment in the *Federal Register*, along with proposed implementing regulations and an explanation for any changes to the draft plan proposed by the Secretary. The comment period is not to exceed 90 days and, within 60 days of the close of the comment period, a final plan and accompanying regulations are to be adopted. After a plan is adopted, the take reduction team is to meet every six months, or at such other intervals as the Secretary deems necessary, to monitor plan implementation until its objectives have been met. For stocks with fishery-related mortality and serious injury that are less than the potential biological removal level, section 118(f)(8) allows a somewhat longer time frame for developing take reduction plans.

Section 118(f)(9) identifies the types of measures that

may be adopted to implement take reduction plans. It authorizes regulatory measures to (1) limit incidental taking of marine mammals in fisheries by time or area, (2) require the use or encourage the development of alternative fishing gear or techniques less likely to take marine mammals, (3) educate fishermen on the importance of reducing marine mammal bycatch, and (4) monitor the effectiveness of take reduction actions. Section 118(g) directs the Secretary of Commerce to issue emergency regulations when necessary to reduce mortality and serious injury of marine mammals incidental to commercial fisheries that are having immediate and significant adverse effects on a marine mammal stock.

Efforts to Develop and Implement Take Reduction Plans

In furtherance of these requirements, the National Marine Fisheries Service has, to date, established five take reduction teams. They are (1) the Atlantic Large Whale Take Reduction Team, (2) the Gulf of Maine Harbor Porpoise Take Reduction Team, (3) the Mid-Atlantic Coastal Gillnet Take Reduction Team, (4) the Pacific Offshore Cetacean Take Reduction Team, and (5) the Atlantic Offshore Cetacean Take Reduction Team. To organize and support team activities, the Service contracted with professional facilitators to lead meeting discussions and prepare team reports. A representative of the Marine Mammal Commission has participated as a member of the Atlantic Large Whale and Gulf of Maine Harbor Porpoise Take Reduction Teams.

The facilitators used by the Service to help structure and lead discussions of the take reduction teams have served the teams well and have been a great help in preparing reports that accurately reflect the members' discussions and views. While each of the teams has submitted a draft plan to the Service consistent with the requirements of Section 118, adoption and implementation of final plans have not always been accomplished within the mandated time frames and, in some cases, have not satisfied the objective of reducing mortality and serious injury to below a stock's potential biological removal level. The problems that have been encountered appear to be due to a combination of factors related to the complexity of the issues involved, concern about the economic impact of possible mitigation measures, and an inability to meet tightly drawn statutory deadlines.

Pacific Offshore Cetacean Take Reduction Plan: A team to develop a draft plan to reduce the incidental take of several whale species in the California/Oregon shark drift gillnet fishery was established in February 1996. The team submitted a draft plan to the Service in August 1996 at the end of the six-month development period. The Service responded promptly and, early in 1997, published implementing regulations requiring (1) the use of pingers on all nets, (2) the setting of nets at a minimum depth below the surface, (3) fishing boat operators to attend educational workshops, and (4) steps to limit entry into the fishery. As we understand it, the measures are working well and have significantly reduced marine mammal incidental take.

Atlantic Offshore Cetacean Take Reduction Plan: This plan addresses the incidental taking of northern right whales, humpback whales, and sperm whales, as well as the taking of several species of small cetaceans, in pair trawl, longline, and drift gillnet fisheries for swordfish, sharks, and tuna in U.S. waters off the Atlantic coast. A take reduction team was established on 23 May 1996 and submitted its draft plan on 22 November 1996, within the established six-month development period. However, before the plan was finalized, the Service initiated steps in 1997 to permanently close the swordfish gillnet fishery and, early in 1998, to close large segments of other drift gillnet fisheries. These closures were expected to substantially reduce the incidental take of marine mammals and, in light of the changed circumstances, the Service indicated its intention to reconstitute and reconvene the team to address remaining issues. To our knowledge, however, no such action has yet been taken.

Atlantic Large Whale Take Reduction Plan: This plan was developed to reduce the incidental take of several large whale species, including northern right whales, in gillnet and lobster trap fisheries along the East Coast. On 6 August 1996, the Service established a take reduction team to develop a draft plan. Because of the critically endangered status of northern right whales, almost all of the team's attention has been devoted to reducing incidental take of that species.

