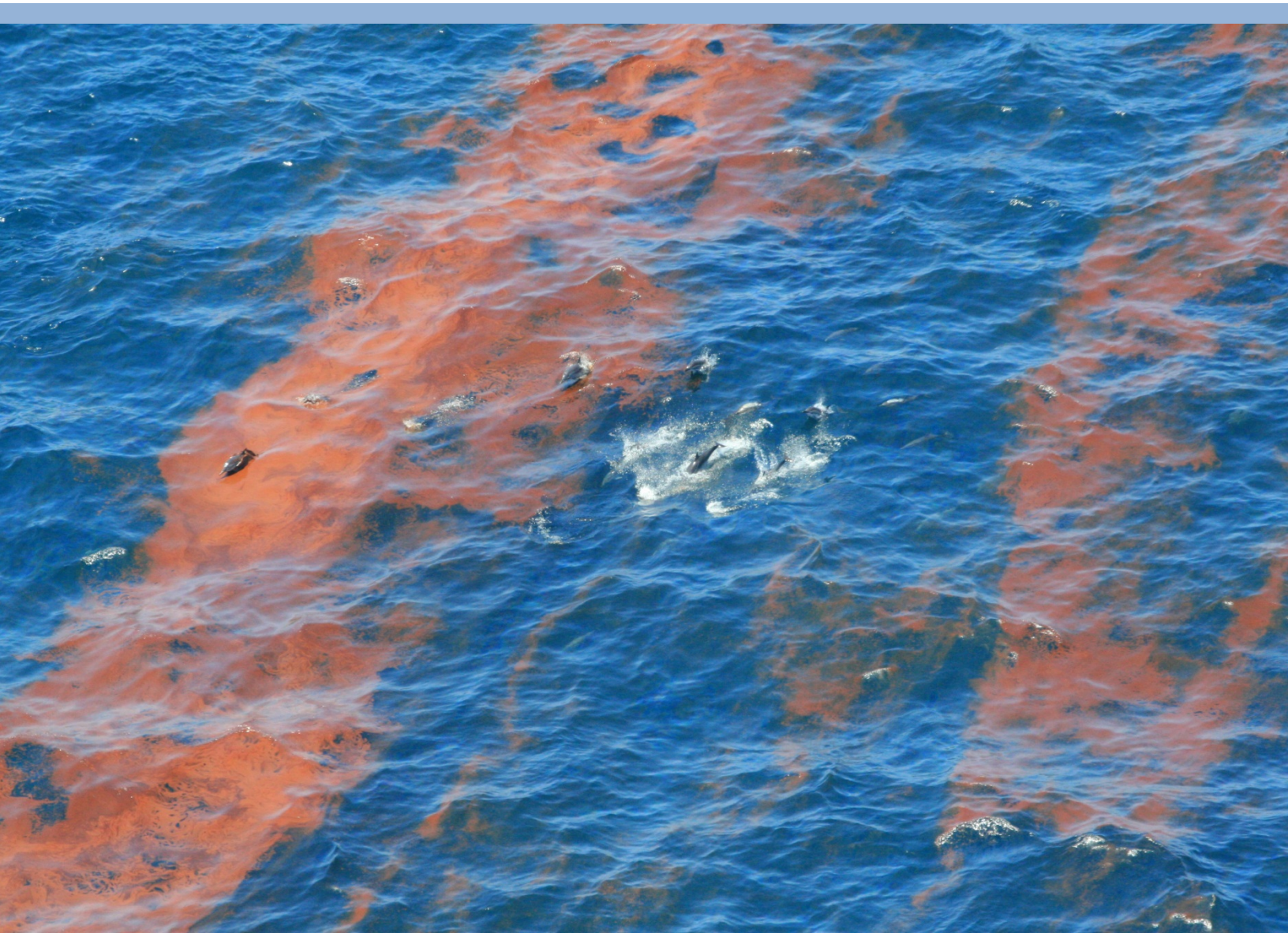
ANNUAL REPORT TO CONGRESS
2010 – 2011

THE MARINE MAMMAL COMMISSION



MARINE MAMMAL COMMISSION

Annual Report to Congress

2010–2011

Marine Mammal Commission
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May 2013

Marine Mammal Commission

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Cover photograph: Striped dolphins (*Stenella coeruleoalba*)
swimming through oiled water following the 20 April 2010 Deepwater Horizon blowout in the Gulf of Mexico.
Photo credit: Ron Wooten, National Marine Fisheries Service, Galveston Laboratory

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Chapter I

INTRODUCTION

The Marine Mammal Protection Act provides a cornerstone for U.S. policy protecting marine ecosystems. The Act reflects the value that the U.S. public places in the conservation of marine mammals specifically and our natural world generally. Title II of the Act created the Marine Mammal Commission as an independent federal agency to oversee federal activities and advise the federal government regarding the Act's provisions and primary objective—to maintain the health and stability of the marine ecosystem.

The Marine Mammal Commission consists of three members who are appointed by the President with the consent of the U.S. Senate. One of the Commissioners serves as Chairman and all three must be knowledgeable in marine ecology and resource management. They are supported by a nine-member Committee of Scientific Advisors on Marine Mammals. The Chairman appoints Committee members with the concurrence of the other Commissioners and after consultation with the Chairman of the Council on Environmental Quality, the Secretary of the Smithsonian Institution, the Director of the National Science Foundation, and the Chairman of the National Academy of Sciences. Committee members must be knowledgeable in marine ecology and marine mammal affairs. The Commissioners also are supported by a staff, which is located in Bethesda, Maryland.

The Marine Mammal Protection Act sets forth the Commission's duties as follows. The Commission shall—

(1) undertake a review and study of the activities of the United States pursuant to existing laws and international conventions relating to marine mammals, including, but not limited to, the International Convention for the Regulation of Whaling, the Whaling Convention Act of 1949, the Interim Convention on the Conservation of North Pacific Fur Seals, and the 1966 Fur Seal Act;
(2) conduct a continuing review of the condition of the stocks of marine mammals, of methods for their protection and conservation, of humane means of taking marine mammals, of research programs conducted or proposed to be conducted under the authority of this Act, and of all applications for permits for scientific research, public display, or enhancing the survival or recovery of a species or stock;
(3) undertake or cause to be undertaken such other studies as it deems necessary or desirable in connection with its assigned duties as to the protection and conservation of marine mammals;
(4) recommend to the Secretary [of Commerce or the Interior] and to other federal officials such steps as it deems necessary or desirable for the protection and conservation of marine mammals;
(5) recommend to the Secretary of State appropriate policies regarding existing international arrangements for the protection and conservation of marine mammals and suggest appropriate international arrangements for the protection and conservation of marine mammals;
(6) recommend to the Secretary such revisions of the endangered species list and threatened species list published pursuant to section 4(c)(1) of the Endangered Species Act of 1973 as may be appropriate with regard to marine mammals; and
(7) recommend to the Secretary, other appropriate federal officials, and Congress such additional measures as it deems necessary or desirable to further the policies of this Act, including provisions for the protection of the Indians, Eskimos, and Aleuts whose livelihood may be adversely affected by actions taken pursuant to this Act.

Those duties are aimed at maintaining marine mammal populations as functioning elements of healthy marine ecosystems. In demographic terms, the status of a marine mammal population is determined by its survival and reproductive rates. These rates, in turn, reflect such things as individual health and condition; direct and indirect interactions with fisheries; the quality and quantity of habitat (or changes therein) for foraging, reproduction, and rest; exposure and resilience to disease, contaminants, noise, and harmful algal blooms; natural ecological processes, including predation; and the manner in which human-related threats are managed.

The Commission prepares annual reports to summarize key issues and events that determine or influence the status of marine mammal populations. First and foremost, the Commission uses these reports to inform Congress and the Administration. The reports also serve as an educational tool and an historical record dating back to 1973.[1] To ensure accuracy, federal and state agencies and knowledgeable individuals review report drafts, and the Commission gratefully acknowledges their efforts. The Commission disseminates its reports widely, both within the United States and abroad, with the aim of ensuring that all parties interested in marine mammals and marine ecosystems are well informed about such matters.

The Commission combined its 2010 and 2011 reports into one document to allow Commission staff to devote more time to monitoring developments related to the Deepwater Horizon oil spill and response efforts. In 2010 oil spilled into the Gulf of Mexico from 20 April to 15 July but, in one form or another, response efforts continued throughout the remainder of 2010 and all of 2011. In May 2011 the Commission held its annual meeting in New Orleans, Louisiana, to focus on the spill, response efforts to that time, and lessons learned. Chapter III of this report highlights the spill and response effort.

Chapters in the report

Chapter II describes progress made by the Administration to complete and implement a new national ocean policy. The new policy emphasizes ecosystem-based management, obtaining and using the best available science, being efficient and collaborating, and strengthening regional management efforts. It also attempts to promote ocean research and management that will improve ecosystem resiliency and adaptation, enhance protective and restorative measures, link ocean management with water quality and sustainable practices on land, address changing conditions in the Arctic, and improve ocean observations, mapping, and infrastructure. In 2011, the Administration began to focus its efforts on development of nine strategic action plans intended to guide implementation of the new national ocean policy.

Chapter III describes the Deepwater Horizon oil spill, response efforts,[2] and lessons learned from the spill and response. The event dominated marine/environment-related concerns in 2010. It illustrated the considerable difficulty of responding to spills in deepwater environments and the complex nature of interactions between spilled oil, dispersants, and the physical properties of surrounding waters. As with past spills, this event demonstrated the difficulty of assessing spill effects in the absence of adequate baseline information, particularly for marine mammals. It also illustrated the potential for conflict between legal and scientific endeavors, both of which may be aimed at characterizing spill effects, but for somewhat different purposes. And the event highlighted the challenges that may be involved in responding to a spill under more difficult environmental conditions, such as in the Arctic.

Chapter IV highlights species that the Commission considers to be of special concern, which are generally those species listed as endangered or threatened under the Endangered Species Act or depleted under the Marine Mammal Protection Act. Such species include those of particularly low abundance (e.g., North Pacific right whale, southern resident killer whale, Hawaii insular false killer whale, Cook Inlet

[1] Available at http://www.mmc.gov/reports/annual

[2] The views contained in this statement are those of the Marine Mammal Commission and do not necessarily reflect the views of the natural resource trustees designated under the Oil Pollution Act to assess natural resource injuries associated with the Deepwater Horizon spill and to develop and implement a plan to restore injured resources under their trusteeship.

beluga whale, North Atlantic right whale, Hawaiian monk seal, southern sea otter, and Florida manatee), those that have exhibited especially rapid declines (e.g., Steller sea lion), and those that are being subjected to rapidly changing conditions from climate disruption (e.g., polar bear, walrus, ringed and bearded seals). The status of each of these species may be affected by a variety of human activities (e.g., fishing, shipping, energy production, coastal development, military exercises) or the consequences thereof (e.g., climate disruption, ocean acidification, hypoxia, and harmful algal blooms).

Chapter V highlights species of special concern in foreign or international waters. It begins by describing the Commission's efforts to develop a global assessment of marine mammals; the assessment will be based largely on various reviews conducted by species survival groups convened by the International Union for Conservation of Nature. This chapter then highlights some of the species in need of special protection. As a group, freshwater dolphins are perhaps in greatest need of attention, particularly in Southeast Asia. On a single species basis, the vaquita is considered by many authorities to be at the greatest risk of extinction. It occurs only in the northern Gulf of California and has been decimated by gillnets set primarily to catch shrimp. The Mexican government has taken a number of steps to conserve the species, but the most important step—not yet taken—is to replace the gillnets with other gear that will not entangle and drown vaquita. Several trawl nets have been developed for that purpose and conservation of this species appears to depend heavily, if not entirely, on efforts to make the transition from gillnets to trawl nets. The transition is urgent because surveys of the species' abundance indicate about 200 individuals remain. The United States has an important role to play in the recovery of this species because it is the primary market for the shrimp fishery. A number of other species are included in this chapter because they face serious threats to their survival and will require strong international attention to prevent further decline and promote recovery.

Chapter VI focuses on the Arctic, which warrants special attention because it is changing rapidly both from climate disruption and a secondary increase in human activities as the Arctic warms and Arctic sea ice area decreases. The Arctic is changing more rapidly than many other places on earth because of "polar amplification." This phenomenon results from the atmospheric transfer of heat from low to high latitudes and a reduction in the amount of solar radiation reflected by sea ice back to the atmosphere or space as sea ice melts. The results are degrading the habitat of a number of marine mammals (e.g., polar bear, walrus, ringed seal, and bearded seal) that depend on sea ice and snow for resting, foraging, reproduction, and refuge from predators. Climate disruption also will have potentially severe effects on Alaska Natives who depend on marine mammals for subsistence and whose cultures likely will be altered substantially by increasing human activities in the Arctic.

Chapter VII describes interactions between fisheries and marine mammals.[3] Fishery interactions are considered by many to be the most serious threat to marine mammals. Interactions may be direct or operational (e.g., bycatch of marine mammals), or indirect or ecological (e.g., competition for prey). The Marine Mammal Protection Act imposes an extensive research and management framework on the National Marine Fisheries Service and considerable progress has been made for most species that have been taken directly by fisheries. That framework is based on methods to estimate the tolerance of marine mammal populations to withstand human-related deaths (i.e., the potential biological removal of each marine mammal population); assessment of actual take levels; and take reduction efforts based on structured interactions between fishery managers, scientists, conservationists, and fishery participants. In contrast, the National Marine Fisheries Service has made limited progress in assessing the ecological effects of fishing on marine ecosystems.

Chapter VIII focuses on the interaction between marine mammals and human-generated noise in the marine environment. Although humans depend primarily on vision, marine mammals depend primarily on hearing. Light transmission in the oceans is limited to hundreds of meters under the best of conditions,

[3] The Commission generally includes in its annual reports an update on the interaction between dolphin populations and tuna fisheries in the eastern tropical Pacific. It did not do so in this report because it is already quite lengthy and because the U.S. has directed less attention to this fishery in recent years. The Commission plans to provide a full update on this topic in the 2012 annual report.

whereas low-frequency sound can travel and be detected thousands of kilometers from the source. Major sources of human-generated sound include commercial shipping, seismic studies (primarily in support of oil and gas operations), military sonar, and coastal development (e.g. pile driving). In the past decade, concerns about the introduction of sound into the marine environment have led to a marked increase in studies related to potential sound effects and the use of sounds, including marine mammal vocalizations, as an assessment tool (e.g., passive acoustic monitoring). The main concerns with regard to human-generated sound are that it may injure marine mammals (including injuries that, in extreme cases, may lead to marine mammal deaths), alter their behavior in ways that may affect their ability to survive and reproduce (e.g., decreased foraging efficiency, change in habitat use patterns, disruption of mother-offspring bonds), or mask important sounds that marine mammals use or depend on (e.g., to detect predators or potential mates). Sound also may affect the ecosystems upon which marine mammals depend. This chapter reviews the efforts of federal agencies to assess and mitigate the effects of human-generated sound in the marine environment.

Chapter IX discusses matters related to the health of marine mammal populations as revealed by stranded animals. Before the passage of the Marine Mammal Protection Act, large numbers of marine mammals were killed to learn about their biology or to manage their populations. The Act stopped such practices, allowing many populations to recover from depleted states. As a result of that change, biologists have become more dependent on stranded marine mammals for studies of species' ranges and movement patterns, health and condition, demographic patterns (e.g., age structure), natural history (e.g., foraging patterns or diet), and—perhaps most importantly—threats (e.g., fishery interactions, ship strikes, disease, harmful algal blooms, human-generated noise). Such information provides valuable insights into the health of the marine environment, as is evident in the now common "unusual mortality events" occurring in all U.S. coastal regions, including Alaska and Hawaii. This chapter describes recent marine mammal mortality events and the need for further research and restoration activities in our nearshore marine environments.

Chapter X describes the Commission's research program and the research activities it supported in 2010 and 2011. Appendix B of this report lists 2010–2011 publications resulting from studies conducted with Commission support. The reader can find a list of all publications resulting from Commission support on the Commission's website.[4]

Chapter XI describes scientific permit applications and applications for incidental take authorizations reviewed by the Commission in 2010–2011. The Commission reviews those applications and provides its recommendations and rationale to the appropriate regulatory authority (i.e., either the National Marine Fisheries Service or the Fish and Wildlife Service).

Finally, Appendix A to this report includes a complete listing of 2010–2011 recommendations made by the Commission to other federal agencies and their responses.

[4] Available at http://www.mmc.gov/reports/comm_pub/welcome.shtml

Chapter II

OCEAN POLICY AND MARINE SPATIAL PLANNING

In 2003 the Pew Oceans Commission published its report entitled "America's Living Oceans: Charting a Course for Sea Change" (Pew Oceans Commission 2003). In 2004 the U.S. Commission on Ocean Policy published its report entitled "An Ocean Blueprint for the 21st Century" (U.S. Commission on Ocean Policy 2004). Both reports called for profound changes in the way the United States views the oceans and manages its relationship with them. President Bush's Administration responded by issuing its Ocean Action Plan, which laid out a strategy for beginning that transition. In 2009 President Obama followed suit by issuing a memorandum to create a new ocean policy.

Creating a national ocean policy

On 12 June 2009 President Obama issued a Memorandum for the Heads of Executive Departments and Agencies establishing an Interagency Ocean Policy Task Force. He designated the Chair of the Council on Environmental Quality to lead the task force, which was to consist of senior officials from 24 federal agencies. The President directed the task force to develop recommendations for a national policy on ocean, coastal, and Great Lakes ecosystems and resources. The recommendations were to be developed within 90 days and were to include—

- an ocean policy based on promoting the health of marine and Great Lakes ecosystems and resources, sustainability of coastal economies, preserving maritime heritage, facilitating adaptive management, and coordination with U.S. security and foreign interests;
- a policy coordination framework to facilitate integration and collaboration across jurisdictional (e.g., federal, state, tribal, local) boundaries; and
- an implementation strategy that identifies and prioritizes a set of objectives for the United States to pursue.

The President also directed the task force to develop, within 180 days from the date of the memorandum and with appropriate public input, a recommended framework for effective coastal and marine spatial planning. Through this framework, the task force was to craft an integrated and ecosystem-based approach for guiding sustainable use of marine and Great Lakes resources. The task force would then disband upon completion of its duties.

Interim framework for marine spatial planning

On 9 December 2009 the task force submitted an "Interim Framework for Effective Coastal and Marine Spatial Planning" (Interim Framework) to the President. The task force announced this report in the *Federal Register* (74 Fed. Reg. 67178) and requested public review and comment by 12 February 2010. In this document, the task force defined coastal and marine spatial planning as "a comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal, and Great Lakes areas." The framework identified areas most suitable for various types or classes of activities to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security, and social objectives. The task force emphasized the need for

integration, cooperation, and coordination within and among governments, and it set forth a series of goals, guiding principles, and a proposed timeline to facilitate progress toward achieving its vision.

The task force then described regional ocean planning zones within which regional planning bodies would implement the marine spatial planning framework through development of agreements and work plans. Each region would have flexibility to adapt to its unique resources, economies, and planning needs and would (1) establish its own objectives, (2) identify existing efforts for managing marine resources, (3) engage stakeholders, (4) consult with scientific experts, (5) analyze appropriate data, (6) evaluate alternative-use scenarios and trade-offs, (7) issue a draft plan with environmental impact analyses for public comment, (8) release a final plan for review by the National Ocean Council, and (9) implement, monitor, and evaluate the plan. Each regional plan would describe its area and regulatory context; assess regional environmental and socioeconomic conditions; describe its objectives, strategies, and mechanisms; identify plans for ensuring compliance, monitoring, and enforcement; and establish a process for resolving disputes. The National Ocean Council, to be established based on the task force's ocean policy recommendations, would first establish national objectives and national outcome-based performance measures and then review each plan to ensure consistency with the national ocean policy.

On 12 February 2010 the Commission wrote to the President's Council on Environmental Quality to comment on the interim framework for marine spatial planning. In its letter, the Commission expressed overall support for the framework, noting that although the plan contains certain ambiguities that will eventually need to be resolved, the framework developed by the task force represents a visionary step forward for better management and conservation of healthy marine ecosystems. The Commission concurred with the framework's emphasis on the value of scientific information to guide its implementation, and use of the precautionary approach to guide management decisions, noting that to fully understand how human activities are affecting marine ecosystems, it is necessary to first understand the baseline conditions in marine ecosystems (i.e., physical, biological, ecological characteristics), their natural sources of variation, and the human activities that pose risks to them (including the social context). Although the interim framework delineated the geographic scope of marine spatial planning to begin at the mean high tide line and include inland bays and estuaries, the Commission noted that activities on land also pose threats to the marine environment as various materials enter watersheds and, eventually, the oceans via runoff and wind drift, effluent discharge, and dumping. Chemical pollutants, debris, and even disease find their way from the land to the water, resulting in harmful algal blooms, contaminated marine life, and declines in the health of species and ecosystems. The interim framework recognized that ocean management and land management must be reconciled if we are to maintain healthy marine ecosystems or restore degraded ecosystems to a healthy state. The Commission strongly supported that view, and expects that, as the national framework is implemented, the immediate need to integrate ocean and land management will become obvious and provide impetus for expanding the framework accordingly. Finally, the Commission noted that in the current strained economic and fiscal climate, the nation will continue to face difficult choices regarding funding for various social and environmental challenges. The Commission therefore encouraged the task force and participating federal agencies to begin to develop cost estimates and budget requests as they move forward in the planning phases, and to work closely with the Administration to obtain the high level support necessary to effectively implement the framework for marine spatial planning.

Creation of the National Ocean Policy and National Ocean Council

On 19 July 2010, the Interagency Ocean Policy Task Force released its final recommendations in response to the President's directive. The task force recommended (1) a first-ever "National Policy for the Stewardship of the Ocean, Our Coasts, and Great Lakes," (2) a new governance structure that establishes a National Ocean Council to consolidate and strengthen the principal- and deputy-level components of the existing Committee on Ocean Policy within a single structure; (3) an implementation strategy based on nine strategic objectives; and (4) a framework for coastal and marine spatial planning to address conservation and management of our oceans, coasts, and Great Lakes. Following the plans set forth in the

interim framework, the final framework for coastal and marine spatial planning called for the National Ocean Council to work with the states and federally-recognized tribes to create regional planning bodies, which would then develop coastal and marine spatial plans for each of nine regional planning areas designated across the nation (Council on Environmental Quality 2010).

As part of the National Policy for the Stewardship of the Ocean, Our Coasts, and the Great Lakes, the task force recommended an implementation strategy centered around nine priority objectives. The first four objectives, framed around the theme "how we do business," represent overarching ways in which the federal government must operate differently or better to improve stewardship of the ocean, our coasts, and the Great Lakes. The four objectives are—

(1) adopt ecosystem-based management;
(2) obtain, advance, use, and share the best science and data;
(3) promote efficiency and collaboration; and
(4) strengthen regional efforts.

The implementation strategy also identifies five "Areas of Special Emphasis" that involve risks to the ocean, our coasts, and the Great Lakes, and pose significant challenges for agency managers, scientists, and the private sector (Council on Environmental Quality 2010). They are—

(1) resiliency and adaptation to climate change and ocean acidification;
(2) regional ecosystem protection and restoration;
(3) water quality and sustainable practices on land;
(4) changing conditions in the Arctic; and
(5) ocean, coastal, and Great Lakes observations, mapping, and infrastructure.