The potential biological removal level for the western North Atlantic right whale population, the stock affected by these fisheries, was calculated in the original stock assessment to be 0.4 whale per year. It is expected that the potential biological removal level for this stock will be reduced to zero in the next update of the stock assessment. Despite the urgent need to reduce right whale mortality and serious injury, efforts to identify and implement measures to reduce incidental take below the stock's potential biological removal level have been unsuccessful.

With a population of about 300 whales ranging seasonally from Florida to Maine, the team's challenge has been enormous – identifying measures that will prevent perhaps 5 to 10 serious or fatal right whale entanglements per year in more than three million lobster traps and tens of thousands of gillnet sets along the entire U.S. East Coast. Although the team was unable to reach consensus on all needed measures, it submitted its findings and recommendations to the Service on 3 February 1997, within the statutory time frame. The team recommended (1) requiring gear modifications that could possibly reduce entanglement risks, although their effectiveness was untested and unknown, (2) further gear modification research, (3) efforts to locate and free entangled whales, and (4) seasonal fishery closures in those parts of designated right whale critical habitat that would least affect commercial fishing.

Based on the team's recommendations, the Service published a proposed take reduction plan and implementing regulations on 7 April 1997, within the statutory time frame. The Service's proposal relied heavily on the effectiveness of untested gear modifications and elicited thousands of letters of opposition, primarily from participants in the Maine lobster fishery, who objected to the expense associated with proposed fishing gear modifications. The Marine Mammal Commission also believed that it was premature to propose extensive gear modifications without first determining their likely costs and effectiveness. In a 5 June 1997 letter commenting on the proposed plan, the Commission recommended that the Service (1) defer imposing most gear modification requirements until more is known about their likely effectiveness, (2) reduce entanglement risks by expanding fishery closures in right whale critical habitat to better cover those times and areas in which right whales are likely to occur, and (3) implement an aggressive gear research program.

The Service published an interim final rule on 22 July 1997, relaxing the proposed gear requirements to a point where few modifications would be required. However, the Service incorporated no offsetting changes to the proposed fishery closures in right whale critical habitats to reduce the potential for whale entanglements. Although the Service made commitments to support further gear research and to increase whale disentanglement efforts, implementation of the plan did little to reduce entanglement risks. Instead, the Service relied on efforts to disentangle whales and on further gear research that it hoped would identify a long-term solution.

To date , the Service has not been able to undertake all of the gear research recommended by the take reduction team and its subsidiary gear advisory group. In 1998 and 1999, agency resources were focused on addressing other pressing right whale recovery efforts and enlisting the assistance of fishermen in reporting and releasing whales entangled in fishing gear. Although some important gear research and testing has been done, much remains to be accomplished.

Despite implementation of the take reduction plan, whale entanglements continue to occur. In 1999 at least six right whales (as well as other whale species) were observed to have been entangled. Three of these whales were initially sighted last spring in the Great South Channel critical habitat area. However, they may have become entangled elsewhere. While funding for disentanglement operations has at times been uncertain, these operations appear to have been adequately funded during both 1998 and 1999. Despite full funding, whale disentanglement efforts have proven to be difficult. Although several right whales and other whales have been successfully disentangled, and some whales have been able to free themselves, others have been hard to relocate, compromising the Service's ability to monitor their status or undertake disentanglement efforts. Last October, after several unsuccessful attempts to remove entangling gear from one right whale, it was found dead.

Disentangling large whales is expensive, risky to the human rescuers, and not an entirely effective means for saving the whales. Thus, at present, the only proven way to reduce right whale entanglement risks is to reduce the presence of potentially hazardous fishing gear at times and in areas where the whales are most likely to occur. Because of the high number of entanglements that occurred in 1999, the Marine Mammal Commission recommended on 1 October, and again on 23 November 1999, that the Service use its emergency rulemaking authority to close the entire area in the Great South Channel designated as right whale critical habitat to gillnet fishing by the spring of 2000 when right whale concentrations in that area would next reach their peak. Although the Service reconvened the Atlantic Large Whale Take Reduction Team on 22-24 February 2000, it has taken no further steps to implement either the Commission's recommendations or other measures to reduce entanglement risks. Inasmuch as the Atlantic Large Whale Take Reduction Team was unable to address the issue of further closures at its February 2000 meeting, it remains uncertain whether and, if so, when the Service will act to strengthen its take reduction plan. In the interim, one right whale entangled in fishing gear died off Rhode Island in mid-January 2000, and another, badly entangled whale seen alive in February in Cape Cod Bay has not been relocated.