In response to the task force's final report, on 19 July 2010, President Obama issued Executive Order 13547 – "Stewardship of the Ocean, Our Coasts, and the Great Lakes," adopting these recommendations in full. The executive order established a formal policy for the nation's oceans, coasts, and Great Lakes, and created the National Ocean Council, which would be co-chaired by the Council on Environmental Quality and the Office of Science and Technology Policy, with membership made up of cabinet-level secretaries and heads of other federal agencies, the National Security Advisor and Chairman of the Joint Chiefs of Staff, and several other White House Offices. Within the Council, the executive order established (1) a Governance Coordinating Committee consisting of 18 officials from state, tribal, and local governments, and (2) a series of regional advisory committees to advise regional planning bodies established for the development of coastal and marine spatial plans. The executive order directed the Council and its members as well as any other executive branch departments, agencies, and offices whose activities affect the oceans, coasts, and Great Lakes, to begin implementing the national policy as recommended by the task force and set forth in the order.

Draft implementation plan and strategic action plans

In response to the President's charge, the National Ocean Council began developing a comprehensive draft "National Ocean Policy Implementation Plan" that would provide a series of targeted actions, centered on the nine national priority objectives and designed to address the pressing challenges facing the ocean, our coastline, and the Great Lakes. From January through April 2011, and again from June to July 2011, the National Ocean Council sought public input on the development of the implementation plan. The Council held 12 regional listening sessions around the country, and also received input from the Council's Governance Coordinating Committee composed of state, local, and tribal representatives (National Ocean Council 2012).

In June 2011 the Council also released for public comment nine strategic action plans that provided an overview of how federal agencies might address the nine priority objectives contained in the National

Ocean Policy (National Ocean Council 2012). Each plan was developed by an interagency writing team and based on public input gathered during a scoping period earlier that year. The plans were provided in early draft outline form and sought to enlist public/stakeholder support and input to help shape the final plan. Each draft plan outline described potential actions to address the national priority objective, the rationale for those actions, expected milestones and outcomes, gaps and needs in science and technology, and timelines for completion (76 Fed. Reg. 33726).

The Council received hundreds of comments during the June–July 2011 public comment period, and more than 1,000 individuals and groups participated in the regional listening sessions. Comments reflected concerns over the need to balance economic and environmental goals, the need for more resources to implement the plans at the state and local levels, and the need for greater ocean-literacy through education. The Council adopted many of these recommendations and incorporated them as it developed the draft implementation plan (National Ocean Council 2012). At the end of 2011, the Commission expected the National Ocean Council to seek public comment on its draft "National Ocean Policy Implementation Plan" in early 2012.

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Chapter III

MARINE MAMMALS AND OCEAN ENERGY

Worldwide demand for energy is increasing, and a significant portion of that energy is taken from the marine environment. The development of energy resources poses certain risks to the oceans. How our society addresses the risks reflects its commitment to environmental sustainability in the face of considerable economic stress. That commitment was tested in the summer of 2010 when the United States experienced one of the largest environmental catastrophes in history—the Deepwater Horizon oil spill. The spill and response were massive but, arguably, the response was only marginally effective because oil containment and cleanup methods have not kept pace with advances in deepwater drilling technology. The public was greatly concerned about the spill but, over time, shifted its concern to the loss of jobs in a region that long ago had become dependent on oil production as a mainstay of its economy.

Although considerable research and monitoring was initiated during and after the spill, understanding the full impact of the Deepwater Horizon spill on marine mammals and other living marine resources will be challenging due to inadequate information on pre-spill (i.e., baseline) environmental conditions. Looking backward, scientists reviewing the *Exxon Valdez* spill in 1989 placed great emphasis on the collection of baseline information. Such information was not collected for most of the marine mammals in the Gulf of Mexico, despite decades of oil and gas development and other, extensive human-activities in those waters. Looking forward, the extent to which such lessons will be heeded in the Arctic is not clear. It is clear that drilling in the Arctic will be confounded by a much harsher environment, extensive logistical challenges, and inadequate response infrastructure.

Growing demands for clean energy sources are prompting greater investments in the development of offshore renewable energy resources. As with oil and gas, the development of renewable energy sources must proceed in a thoughtful and deliberate manner, with similar attention to the collection of baseline information to understand and minimize any adverse environmental effects from that new technology. Although energy independence is an important goal for the United States, adequate safeguards also are essential to protect an increasingly industrialized and rapidly changing marine environment.

The Deepwater Horizon Oil Spill

On 20 April 2010 BP's mobile offshore drilling unit Deepwater Horizon exploded and burned, and subsequently sank in the Gulf of Mexico 52 miles southeast of Venice, Louisiana (Figure III-1). Eleven of the 126 workers on the rig were killed and, over the following 86 days, an estimated 206 million gallons (4.9 million barrels[1]) of oil spilled into the Gulf (NOAA 2010, Federal Interagency Solutions Group 2010). This was the largest accidental oil spill ever reported.[2] In comparison, the Ixtoc I exploratory well spilled approximately 140 million gallons (3.5 million barrels) in the Bay of Campeche, Mexico, in 1979 (Jernelöv and Lindén 1981) and the *Exxon Valdez* tanker spilled approximately 11 million gallons (257,000 barrels) of crude oil into Prince William Sound, Alaska, in 1989.[3]

[1] One barrel of oil equals 42 U.S. gallons.

[2] In January 1991 an even larger oil spill occurred in the Persian Gulf, but in that case Iraqi forces intentionally released oil into the Gulf from a Kuwaiti offshore oil trans-shipment terminal and several oil tankers in an effort to slow the invasion of American troops. The total volume of released oil was unknown, but estimates have ranged from 84 to 520 million gallons. (Khordagui and Al-Ajmi 1993; Tawfiq and Olsen 1993).

[3] http://www.evostc.state.ak.us/facts/qanda.cfm

Oil spill response efforts

Figure III-1. Fire boat response crews battle the blazing remnants of the offshore oil rig Deepwater Horizon April 21, 2010. Multiple Coast Guard helicopters, planes and cutters responded to rescue the Deepwater Horizon's 126 person crew. (Source: U.S. Coast Guard)

On 29 April 2010, the U.S. Coast Guard declared the Deepwater Horizon incident a "Spill of National Significance," thereby marshalling extensive resources to respond. The response was massive, involving 13 federal agencies, multiple agencies from the five Gulf states, numerous local agencies, non-governmental organizations, oil companies and contractors, academia and private researchers, and thousands of local residents, volunteers, and expert consultants. In accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan),[4] the Coast Guard established a Unified Command to coordinate the response efforts of federal and state governments and to execute national and regional contingency plans. The Unified Command structure was developed to ensure efficient and coordinated containment, dispersal, and removal of oil and hazardous substances while minimizing damage to the human and marine environment. The Unified Command linked the government agencies and other organizations responding to the spill, providing a forum for key parties to make consensus decisions.

Under the direction of the Unified Command, responders used both traditional and novel approaches to contain and recover the spilled oil. Traditional methods included booming and skimming the oil and in-situ burning. Responders also used planes to apply chemical dispersants, such as Corexit 9500A and 9527, onto the water surface. For the first time, responders also sought and obtained approval from the Environmental Protection Agency to inject Corexit 9500A directly at the wellhead at a depth of approximately 1500 m (Khatchadourian 2011, Kujawinski et al. 2011).

Several different techniques were used unsuccessfully to stop the flow of oil before a "capping stack" achieved that goal on 15 July 2010, 86 days after the explosion. A relief well intercepted and permanently capped the well on 19 September 2010.

Once the well was capped, the National Oceanic and Atmospheric Administration (NOAA) issued a report on the fate of the oil in the marine environment (NOAA 2010). Of the 4.9 million barrels discharged, approximately 17 percent of the oil was recovered directly from the wellhead, skimming and burning removed another 8 percent, and the other 75 percent was either chemically or naturally dispersed, evaporated/dissolved, metabolized by microbes (e.g., bacteria) or remained as "residual" oil either in the water column or on or buried in sediments (Figure III-2).

[4] The National Contingency Plan is authorized by the Federal Water Pollution Control Act, also known as the Clean Water Act.

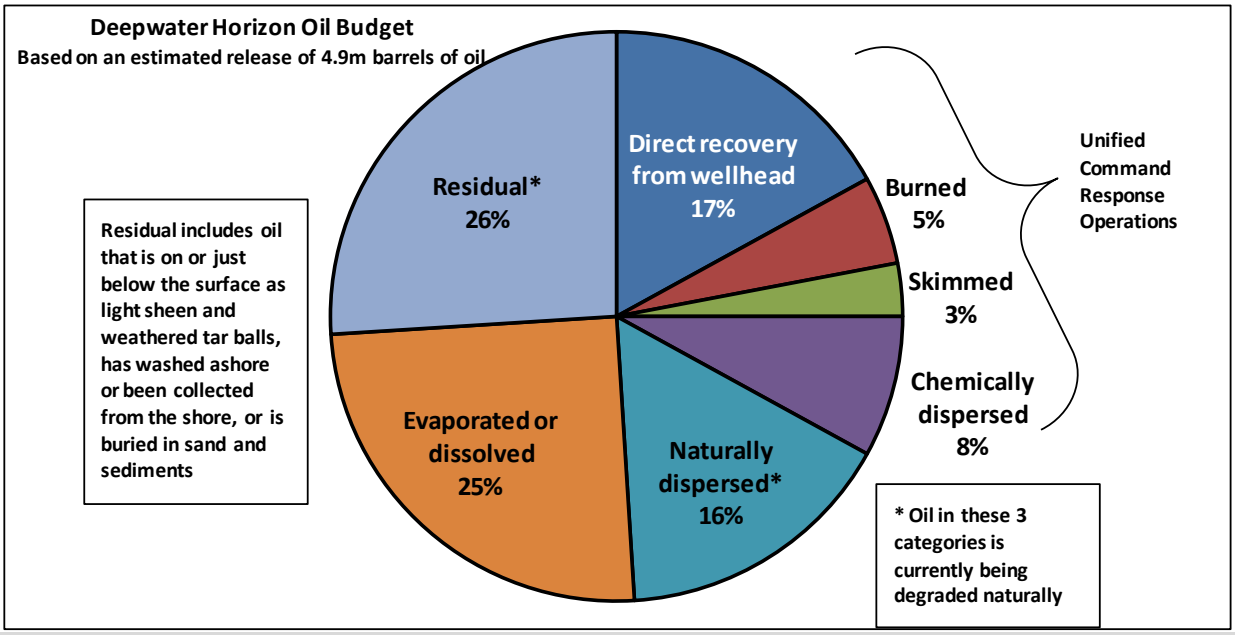

Figure III-2. Estimated fate of oil spilled after the Deepwater Horizon explosion (based on NOAA 2010)

The Deepwater Horizon oil spill presented a number of unique challenges compared to other spills in U.S. and international waters:

- **Amount**: As noted above, the amount of oil that escaped from the Deepwater Horizon wellhead was unprecedented, with an estimated peak flow rate of between 35,000 to 60,000 barrels (1.47 to 2.52 million gallons) per day—each week the spill released an amount of oil roughly equal to the entire *Exxon Valdez* spill.
- **Movement**: Until now, modeling of oil spill trajectories had been based on the movement of surface currents, winds, tides, and factors that affect the ocean surface. However, since the source of the release was deep underwater (at the wellhead), predicting how the oil and gas venting from the blow out would spread was a challenge for modelers (Ji et al. 2011). In addition, large amounts of oil and gas remained in the water column and little information or predictive capacity was available to model how the oil and gas would travel or weather at depth.
- **Type**: The oil released from the Deepwater Horizon wellhead was a mixture of both Louisiana sweet crude oil and gas (methane, ethane, and propane). Among other things, the composition of oil determines its toxicity, physical characteristics, and the rate that it weathers, all critical determinants of its potential effect on the Gulf ecosystem.
- **Dispersants**: At the height of the spill up to 15,000 gallons of chemical dispersants were applied daily at the wellhead—something that had never been done at this depth or scale before. In earlier stages of the spill, dispersants also were applied at the surface, and over the course of the spill more than 1.8 million gallons of dispersants were applied.[5] Dispersants reduce the surface tension of the oil, allowing it to break into smaller particles. Smaller particles have a larger surface-to-volume ratio, are more amenable to degradation by microbes, weather more quickly, and are less likely to form large slicks that cover and contaminate shorelines.

[5] http://www.restorethegulf.gov

- **In-water clean-up and containment**: Clean-up operations for oil in the water included containment of oil in booms, skimming of oil at the ocean surface, and in-situ burning. An unprecedented number of personnel, vessels, and aircraft were involved, working in coastal and pelagic habitats (Table III-1). Cleanup efforts generated significant amounts of liquid and solid waste. The final stages of containment involved seismic surveys around the wellhead to detect additional leaks. Almost all aspects of clean-up and containment activities had the potential to disturb marine mammals or displace them from important feeding or breeding grounds or other important habitat.

Table III-1. Statistics associated with the Deepwater Horizon response efforts (Source: Joint Information Center, http://www.restorethegulf.gov)

4.9	million barrels of oil spilled
47,829	responders at peak
9,700	vessels at peak
6,500	government vessels
3,200	commercial vessels of opportunity
127	surveillance aircraft
4,114	km of hard and soft boom deployed
1.8	million gallons of dispersants applied
>770,000	millions gallons subsea
1.07	million gallons at surface
411	in-situ burns conducted
265,450	barrels of oil burned
4	incident command posts (TX, LA, AL, FL)
32	equipment staging areas
1.4	million barrels of liquid wastewater collected
92	tons of solid waste collected

- **Baseline information**: A paucity of pre-spill baseline information on the status and health of marine mammals in the Gulf of Mexico significantly reduced the ability of the responsible authorities to make the before-and-after comparisons needed to determine the full effects of the spill on marine mammals.

Preliminary investigations into the causes of the spill

The loss of human life and the sheer size and scope of the spill prompted immediate investigations into what happened, how it happened, and how such information might be used to prevent a future spill. It also prompted changes in federal policy and organizational structure to address inadequacies and conflicts in the management of offshore oil and gas activities. A summary of the results of those investigations can be found below under the section "Lessons Learned."

The more prominent federal investigations initiated immediately following the explosion included:

- The Department of Homeland Security (Coast Guard) and the Department of the Interior (Minerals Management Service) launched a joint investigation on 27 April 2010 into the explosion and sinking of the Deepwater Horizon drilling rig, with the final report to be submitted within nine months of convening the Joint Investigation Team.
- The Department of the Interior established an Outer Continental Shelf Safety Advisory Board on 30 April 2010 to conduct a review of the Deepwater Horizon incident and, to report, within 30 days, on "what, if any, additional precautions and technologies should be required to improve the safety of oil and gas exploration and production operations on the outer continental shelf."
- The President established the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling (Oil Spill Commission) on 21 May 2010. The Oil Spill Commission was directed to examine the relevant facts and circumstances concerning the root causes of the Deepwater Horizon oil disaster, and to develop options for guarding against, and mitigating the impact of, oil spills associated with offshore drilling, taking into consideration the environmental, public health, and economic effects of such options. The results of the Oil Spill Commission's investigation were to be delivered to the President within six months of its first meeting.
- Several Congressional committees also investigated the oil spill, primarily in the form of hearings, to assess the potential short- and long-term effects on the environment and human health. On 10 June 2010, the Marine Mammal Commission's Executive Director testified before the House Subcommittee on Insular Affairs, Oceans, and Wildlife regarding the Deepwater Horizon Oil Spill

and its effects on marine mammals. He summarized the potential short- and long-term effects of oil spills on marine mammals, how best to assess the effects of the spill and response activities, and the likely impacts of oil and gas activities in the Gulf and elsewhere. Finally, he provided recommendations to the Subcommittee on ways to minimize the impacts of oil and gas operations on marine mammals and the marine ecosystems.[6]

Responding to injured and oiled marine wildlife

Responding to stranded marine wildlife, especially to those that may have been exposed to oil, was a high priority during the days and months immediately following the Deepwater Horizon oil spill. The National Contingency Plan outlines general procedures for minimizing effects of the oil spill and response activities on fish and wildlife and their habitat. Detailed procedures for wildlife response are outlined in Regional Area Contingency Plans. The Regional Area Contingency Plans for the Gulf (Regions IV and VI) identify the Fish and Wildlife Service as the lead agency for responding to endangered species, and NOAA as the lead agency for responding to the "living marine resources it manages and protects,"[7] which includes marine mammals, other protected marine species, and harvested marine fish. Wildlife response functions were the responsibility of the Unified Command's Wildlife Branch (Figure III-3).

The Wildlife Branch, with the recommendation and endorsement of NOAA NMFS, contracted with the Oiled Wildlife Care Network, a California-based oil spill response organization, to coordinate marine

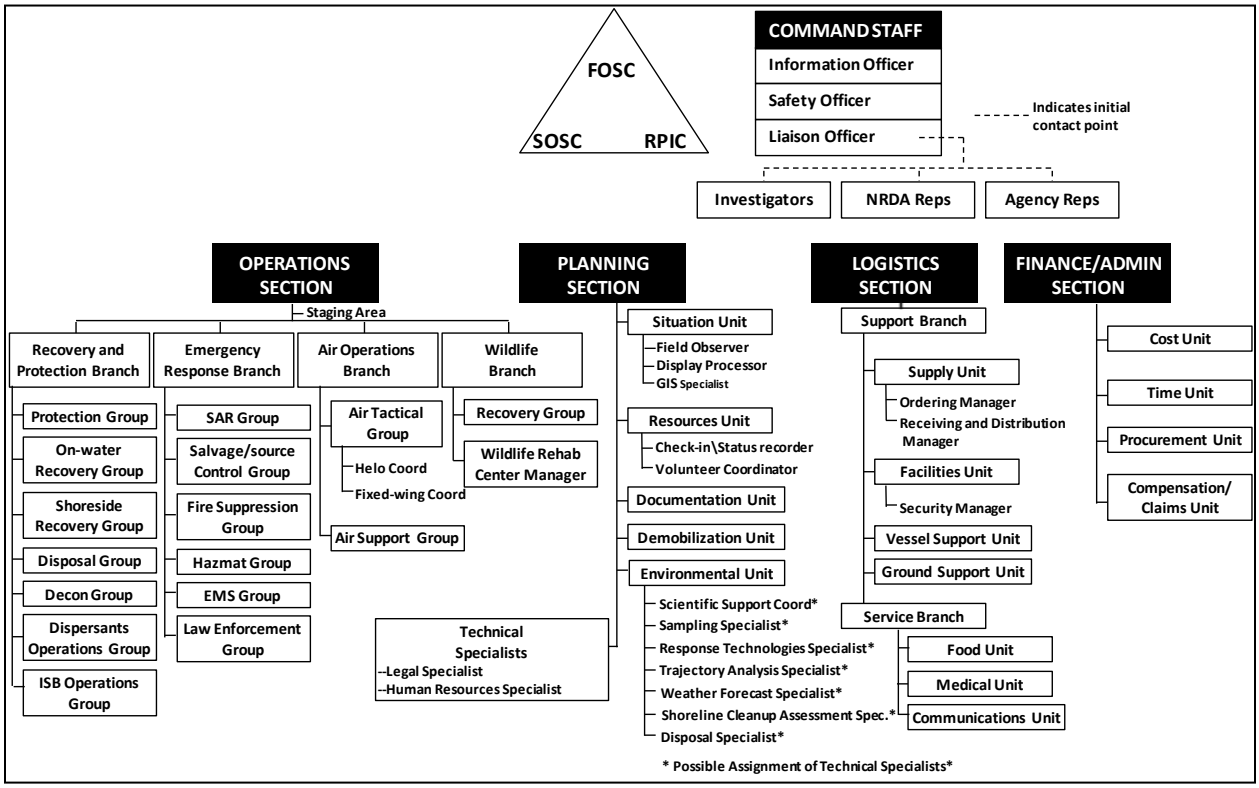

Figure III-3. Incident Command Structure for the Deepwater Horizon oil spill, in accordance with the National Contingency Plan. Wildlife response functions were under the Wildlife Branch of the Operations Section. (FOSC = Federal On-Scene Coordinator; SOSC = State On-Scene Coordinator; RPIC = Responsible Party In Charge)

[6] http://www.mmc.gov/testimony/pdf/testimony_061010.pdf
[7] http://www.nrt.org

mammal and sea turtle response efforts as the Marine Mammal and Sea Turtle Group in the Wildlife Branch.[8] In partnership with NOAA and the Fish and Wildlife Service, the Network applied NOAA's draft Marine Mammal Oil Spill Response Guidelines (Johnson and Ziccardi 2006), adapting them for Gulf species, including cetaceans and manatees. The Wildlife Branch, Marine Mammal and Sea Turtle Group, also trained regional stranding responders in hazardous materials, specific response sampling, and chain-of-custody protocols and coordinated the purchasing and distribution of supplies for collecting and archiving various types of samples. The Wildlife Branch relied heavily on the existing stranding network in the Gulf region to respond to stranded, distressed, or injured marine mammals, as those organizations already were federally authorized to conduct marine mammal stranding response activities under either section 112(c) or 109(h) of the Marine Mammal Protection Act. Several stranding network members or technical experts from outside the region also assisted with wildlife response.

Early in the response the Unified Command initiated aerial surveys to assess the extent of oil contamination. Those surveys provided a platform for opportunistic sightings of injured or dead marine mammals and other wildlife. In addition, the Wildlife Branch established a wildlife hotline for reporting oiled, injured, distressed, or dead marine mammals, sea turtles, and birds. Reports from the hotline and information from response vessels and aerial survey teams helped guide the Wildlife Branch's emergency response efforts. The Wildlife Branch defined the affected area for marine mammal and sea turtle response to include the central and eastern areas of the northern Gulf (from the Texas-Louisiana border to the Florida panhandle). The Wildlife Branch operated out of the Houma (Louisiana) Incident Command Post, with assistance from the Mobile (Alabama) Incident Command Post. The Wildlife Branch's Marine Mammal and Sea Turtle Group in the Command Posts was staffed primarily by NOAA employees. The Marine Mammal Commission also assisted in staffing the Mobile Incident Command Post for three weeks during the peak of the spill.

The Natural Resource Damage Assessment process

The Oil Pollution Act of 1990 requires federal, state, and tribal natural resource trustees to conduct a Natural Resource Damage Assessment (NRDA) following an oil spill to address resulting injuries. The trustees then determine the restoration actions needed to bring injured natural resources and services back to baseline conditions and make the environment and public whole with regard to spill-related losses (15 C.F.R. § 990.30). Therefore, concurrent with initial response activities, NOAA, the U.S. Fish and Wildlife Service, and the other natural resource trustees[9] initiated the pre-assessment phase of the natural resource damage assessment.

Natural resources include wildlife, such as marine mammals, sea turtles, seabirds, fishes, and invertebrates (e.g., corals, shrimps), and their habitat. Services include the functions of and benefits derived from those natural resources, such as those that support tourism, fishing, boating, marine products, and transportation. The responsible parties (i.e., those entities responsible for damages resulting from the incident) pay the costs of natural resource damages (including the costs of assessing such

[8] The Oiled Wildlife Care Network also coordinated the response to stranded sea turtles.