The Commission appreciates that reducing incidental taking of northern right whales in fishing gear presents an extraordinarily difficult challenge. Nevertheless, it seems that more must be done to meet the challenge presented by the 1994 Marine Mammal Protection Act amendments. In particular, we believe that the Service should use its emergency regulatory authority under section 118 to augment its implementation of the existing take reduction plan.

Gulf of Maine Harbor Porpoise Take Reduction Plan: This plan is designed to reduce the incidental take of harbor porpoises in the sink gillnet fisheries for groundfish and other species off New England. To help develop the plan, the Service established a take reduction team on 12 February 1996. At that time, an estimated 1,500 harbor porpoises were being killed annually in gillnet fisheries in New England, mid-Atlantic, and Canadian waters. This far exceeded the potential biological removal level for the affected stock, then calculated to be 403 porpoises per year. The vast majority of the porpoise mortality, estimated at 1,200 animals per year, was occurring off New England.

Because of the urgent need to reduce this take, the 1994 amendments to the Marine Mammal Protection Act authorized the Service to expedite the process for publishing a stock assessment and developing a take reduction plan for the Gulf of Maine harbor porpoise. The amendments also recognized that reducing the take of harbor porpoises in these fisheries could prove particularly difficult and gave the

Service flexibility to extend the time by which mortality and serious injury were to be reduced below the stock's potential biological removal level. Nevertheless, the amendments directed the Service to develop and implement a take reduction plan for harbor porpoises by 1 April 1997. While progress has been made in reducing harbor porpoise bycatch, it remains unclear whether efforts to date will prove successful in bringing the number of mortalities and serious injuries to less than the potential biological removal level of the stock.

The take reduction team submitted a consensus draft plan to the Service on 7 August 1996, within the statutory six-month time frame. As core measures, the draft plan recommended regulations to establish two types of management zones. For some zones, all fishing was to be prohibited on a seasonal basis. For others, fishing was to be allowed, but only if fishermen used nets fitted with newly developed acoustic deterrent devices (*i.e.*, pingers) intended to keep harbor porpoises away from nets. The management zones recommended by the take reduction team expanded on fishery closures previously established by the Service under the Magnuson-Stevens Fishery Conservation and Management Act to protect groundfish stocks and other closures established specifically to reduce harbor porpoise bycatch. The draft plan also recommended (1) studies to further test the effectiveness of pingers, (2) a census of the gillnet fleet, (3) a mandatory training and certification program for fishermen on the use of pingers, (4) actions to ensure enforcement of management measures, (5) more timely analysis of data on harbor porpoise bycatch levels, and (6) studies to determine the effects of pingers on harbor porpoises and other organisms in the marine environment.

The team's work was complicated by uncertainty concerning the New England Fishery Management Council's plans for recommending new closures to protect depleted groundfish stocks. The team recognized that the closures recommended by the Council to conserve groundfish would correspondingly reduce harbor porpoise bycatch, but, absent information as to where and when they were likely to occur, the team was unable to predict the extent to which they would do so. Further complicating the matter, the Council was unwilling to consider harbor porpoise take reduction needs specifically as it designed its system of closures.

Shortly after the team submitted its draft plan, the Council recommended, and the Service adopted, a system of gillnet fishery closures that included most, but not all, of the management zone measures recommended in the team's draft plan. Apparently in light of this action, the Service deferred action on the team's recommended plan for one year, thereby missing the statutorily mandated deadline for developing the take reduction plan. During this period, the Service did take action to implement some of the team's other recommendations, such as conducting research on habituation of harbor porpoises to pinger sounds, but did not address other recommendations, such as establishing a mandatory pinger certification program, developing mechanisms for enforcing take reduction measures, and assessing the effect of pingers on the distribution of harbor porpoises.

By the spring of 1998 it was clear that the measures that had been initiated were insufficient, as harbor porpoise bycatch continued to exceed the stock's potential biological removal level by more than a factor of two. The Service therefore published a proposed take reduction plan that adopted most, but not all, of the measures included in the draft plan submitted by the team a year earlier. By then, however, it was apparent that even if all of the team's recommendations were implemented, they would be insufficient to reduce harbor porpoise mortality and serious injury to the required level. The Service therefore decided to defer action again, opting to reconvene the team in December 1997. Frustrated by the closures implemented in response to the Fishery Management Council's recommendations and the likely adoption of further restrictions to protect harbor porpoises, several fishing industry representatives chose not to attend the meeting. While participating members considered alternative time/area closures at that meeting, no recommendations were put forward. The Service therefore continued to defer action on the proposed plan throughout the first half of 1998 while it considered alternative measures. In the interim, the New England Fishery Management Council recommended a new system of fishery closures to protect groundfish stocks that further reduced fishing effort in areas of high harbor porpoise bycatch.

Dissatisfied with the Service's progress in adopting a take reduction plan that fully met the Act's take reduction goals within the statutorily mandated time frame, environmental groups filed a lawsuit on 21 August 1998. As part of a settlement agreement reached in the case, the Service agreed to publish a new plan promptly and to develop harbor porpoise bycatch estimates on a more timely basis to help assess progress towards reducing incidental mortality and serious injury. On 13 September 1998 the Service published a new proposed harbor porpoise take reduction plan that included measures applicable to waters off both New England and the U.S. mid-Atlantic states (see Mid-Atlantic Coastal Gillnet Take Reduction Plan below).

The plan, adopted on 2 December 1998, significantly expanded the fishing areas subject to pinger requirements. These requirements were established under the authority of the Marine Mammal Protection Act. However, to reach the initial goal of reducing harbor porpoise bycatch to less than the stock's potential biological removal level, the plan also relied on fishery closures recommended by the New England Fishery Management Council to protect depleted groundfish stocks and adopted by the Service under the Magnuson-Stevens Fishery Conservation and Management Act. The adopted take reduction plan also included a

mandatory training program for fishermen on the use and maintenance of pingers, a program to randomly test the functioning of deployed pingers, efforts to develop hydrophones that could be used to enforce the pinger requirements, a commitment to provide bycatch estimates in a more timely manner, and further research on the habituation of harbor porpoises to pinger sounds and the effects of those sounds on other components of the ecosystem.

To review progress in implementing the plan, the Service sought to reconvene the team in the summer and fall of 1999. However, several fishery representatives, dissatisfied with the adopted plan, resigned from the team. To enable the Service to identify and appoint new representatives and resolve scheduling conflicts, the team did not meet until 14-15 December 1999. By that time, recently collected data suggested that bycatch had been substantially reduced during the first three-quarters of 1999 and was approaching the harbor porpoises' potential biological removal level. At about the same time, however, the New England Fishery Management Council was again considering changes to the fishery closures instituted to protect groundfish, and the Service did not yet have data to evaluate how much of the estimated bycatch reduction was attributable to fishery closures and how much was attributable to mandatory pinger use under the harbor porpoise take reduction plan. As a result, the team was unable to provide advice on whether or how to alter the management zones established by the regulations implementing the take reduction plan. It remains uncertain whether or when the Service plans to make any adjustments to the plan.

During the December meeting, the Service advised the team that, although it had purchased hydrophones to help enforce pinger requirements at certain times and in certain areas, the Coast Guard was reluctant to use them based on its concerns regarding the enforceability of the applicable regulations, questions concerning the reliability of the hydrophones, lack of training in hydrophone use, and the value of hydrophone recordings as evidence in enforcement proceedings. Because of these concerns, the Coast Guard requested that a Service enforcement agent or the affected fishermen be present at the time the hydrophones were used to ensure that they were deployed properly. Because the Service does not have enforcement agents available to assign to the task, apparently no efforts have been made to conduct checks to ensure that pingers are in fact being used on deployed nets. The Service also advised the team that it had been unable to randomly collect deployed pingers and replace those determined to be faulty because fishermen believed the replacement pingers to be inferior models and were unwilling to accept them in exchange. As a result, little was done in 1999 to check the durability of pingers under routine industry use.

While significant steps had been taken to reduce harbor porpoise mortality and serious injury, it is unclear whether actions taken to date have successfully achieved the Act's initial objective of reducing these types of takings to below the stock's potential biological removal level. In part, the delay in meeting the statutory goal is attributable to a delay in publishing a take reduction plan. Despite a specific statutory deadline, a plan was not adopted until December 1998, approximately 16 months late.