[9] Natural Resource Trustees are those officials of federal and state governments, Indian tribes, and foreign governments designated under authority of 33 U.S.C. 2706(b) of the Oil Pollution Act for the Deepwater Horizon incident. They include the Department of Commerce (National Oceanic and Atmospheric Administration), Department of the Interior (Fish and Wildlife Service, National Park Service, the Bureau of Indian Affairs, and the Bureau of Land Management), Department of Defense, and state agencies from the five affected coastal states (Florida's Department of Environmental Protection and Fish and Wildlife Conservation Commission; Alabama's Department of Conservation and Natural Resources and Geological Survey of Alabama; Mississippi's Department of Environmental Quality; Louisiana's Coastal Protection and Restoration Authority, Oil Spill Coordinator's Office, Department of Environmental Quality, Department of Wildlife and Fisheries, and Department of Natural Resources; Texas' Parks and Wildlife Department, General Land Office, and Commission on Environmental Quality) (75 Fed. Reg. 60800).

damage) and compensate the public for lost services derived from those natural resources, subject to statutory limitations.[10]

Regulations implementing the Oil Pollution Act specify three phases for conducting natural resource damage assessments: (1) pre-assessment, (2) injury assessment and restoration planning, and (3) restoration implementation (15 C.F.R. § 990.10-990.66) (Figure III-4). The pre-assessment phase consists of collecting and analyzing information to determine whether injuries to natural resources have occurred and whether to pursue restoration under additional provisions of the Act. Those activities can include collecting time-sensitive data (such as data collected from the affected area before it was exposed to oil), reviewing scientific literature about the oil and its impact on coastal resources, and making a preliminary determination regarding the extent and severity of injury.

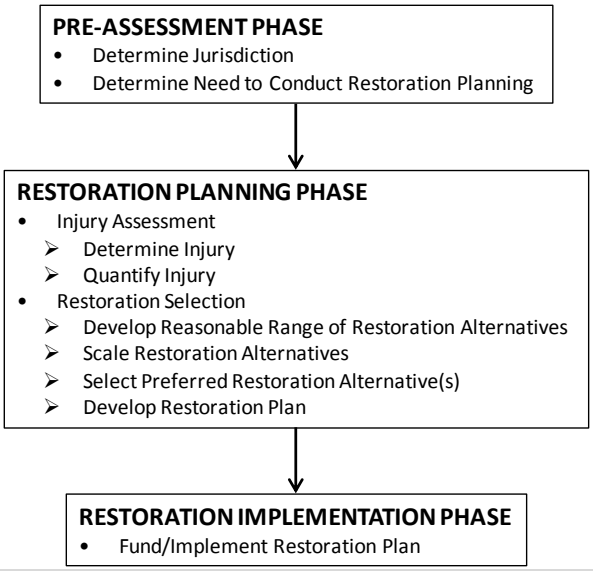

Figure III-4. Phases involved in a natural resource damage assessment under the Oil Pollution Act of 1990 (NOAA)

If the trustees determine that (a) injuries have been caused by the incident, (b) response activities cannot address the injuries, and (c) restoration activities exist to remedy the injuries, they will then move on to the injury assessment and restoration planning phase. During that phase, trustees must assess injuries caused by the spill and develop a plan for restoring the environment to remedy those injuries. The trustees conduct both scientific and economic injury assessments and restoration planning with the participation (and funding) of the responsible parties in a process known as "cooperative assessment." However, final authority over determinations of injury and restoration alternatives is retained by the trustees. Trustees are required to provide the public with at least one opportunity to comment on proposed restoration plans. Once they approve a final restoration plan, they work with the public and the responsible parties to implement the plan by conducting restoration projects during the restoration implementation phase. Completion of all three phases can take months to years, depending on the size and extent of the spill, and other factors.

Potential effects of an oil spill on marine mammals and the Gulf ecosystem

Many marine mammal stocks in the Gulf may have been, and may continue to be, affected by the Deepwater Horizon spill. Soon after the spill began, the Marine Mammal Commission compiled all relevant studies of oil impacts on marine mammals and consulted with the Services and academic experts on response options. That process culminated in publication of a report entitled "Assessing the long-term effects of the BP Deepwater Horizon oil spill on marine mammals in the Gulf of Mexico: A statement of research needs."[11] The following sections present information gathered during that process.

In general, the effects of an oil spill are expected to be manifested first at the level of the individual animal, either directly (e.g., contact with oil or dispersants, interactions with response activities) or indirectly (e.g., degradation of habitat, reduced availability of prey). Significant acute or chronic exposure

[10] The current limit on the liability of responsible parties for damages due to an oil spill from an offshore facility such as the Deepwater Horizon is $75 million under the Oil Pollution Act, plus any removal (i.e., cleanup) costs, unless the responsible party for the spill showed gross negligence, willful misconduct, or a failure to comply with federal operating, construction, or safety regulations, in which case the limit does not apply (33 U.S.C. § 2704).
[11] http://www.mmc.gov/reports/workshop/pdf/longterm_effects_bp_oilspil.pdf

could affect an individual's ability to survive and reproduce and, subsequently, the survival and reproductive rates of the affected population. The full nature and extent of any effects will depend on a variety of factors, such as the—

- chemical constituents of the oil and dispersants, which change over time as oil and dispersants degrade and are metabolized;
- dose of exposure (i.e., amount and duration);
- route of exposure (e.g., inhalation, ingestion, external contact, transplacental);
- type and trophic level of prey (e.g., fish, invertebrates) or forage (i.e., seagrass) consumed and their contaminant levels;
- marine mammal species involved; and
- physical and physiological characteristics of the affected individuals (e.g., age, sex, reproductive and health status).

Current understanding of the potential effects of oil on marine mammals is based on information from (1) effects observed during or after other oil spills (Geraci and St. Aubin 1990, Loughlin et al. 1994, Smultea and Würsig 1995, Bickham et al. 1998, Bodkin et al. 2002, Boehm et al. 2007, and Matkin et al. 2008), (2) a small number of controlled exposure studies using captive marine mammals (Geraci et al. 1983, Smith et al. 1983, St. Aubin et al. 1985), (3) simulations and in vitro studies (Braithwaite et al. 1983, Godard et al. 2004), and (4) effects observed during accidental and controlled oil exposure of species other than marine mammals (Bickham et al. 1998, Mazet et al. 2001, Golet et al. 2002, Mohr et al. 2007, Esler et al. 2010). Current information does not provide a sufficient basis for predicting, with full confidence, the severity of either short- or long-term effects of the Deepwater Horizon spill on marine mammals. However, it does provide ample evidence that exposure to oil can harm marine mammals.

For example, inhalation of specific volatile organics from some types of oil can cause respiratory irritation, inflammation, or emphysema. Similarly, ingestion of oil may cause gastrointestinal inflammation, ulcers, bleeding, diarrhea, or maldigestion. Certain inhaled and ingested chemicals in oil also may damage organs such as the liver, kidney, adrenal glands, spleen, and brain; cause anemia, cancer, congenital defects, and immune system suppression; or lead to reproductive failure. Chemical contact may cause skin and eye irritation; inflammation; burns to mucous membranes, mouth, and nares; or increased susceptibility to infection. Oil mixtures can physically foul the baleen of mysticete whales, which is used to filter food.

Response activities to contain and remove spilled oil also may affect marine mammals. Increased vessel and air traffic may disrupt foraging, habitat use, daily or migratory movements, and behavior (e.g., social interactions such as mother-calf bonding, breathing, and resting patterns) (Nowacek et al. 2001, Constantine et al. 2004, Williams et al. 2006, Stensland and Berggren 2007, Lusseau et al. 2009). Increased vessel traffic also increases the risk of vessel strikes (Laist et al. 2001, Fish and Wildlife Service 2001, Bechdel et al. 2009), although none were reported during the prolonged spill and response phase. Noise from seismic surveys (such as those used to detect potential leaks around the wellhead) or other response-related activities may also cause disturbance or displacement, hearing loss (temporary or possibly permanent), or other physical injury to marine mammals (McCauley et al. 2000, National Research Council 2003). In the Gulf of Mexico, seismic survey mitigation measures state that seismic survey work must pause when sperm whales or other cetaceans are closer than 0.5 km to a seismic sound source array and that the seismic sound source must not be restarted until survey vessel has moved another 0.5 km away from the marine mammals.[12]

In the Gulf, responders used large quantities of the dispersant Corexit at the sea surface (e.g., Corexit 9527, Corexit 9500A) and at the wellhead (Corexit 9500A) (Kujawinski et al. 2011). The long-term effects of dispersants on marine mammals are largely unknown (National Research Council 2005). The

[12] http://www.nmfs.noaa.gov/ocs/mafac/meetings/2010_06/docs/mms_2007_ntl.pdf

Regional Response Team had pre-approved the use of Corexit prior to the spill because it is listed on the National Contingency Plan product schedule maintained by the Environmental Protection Agency. The Environmental Protection Agency was consulted and concurred on decisions related to the volume of dispersants used in response to the spill, while also conducting additional toxicity tests during the spill. Those tests are helping to describe the potential for adverse effects from exposure to dispersants.

Responders also use hard and soft boom and skimmers to contain and collect surface oil and in-situ burning to remove it, and those activities also may affect marine mammals both through direct interaction and displacement from habitat. Burning reduces the overall amount of oil in the water, but also leaves behind a residue of uncertain composition and toxicity (Benner et al. 1990, Wang et al. 1999). Burning also releases additional chemicals into the air, posing additional inhalation risks that will vary based on the level of exposure.

Oil spills may affect marine mammals indirectly by altering the marine ecosystem and the key features of their habitat (Paine et al. 1996, Golet et al. 2002, Peterson et al. 1996, National Research Council 2002). Such effects could include reductions in animal or plant biomass, shifts in prey or seagrass distribution, or contamination of prey or seagrass. In Prince William Sound, Alaska, oil from the *Exxon Valdez* spill accumulated in sediments, continues to contaminate nearshore environments, and appears to have impeded recovery of sea otters (Bodkin et al. 2002). How long that effect will persist is uncertain (Page et al. 2002, Rice et al. 2003, Neff et al. 2006, Boehm 2007). In the Gulf, spilled oil that has accumulated in coastal and offshore bottom sediments could be re-released during hurricanes and storms, with intermittent, recurring effects on the marine ecosystem (Machlis and McNutt 2010). Further research is needed to characterize physical and biogeochemical degradation rates in the Gulf of Mexico and to evaluate the likelihood of such long-lasting impacts.

A full assessment of the damages that resulted from the Deepwater Horizon oil spill will likely take many years and require integration and analysis of multiple types of information. Those include measures and comparisons of the ecological, biological, geophysical, chemical, and oceanographic conditions in the Gulf, both pre- and post-spill, and/or modeling of conditions where pre- and/or post-spill information is not available. Such an assessment also will require an understanding of other human-related risk factors in the Gulf and their role in the health of the marine ecosystem.

Confounding factors

A number of factors and events could potentially complicate assessment of the injuries from the Deepwater Horizon oil spill to the Gulf ecosystem and the marine mammals it supports. Some Gulf marine mammal populations have experienced multiple unusual mortality events (UMEs) in the last two decades. NOAA's National Marine Fisheries Service has declared 18 UMEs in the Gulf since 1991, 11 of which involved cetaceans (primarily bottlenose dolphins) and eight of which involved manatees. The cause was determined for nine events: eight were caused by biotoxins and one was caused by an infectious disease.[13]

In February 2010, just prior to the spill, an unusually high number of bottlenose dolphins began to strand in the northern Gulf. In March 2010 NOAA began consultation with the Working Group for Marine Mammal Unusual Mortality Events (Working Group) to determine whether the increase in strandings constituted an unusual mortality event (in accordance with section 404 of the Marine Mammal Protection Act). When the spill occurred, the consultation was delayed until NOAA could reanalyze the data on marine mammal deaths along the northern Gulf before, during, and after the oil spill. Consultation with the Working Group was reinitiated in October 2010 (six months after the spill) and, in December of that year, NOAA declared the deaths an unusual mortality event. Since then, strandings continue to be elevated in the northern Gulf, and have involved a large percentage of premature, stillborn, and neonatal bottlenose dolphins.

[13] http://www.nmfs.noaa.gov/pr/health/mmume/

To the extent practicable, NOAA and the Working Group are coordinating the investigation of those deaths (pre-, during, and post-oil spill) with ongoing NRDA activities where the data and analytical needs of those two processes coincide. At the end of 2011, the unusual mortality event and the investigation of it were still ongoing. The experts have not determined the cause or causes of the UME, but 13 of the 58 bottlenose dolphins that died in the northern Gulf during that event have tested positive for the bacterium *Brucella*.[14] *Brucella* infections in Gulf of Mexico dolphins are not new and the role of *Brucella* in the unusual mortality event is currently unknown.

Other anthropogenic activities and natural perturbations in the Gulf complicate assessment of marine mammal injuries from the spill. They include ongoing seismic surveys for oil and gas, routine oil and gas operations (drilling, production, transport, and decommissioning), commercial and recreational fisheries, commercial shipping, military activities, tourism, recurring hypoxic and anoxic conditions, harmful algal blooms, hurricanes, natural oil seeps, and climate disruption. An assessment of injuries also may be confounded by changes in the physical and biogeochemical properties of Deepwater Horizon oil over time as the result of natural weathering and degradation.

Assessing the relative contributions of direct and indirect factors and determining their relative and combined effects on the long-term survival and reproduction of the Gulf's marine mammals is a considerable challenge. The challenge is made even more difficult because the resources available are not sufficient for a comprehensive assessment.

Marine mammal response and assessment activities

Efforts to locate and respond to stranded marine mammals in the Gulf expanded at the same time that scientists initiated the pre-assessment phase of the natural resource damage assessment. To achieve both goals (response and damage assessment), NOAA and the Fish and Wildlife Service initially conducted the following activities—

- **Aerial and vessel surveys**: used to track movements of selected marine mammal stocks, document their direct exposure to oil, and describe their physical and/or behavioral reactions if and when they came into contact with oil;
- **Blood and tissue sampling**: collected from stranded marine mammals and intended to help assess oil exposure;
- **Passive acoustic monitoring**: used near the Deepwater Horizon wellhead to detect the presence of vocalizing marine mammals; and
- **Visual observations**: used to assess and minimize marine mammal/vessel interactions during the height of skimming and burning operations.

The initial response phase extended temporally from 30 April through 2 November 2010 and spatially from the Texas-Louisiana border to the Florida panhandle. In accordance with criteria it had approved, the Unified Command reinstated response efforts from 3 December 2010 to 24 May 2011 for portions of Louisiana from St. Mary's Parish east to the Louisiana/Mississippi border because of continued strandings of visibly oiled dolphins. On 25 May 2011 the marine mammal response phase of the oil spill ended and no further funding or direction was received from the Unified Command even though additional oiled cetaceans were subsequently found. On 25 May 2011 the Unified Command terminated its responsibility for marine mammal response efforts in the northern Gulf, passing that responsibility back to NOAA's Marine Mammal Health and Stranding Response Program. This ended the responsibility of the Unified Command and responsible parties to pay for response activities. However, NOAA's Marine Mammal Health and Stranding Response Program was still encumbered by National Resource Damage Assessment requirements.

[14] http://www.nmfs.noaa.gov/pr/health/mmume/cetacean_gulfofmexico2010_brucella.htm

Table III-2. Dolphin and whale stranding data by species, 30 April 2010 through 17 April 2011 (NOAA)

Cetacean species	Alive	Dead	Condition unknown	Total
Bottlenose dolphins (*Tursiops truncatus*)	9	142	4	155
Kogia spp.	0	2	0	2
Melon-headed whale(*Peponocephala electra*)	0	2	0	2
Spinner dolphin (*Stenella longirostris*)	3	3	0	6
Sperm whale (*Physeter macrocephalus*)	0	2	0	2
Unknown species	1	2	1	4
Total	13	153	5	171

Throughout the response phase the Wildlife Branch compiled daily reports of the numbers of marine mammals, sea turtles, and birds collected (alive or dead), and identified them as either visibly oiled, without visible oil, or pending further information. The Unified Command used the daily reports to direct response and surveillance activities and to update the public and the media. Table III-2 provides a summary of all marine mammal strandings reported during the response phase, by species; Figures III-5 and III-6 show the locations of all marine mammal strandings, by species, that were reported to NOAA during the initial and reinstated response stages, respectively.[15]

In May 2010 the trustees established a technical working group for marine mammals and sea turtles.[16] The group, still active at the end of 2011, is comprised of scientists and other representatives from federal and state trustee agencies and contracted consultants and academicians. The regulations implementing the Oil Pollution Act (15 C.F.R. §990) also require that the responsible parties be invited to participate in the damage assessment process, and the trustees coordinated with BP throughout the process.[17] BP's involvement in the review of work plans expedited funding for the costs associated with implementing those work plans. Any work plans or components of work plans that BP did not approve, including stranding response, could be implemented independently by the trustees. The trustees could then seek reimbursement as part of the final damage assessment settlement.

In 2010 and 2011 the Marine Mammal and Sea Turtle Technical Working Group developed several work plans to obtain additional information needed for the natural resource damage assessment. Initial plans focused on short-term assessment, including (1) documenting exposure of particular marine mammals and sea turtles and their habitats in oiled areas, (2) assessing the effects of oil spill response activities (i.e., cleanup), (3) gathering and analyzing baseline information, and (4) filling other data gaps. Natural resource damage assessment projects for marine mammals conducted by the technical working group in 2010 and 2011 included—

- biopsy sampling of bottlenose dolphin populations at four sites (Barataria Bay, Louisiana; Chandeleur Sound, Louisiana; Mississippi Sound, Mississippi; and St. Joseph Bay, Florida);

[15] http://www.nmfs.noaa.gov/pr/health/oilspill/mammals.htm
[16] http://www.gulfspillrestoration.noaa.gov/oil-spill/gulf-spill-data/
[17] The responsible parties designated for the Deepwater Horizon oil spill include BP Exploration and Production Inc., as well as Transocean Holdings Inc., Triton Asset Leasing GmbH; Transocean Offshore Deepwater Drilling Inc.; Transocean Deepwater Inc.; Anadarko Petroleum; Anadarko Exploration & Production Company LP; and MOEX Offshore 2007 LLC (75 Fed. Reg. 60800).

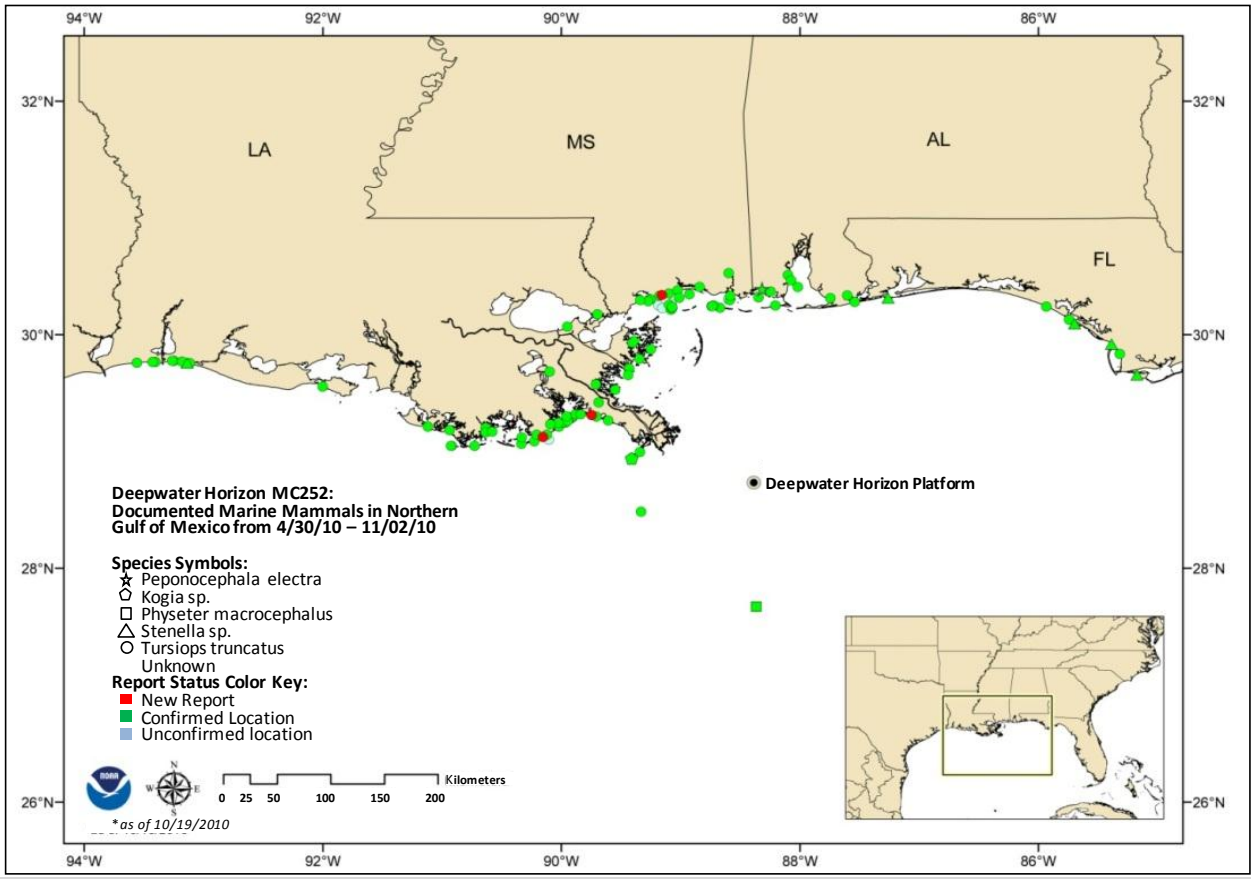

Figure III-5. Location and species identification of marine mammals stranded during the initial response to the Deepwater Horizon oil spill, 30 April–2 November 2010 (NOAA)

- mark-recapture photo-identification surveys in three sites (Barataria Bay, Louisiana; Mississippi Sound, Mississippi; and St. Joseph Bay, Florida); large-vessel pelagic research cruises to—
- visually assess and photo-document marine mammal contact with oil and occurrence of marine mammals in oiled areas;
- deploy satellite tags and collect biopsy samples from Bryde's whales, sperm whales, and other marine mammals in offshore waters;
- collect habitat information, including surface hydrographic data, temperature profiles, salinity, dissolved oxygen, and acoustic echo-sounder backscatter information to characterize water column productivity and prey resources; and
- deploy and recover low and mid-frequency passive acoustic monitoring buoys;
- aerial surveys to estimate abundance and distribution of marine mammals in oil-affected areas, document locations of manatees in distress, and inform rescue efforts;
- live capture-release studies of bottlenose dolphins in Barataria Bay, Louisiana, and Sarasota Bay, Florida, to assess sub-lethal and chronic health impacts;
- genetic analyses of biopsy and stranding samples for species identification, sex determination, and/or stock structure;
- analysis of manatee movements;
- sampling of nearshore and pelagic prey; and
- sampling of seagrass for evidence of oil.