Much remains to be accomplished to implement the harbor porpoise take reduction plan fully and greater efforts need to be directed at developing bycatch estimates on a timely basis, monitoring and enforcing applicable pinger requirements, testing pinger reliability under operational conditions, and conducting research to assess the effects of pinger sounds on the distribution of harbor porpoises and other species. The slow pace of implementation has frustrated team members, apparently contributing to some resignations from the team, and has resulted in a lawsuit being filed. In addition, data have yet to be developed that would enable the Service to differentiate the extent to which bycatch levels have been reduced as a result of measures in the harbor porpoise take reduction plan as compared to those measures implemented for fishery management purposes, which are subject to change.

Mid-Atlantic Coastal Gillnet Take Reduction Plan: The Service originally planned to convene a take reduction team to address the incidental take of harbor porpoises from the Gulf of Maine stock and bottlenose dolphins in coastal gillnet fisheries for dogfish, monkfish, shad, and other species off the U.S. mid-Atlantic coastal states. Because information on bycatch rates in these fisheries was limited, however, the Service delayed establishment of a take reduction team until 25 February 1997 to enable it to collect and analyze additional observer data. Those data provided a sufficient basis to begin addressing the regional bycatch of harbor porpoises, but not bottlenose dolphins. The Service therefore decided to defer development of a take reduction plan for bottlenose dolphins pending collection of additional data on bycatch rates and better delineation of bottlenose dolphin stock structure along the mid-Atlantic coast.

The take reduction team submitted its draft plan for harbor porpoises to the Service on 25 August 1997, within the statutorily mandated time frame. The plan, reflecting a consensus of team members on most measures, did not recommend mandatory pinger use. Rather, it relied on seasonal gear requirements (*e.g.*, net twine diameters, net numbers and length, and mesh size) that observer data suggested were less likely to catch harbor porpoises. Apparently in the interest of combining harbor porpoise take reduction measures for the New England and the mid-Atlantic regions into a single plan, the Service deferred action to adopt the recommended measures until 25 September 1998, when it published a proposed plan covering

both areas. That plan was adopted on 2 December 1998, as noted above.

Although required by the Marine Mammal Protection Act to carry observers to monitor marine mammal bycatch when requested by the Service, some fishermen have refused to do so. Nevertheless, the observer data that have been collected are believed to reflect bycatch rates for most regional gillnet fishing operations. Based on those data, the Service has estimated harbor porpoise bycatch levels in the mid-Atlantic region at 572 and 446 porpoises for 1997 and 1998, respectively. Bycatch for 1999 appears to have declined to well below 100 animals although a final estimate is not yet available.

Although take reduction measures for harbor porpoises off the mid-Atlantic states, deferred for a year after submission of the take reduction team's draft plan, are now in place and appear to have significantly reduced regional bycatch levels, the Commission is concerned that the refusal of some fishermen to carry observers might be skewing bycatch estimates. Despite the apparent success in reducing harbor porpoise bycatch in the mid-Atlantic region, we are concerned that steps to address the bycatch of bottlenose dolphins have not yet been taken and that it remains unclear when a take reduction team for this species will be established. In this regard, the Commission believes that current incidental take levels may be high enough to be causing population declines and that development of a take reduction plan cannot wait until the uncertainties concerning stock structure are resolved.

Conclusions

The requirements for developing and implementing take reduction plans and convening take reduction teams set forth in section 118 of the Marine Mammal Protection Act appear to be appropriate and fundamentally sound. Among other things, the Commission believes that involving all stakeholders in the development of plans ensures that all views are identified and considered in the process of plan development and that plans consequently are more likely to be successfully implemented.

As noted in the Commission's 29 June 1999 testimony before this Committee on implementation of the 1994 amendments, one change that may be warranted concerns the requirement to prepare plans for all strategic stocks taken in Category I or Category II fisheries. Some stocks are considered strategic solely by virtue of being listed as endangered or threatened under the Endangered Species Act or designated as depleted under the Marine Mammal Protection Act, not because of a significant level of fishery-related mortality or serious injury. In cases where there is a very low level of taking incidental to commercial fisheries, the stocks would benefit little from the preparation of take reduction plans. To ensure the best use of limited agency resources, the Commission recommends that the Act be amended to specify that plans need not be prepared for those strategic stocks for which mortality and serious injury resulting from commercial fishing are inconsequential.