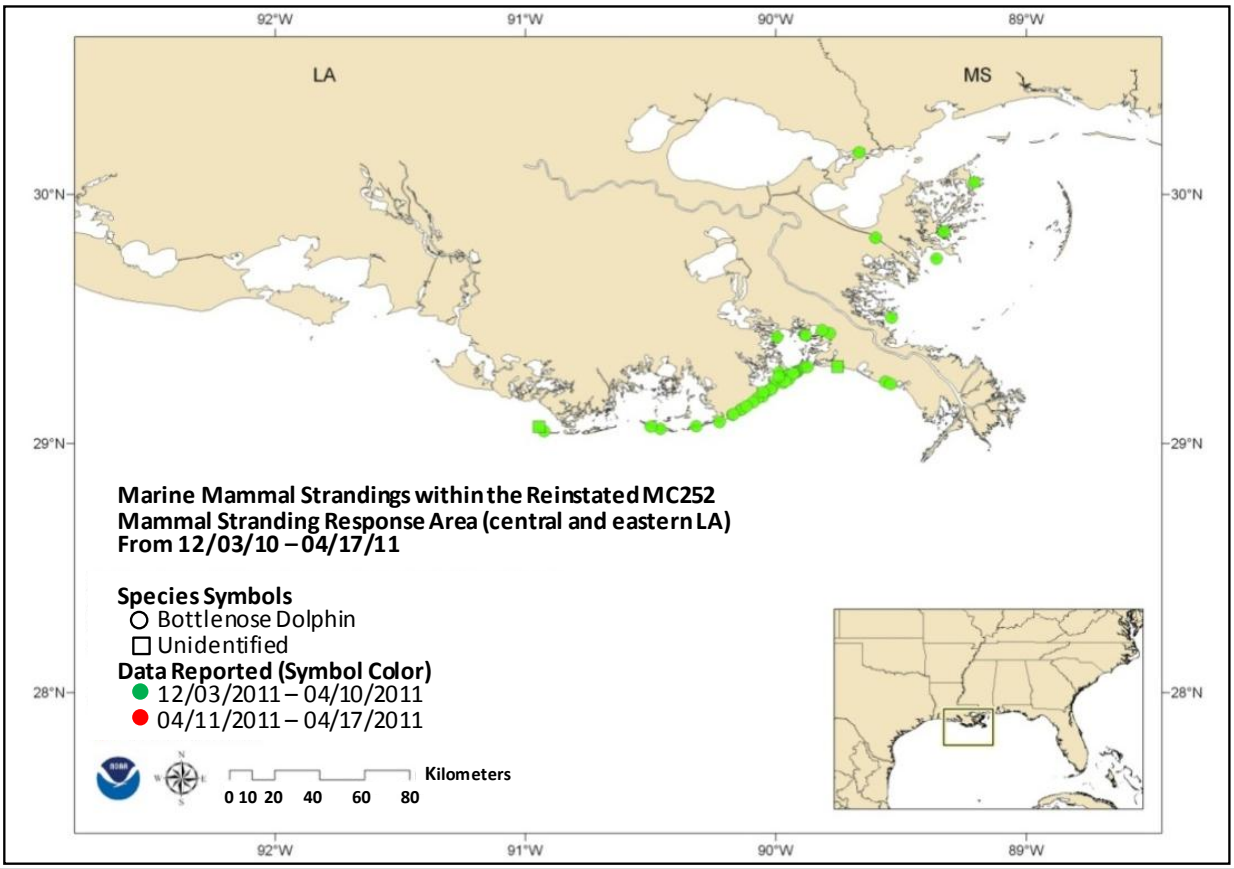

Figure III-6. Location and species identification of marine mammals stranded during the reinstated response for the Deepwater Horizon oil spill, 3 December – 17 April 2011 (NOAA)

The Commission's Executive Director and Energy Policy Analyst visited the Gulf in August 2010 and met with personnel involved in both response and assessment at the Deepwater Horizon Incident Command Centers in New Orleans (Louisiana), Houma (Louisiana), and Mobile (Alabama). They participated in a photo-identification survey of bottlenose dolphins in Mississippi Sound, Mississippi, and an aerial survey of marine mammals and sea turtles out of Mobile, Alabama, both coordinated by NOAA.

Assessment tools and preliminary data

During the oil spill, NOAA launched its Emergency Response Management Application (ERMA), a web-based Geographic Information System tool designed to assist both emergency responders and environmental resource managers involved in response and assessment. ERMA provides a visual display of the features and baseline information for the Gulf of Mexico and also of information collected during and after the spill (Figure III-7). It also provides a link to a wide variety of preliminary data collected during response and assessment activities, including data on marine mammal strandings. Additional information on that valuable tool and data collected during response and assessment efforts can be found at NOAA's ERMA website.[18]

[18] http://www.response.restoration.noaa.gov/maps-and-spatial-data/environmental-response-management-application-erma/erma-gulf-response.html

Table III-3. Marine mammal stocks in the Gulf of Mexico (NOAA)

Sperm whale[1]	Bryde's whale	Killer whale
Cuvier's beaked whale	Atlantic spotted dolphin	False killer whale
Blainville's beaked whale	Pantropical spotted dolphin	Pygmy killer whale
Gervais' beaked whale	Striped dolphin	Dwarf sperm whale
Bottlenose dolphin (oceanic)	Spinner dolphin	Pygmy sperm whale
Bottlenose dolphin (continental shelf)	Rough-toothed dolphin	Melon-headed whale
Bottlenose dolphin (coastal – 3 stocks)	Clymene dolphin	Risso's dolphin
Bottlenose dolphin (bay, sound, estuary –32 stocks)	Fraser's dolphin	Pilot whale, short-finned
West Indian manatee (coastal - 1 stock)[1]		

[1]Listed as endangered under the Endangered Species Act

Baseline information on Gulf of Mexico marine mammal stocks

When an event such as the Deepwater Horizon oil spill occurs, the natural resource damage assessment would benefit greatly by the availability of adequate baseline information on the resources within the affected area. The Gulf of Mexico supports a variety of marine mammals, including 21 cetacean species and 1 sirenian (Waring et al. 2010, Table III-3). Those species comprise 57 stocks, 37 of which are bottlenose dolphin stocks. The National Marine Fisheries Service has management responsibility for the cetacean species and the Fish and Wildlife Service has responsibility for the Florida subspecies of the West Indian manatee. Section 117 of the Marine Mammal Protection Act requires the National Marine Fisheries Service and the Fish and Wildlife Service to prepare stock assessments for each stock of marine mammals occurring in waters under the jurisdiction of the United States.

Existing information on the status of the majority of marine mammal stocks in the Gulf falls well short of that required under the Marine Mammal Protection Act and that needed to assess their pre-spill status and vulnerability to various risk factors. The necessary information includes stock structure, distribution, abundance, movement patterns, age structure, reproductive rates, survival rates, and health (nutritional status, immune function, and exposure to contaminants, biotoxins, and pathogens).

The lack of adequate research infrastructure in the Gulf (especially logistic support) prior to the spill has been a significant impediment to conducting surveys and other assessment studies. The pre-spill studies generally focused on specific topics (e.g., response of sperm whales to seismic surveys). As a result, little multi-year funding before the spill was directed toward understanding the full spectrum of risks to marine mammals and the cumulative effects of multiple risk factors, despite the fact that the Gulf is highly industrialized and multiple marine mammal unusual mortality events have occurred there over the past 20 years.

Comprehensive data collection efforts by NOAA and the Fish and Wildlife Service for the pre-assessment phase of the natural resource damage assessment do not provide a substitute for the baseline data that should have been collected for Gulf marine mammal stocks prior to the spill. Nonetheless, the data collected will be useful for characterizing marine mammal movements and behavior immediately before, during, and after oil and chemical dispersants reached key coastal and deepwater habitats. Thus, they also provide an important reference for assessing the effects of the spill and response activities.

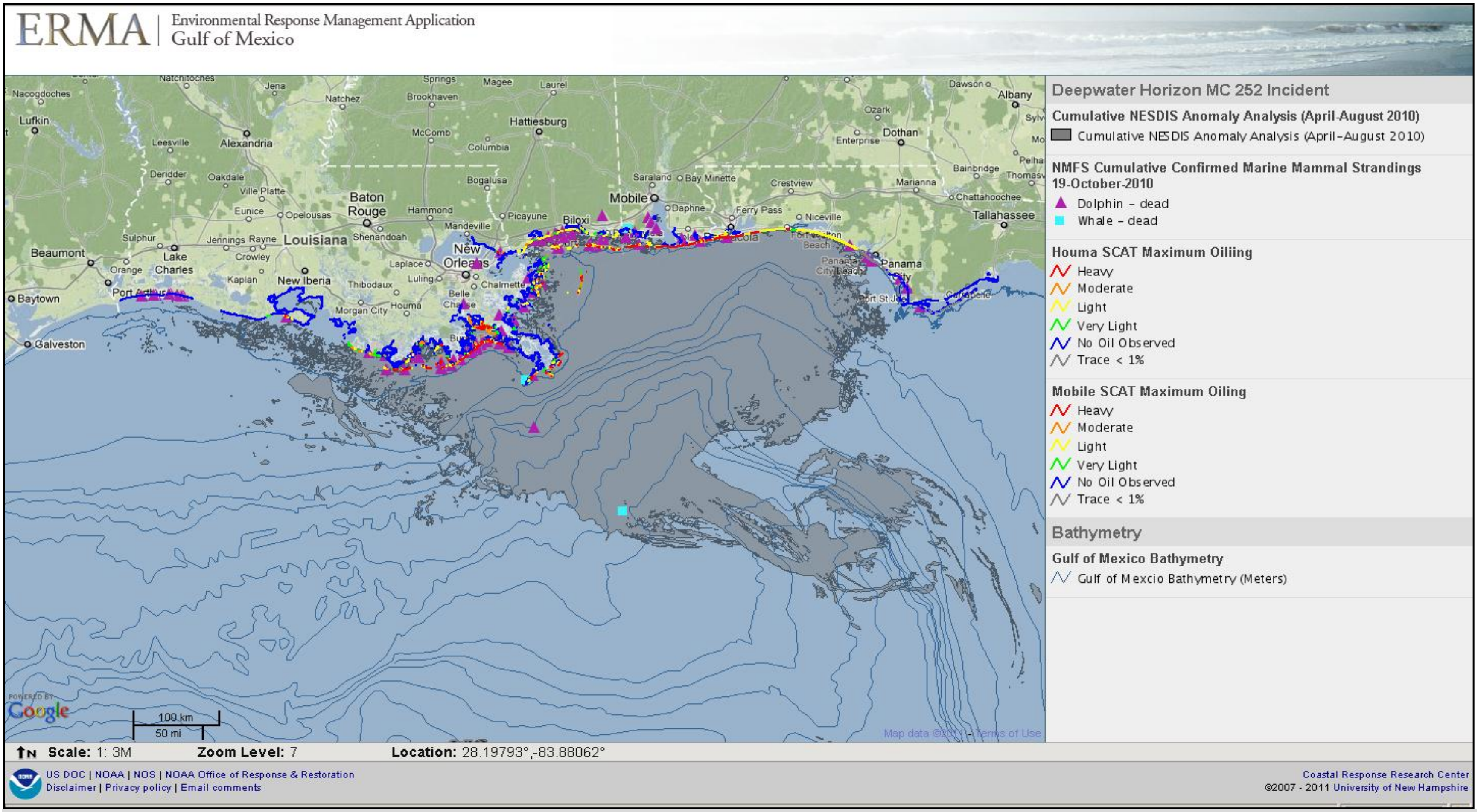

Figure III-7. ERMA map showing cumulative oil spill coverage offshore, marine mammal strandings, and maximum shoreline oiling (NOAA)

Interagency meeting on oil spill preliminary effects and long-term monitoring needs

In August 2010 the Marine Mammal Commission convened a meeting of scientists and managers from several federal agencies working on the Deepwater Horizon oil spill response and assessment efforts. The goals of the interagency meeting were to (1) share information on agency efforts to assess impacts of the oil spill on marine mammal populations in the Gulf of Mexico, (2) identify existing information gaps and ways to address them, and (3) consider information needs as agencies shifted to long-term monitoring of the Gulf ecosystem. In addition to the Marine Mammal Commission, agencies represented at the meeting were NOAA, the Fish and Wildlife Service, the Bureau of Ocean Energy Management, Regulation, and Enforcement (formerly the Minerals Management Service), the U.S. Coast Guard, the Navy, the Office of Naval Research, and the National Science Foundation. NOAA and Fish and Wildlife Service scientists presented preliminary information collected from response and assessment activities to date. They also identified significant data gaps in baseline information on marine mammals and on the possible effects of oil exposure on Gulf marine mammal populations.