Although the requirements for preparing take reduction plans seem conceptually sound, implementation has been inconsistent and there has been difficulty in meeting the requirements of section 118 in a timely manner. These difficulties seem to be undermining the confidence of some team members in the process and, in certain cases, their willingness to participate. Unless these deficiencies are corrected, progress in adopting and implementing plans is likely to continue at a slower-than-expected pace and may expose the Service to litigation risks. In the case of the northern right whale, delay in initiating an effective take reduction plan may be significantly affecting the species' prospects for recovery.

With regard to regulatory measures needed to implement the Atlantic Large Whale Take Reduction Plan, Congress should call on the Service to take all necessary steps to implement fishery closures designed to eliminate hazardous fishing gear from designated right whale critical habitat during those times when right whales are most likely to be present. The Service also should be encouraged to develop adaptive regulatory procedures that enable it to institute temporary restrictions in other areas during periods when concentrations of right whales are detected. Preventing hazardous fishing gear from being deployed in areas where right whales are most likely to occur currently is the only way to ensure that entanglement risks for this species are reduced. Based on the fact that right whales continue to get entangled in fishing gear and that some of these entangled whales do not survive, the Commission believes that further remedial actions are essential.

With regard to the Gulf of Maine Harbor Porpoise Take Reduction Plan, the Service needs to ensure that all measures necessary to achieve take reduction goals are reflected in the plan and are addressed in its implementing regulations. Due to constantly changing fishery closures recommended by the New England Fishery Management Council to conserve fish stocks, which affect harbor porpoise bycatch levels, the ability of take reduction teams to provide timely advice on regulatory measures needed to achieve take reduction goals has been impaired.

As we begin to get a handle on reducing fisheries-related mortality and serious injury to biologically insignificant levels, we should not lose sight of other, sometimes more significant, threats to marine mammals. For example, an average of one manatee is hit and killed by a boat in Florida every four or five days. Further, the size of the human population in Florida is increasing and, as this occurs, both the number of boats and the level of risks to manatees continue to increase. Also, as the human population grows, human-related destruction and degradation

of essential manatee habitats are likely to increase. Thus, the survival of the species will depend on effective use of the Endangered Species Act and the Marine Mammal Protection Act to reduce human-caused mortalities and to prevent destruction and degradation of critical habitats and habitat components.

Another problem that is becoming increasingly apparent is point and non-point source pollution, which may be having significant adverse effects on marine mammals and other components of marine ecosystems. Both the consequences and uncertainties concerning the sources and effects of ocean contaminants on marine mammals were pointed out by participants in the October 1998 *Workshop on Marine Mammals and Persistent Ocean Contaminants*, sponsored jointly by the Commission, the Biological Resources Division of the U.S. Geological Survey, the National Marine Fisheries Service, the Environmental Protection Agency, and the National Fish and Wildlife Foundation. More recently, I learned that due to the presence of chemical contaminants, people have been warned to limit their consumption of fish caught in Galveston Bay, Texas, to two per month to avoid possible health consequences. In Sarasota Bay, Florida, a presumably much less polluted area, older bottlenose dolphin males – the individuals that in normal populations appear to sire the most calves – are showing signs of immune system dysfunction, possibly as a consequence of local pollution. How pollution may be affecting bottlenose dolphins in the Galveston area and other parts of their range in coastal U.S. waters can only be guessed at present.

Apparent contaminant-related problems also are surfacing elsewhere. In California, for example, it has been suggested that the ongoing decline of the southern sea otter, designated as threatened under the Endangered Species Act, may be a direct consequence of environmental contaminants or due to increased susceptibility to disease because of contaminant-related suppression of their immune systems. It also is possible that the apparent decline in reproductive success among right whales in the western North Atlantic is due, at least in part, to direct contaminant effects or to the effects of contaminants on key prey species.

In this regard, the Commission notes that most research and conservation actions are undertaken in response to acute, often controversial conservation issues. Agency mandates, budgets, and programs largely reflect this reactive approach. The Commission recommends that Congress consider the need to provide direction for development and implementation of more effective recovery and conservation plans for endangered, threatened and depleted marine mammals, as well as take reduction plans for stocks being significantly affected by commercial fisheries. The Commission further believes that there is a need for broad-based, interdisciplinary, anticipatory research that will allow the government to take action to address potential conservation problems before they become serious and controversial. If you would like, we would be happy to discuss the possibilities with committee members and staff at your convenience.