Participants at the meeting indicated that they could not be certain that work plans and monitoring programs established under the natural resource damage assessment process would be in place long enough to detect and quantify long-term (five years or more) changes in status or distribution of marine mammal populations, especially for those stocks for which baseline information is scarce and/or access to animals has been limited. For that reason, they gave high priority to the development of a comprehensive plan to address long-term monitoring needs for marine mammals in the Gulf. The Commission agreed to take the lead in developing such a plan and sought input from NOAA's National Ocean Service and National Marine Fisheries Service, the Fish and Wildlife Service, and the Bureau of Ocean Energy Management, Regulation, and Enforcement as it developed the plan.

The Marine Mammal Commission's statement of research needs

In August 2011 the Commission released the long-term monitoring plan in the form of a report "Assessing the long-term effects of the BP Deepwater Horizon oil spill on marine mammals in the Gulf of Mexico: A statement of research needs."[19] The report outlined the legal mandates for assessing a spill's overall effects and reviewed the likely effects of oil spills on marine mammals. It characterized research efforts to date, highlighted the overall need to improve assessment and monitoring of the Gulf's marine mammals, and outlined priorities for future efforts.

The Commission believes that assessment and monitoring efforts should be given high priority during or immediately after a spill to document exposure and make preliminary determinations regarding resources most affected by the spill and response activities. The Commission acknowledges that the likelihood of detecting certain effects decreases with time and the utility and value of certain types of research decline accordingly. Because agencies tend to focus on immediate assessment and monitoring, the Commission's report focused on tasks aimed at understanding potential long-term effects on Gulf marine mammals, including—

- **Evaluating the effect of exposure to oil or dispersant-related contaminants on physiological functions (immune, reproductive, and other vital systems)**: This involves assessing the health status and contaminant loads of stranded or live-captured animals, conducting necropsies of dead animals, assessing reproductive rates and indications of reproductive failure (e.g., aborted fetuses, malformed offspring), controlled exposure experiments, and genomic analyses;
- **Assessing oil and/or response-related changes in the ecosystem resulting in a reduction in prey availability**: This involves evaluating the body condition of live and stranded animals, looking for changes in diet as determined by observations of foraging behavior and stomach/intestinal content analyses, and prey surveys to assess biomass and changes therein over space and time;

[19] http://www.mmc.gov/reports/workshop/pdf/longterm_effects_bp_oilspil.pdf

- **Evaluating how oil and/or response activities may have led to ecosystem changes that are harmful to marine mammals (e.g., harmful algal blooms, hypoxia or anoxia)**: This involves observations of stranded animals and stranding patterns, analyses of tissues for evidence of toxins, and monitoring of harmful algal blooms and hypoxic/anoxic zones; and
- **Determining the extent to which exposure to oil and/or response activities leads to a reduction in status of marine mammal populations involving individual fitness, population vital rates (survival and reproduction), and population abundance and trends**: This involves observations of mortality rates and evidence of reproductive failure, and aerial, vessel, shoreline, and acoustic surveys to assess relative or absolute changes in numbers of animals, especially mother/calf pairs.

The statement of research needs was submitted to the Senate Committee on Commerce, Science and Transportation on 8 August 2011, as part of the administrative record for its 20 July 2011 hearing on "Looking to the Future: Lessons in Prevention, Response, and Restoration from the Gulf Oil Spill." It also was distributed to several federal and state government agencies, research organizations, and conservation groups working in the Gulf and nationally on marine mammals and oil and gas related activities.

Independent studies of oil spill effects

As unfortunate as it was, the spill created an opportunity to learn about the effects of oil spills and response activities on marine ecosystems. The natural resource damage assessment will provide much valuable information, but that information should be supplemented by independent, hypothesis-driven scientific research. The need for such research was recognized soon after the spill and was facilitated by support from BP, the government, and private foundations.

On 24 May 2010, BP committed $500 million over a 10-year period to investigate the impacts of the spill on the Gulf ecosystem and affected states. The funds were used to create the Gulf of Mexico Research Initiative, a broad, independent research program to be conducted primarily by research institutions in the Gulf Coast states. The Research Initiative is overseen by an independent board of scientists selected by BP and the governors of the five Gulf states. The objective is to "investigate the impacts of the oil, dispersed oil, and dispersant on the ecosystems of the Gulf of Mexico and affected coastal States in a broad context of improving fundamental understanding of the dynamics of such events and the associated environmental stresses and public health implications." Funding has been awarded on a competitive basis, with the first year of funding (1 June 2010–31 May 2011) focused on rapid-response studies that could be implemented shortly after the spill. A wide variety of studies were implemented, including a study of the effects of oil on estuarine bottlenose dolphins in the Florida panhandle by the Florida Institute of Technology. Second year funding was for longer-term (three-year) projects.[20]

The National Science Foundation awarded a number of rapid-response grants to independent researchers immediately following the spill.[21] For marine mammals, they included awards to the University of Louisiana at Lafayette for modeling of marine mammal population trends using passive acoustic monitoring cues, and to Mote Marine Laboratory to help assess effects of sub-lethal oil exposure on critical biological functions of marine mammals and sea turtles. Private foundation funding for research on spill effects on marine mammals also was provided to the Chicago Zoological Society, the Ocean Alliance, the Dauphin Island Sea Laboratory, and others. The Gulf of Mexico Sea Grant programs website has a searchable database that provides summary information about research and monitoring activities related to the Deepwater Horizon oil spill.[22]

[20] http://www.gulfresearchinitiative.org/
[21] http://www.nsf.gov/awardsearch/advancedSearch.jsp; enter "5987" under "Reference Code" for Deepwater Horizon-related projects
[22] http://gulfseagrant.tamu.edu/oilspill/database.htm

Restoration planning

In October 2010 the trustees confirmed damage and injury to natural resources and issued a notice of intent to begin planning restoration activities (75 Fed. Reg. 60800). In accordance with the regulations implementing the Oil Pollution Act, restoration planning occurs concurrently with damage assessment—in essence, proposals for ecosystem restoration are being developed even before the nature and full extent of the damages have been determined. The emphasis on early restoration planning was designed to jump-start the restoration process, especially because the determination of final damages can be a protracted process.

During the planning stage, the trustees "fully evaluate, assess, quantify, and develop plans for restoring, replacing, or acquiring the equivalent of natural resources injured and losses resulting from the Deepwater Horizon incident" (75 Fed. Reg. 60800). Resources affected by the spill occurred in state and federal waters and throughout the water column. They included over 1,700 km (1,096 miles) of shoreline habitat, including salt marshes, sandy beaches, and mangroves; a variety of wildlife species including birds, sea turtles, marine mammals; benthic communities and fish; and areas used by humans for such things as swimming, fishing, beach-going, and enjoyment and viewing of wildlife.[23]

On 15 June 2010, President Obama announced that the Secretary of the Navy would lead development of a long-term Gulf Coast Restoration Plan. The Secretary consulted with or sought comments from fishermen, health officials, conservation workers, leaders of nonprofit organizations, local leaders, scientists, members of the business community, elected officials, and thousands of Gulf Coast residents. He released "America's Gulf Coast: A Long Term Recovery Plan after the Deepwater Horizon Oil Spill" in September 2010.[24] The plan's main recommendations were for—

- Congressional action to dedicate a significant amount of civil penalties recovered under the Clean Water Act from BP and the other responsible parties toward assisting the region where the damage from the spill occurred, with federal, state, local, and tribal actions coordinated by a Gulf Coast Recovery Council working in concert with the trustee agencies, and
- immediate establishment of a federal lead for Gulf recovery and the creation of a Gulf Coast Ecosystem Restoration Task Force to coordinate the recovery of the region's ecosystem.

By Executive Order on 5 October 2010, President Obama acted on the Secretary's recommendations and established the Gulf Coast Ecosystem Restoration Task Force. The order charged the Task Force with developing an ecosystem restoration plan to address both the damage caused by the Deepwater Horizon oil spill and the long-standing ecological decline of the Gulf, with the aim of moving toward a more resilient Gulf Coast ecosystem. The President also appointed Lisa Jackson, the Administrator of the Environmental Protection Agency, to Chair the Task Force. Members included representatives of several key federal departments and agencies, representatives of the five Gulf states, and elected officers of affected tribes. In establishing the Task Force, the President recognized that efforts to restore the Gulf had begun well before the Deepwater Horizon spill, and that a comprehensive strategy was needed that could incorporate ongoing activities, support the natural resource damage assessment process, and ensure that restoration efforts were coordinated and effective.

The Marine Mammal Commission sent a letter to Administrator Jackson in October 2010 noting the Commission's familiarity with the wide range of risk factors that affect marine mammals and marine ecosystems, including those posed by oil and gas activities. The Commission offered its assistance to the Task Force's efforts to guide restoration of the Gulf Coast. The Task Force did not respond.

The Task Force released its preliminary "Gulf of Mexico Regional Ecosystem Restoration Strategy" in October 2011. It outlined a framework for reversing widespread environmental degradation (much of it from before the spill) to ensure a healthy marine environment and economic future for the Gulf.

[23] http://www.restorethegulf.gov
[24] http://www.restorethegulf.gov/sites/default/files/documents/pdf/gulf-recovery-sep-2010.pdf

The final "Gulf of Mexico Regional Ecosystem Restoration Strategy," issued in December 2011,[25] established four overarching restoration goals—

- **Restore and conserve habitat**: expedite implementation and improve the effectiveness of state and federal programs related to landscape-scale resource management, habitat conservation and restoration strategies;
- **Restore water quality**: reduce the amount of nutrients flowing into the Gulf and undertake other measures to enhance water quality;
- **Replenish and protect living coastal and marine resources**: promote sustainable resource management that focuses on actions to conserve and restore viable populations of living coastal and marine resources and their coastal and offshore environments; and
- **Enhance community resilience**: integrate the creation of resilient communities with ecosystem restoration through the development of comprehensive coastal planning programs.

The Task Force recommended that resource agencies implement existing recovery and conservation plans and, where needed, develop plans for conserving threatened and endangered species. In the Gulf, the sperm whale and the West Indian manatee are listed as endangered under the Endangered Species Act. The responsible agencies have completed recovery plans for both, but implementation has been hampered for sperm whales by inadequate infrastructure (e.g., access to survey vessels) and for manatees by obstacles to protecting their habitat (e.g., coastal development, poor compliance with boat speed limits). The Task Force also recommended more monitoring to identify and track sentinel species and sites.

In its comments on the draft, the Commission supported the restoration goals of the Gulf, noting they would foster recovery of the Gulf's marine mammals. The Commission also provided to the Task Force a copy of its statement of research needs for assessing the long-term effects of the BP Deepwater Horizon oil spill on marine mammals in the Gulf of Mexico.

Early restoration activities

Coincident with the efforts of the Task Force, the Trustees approached BP to negotiate an agreement on early restoration measures. On 20 April 2011, the one year anniversary of the Deepwater Horizon explosion, the trustees and BP entered into a "Framework Agreement" that required BP and the trustees to work together to identify early restoration projects that would provide "meaningful benefits to accelerate restoration in the Gulf as quickly as practicable" and set out criteria for project design and selection.[26]

The agreement also required BP to set aside one billion dollars for early restoration projects and it outlined how the funds would be used. Each Gulf state would select and implement $100 million in projects. The federal resource trustees (NOAA and the Department of the Interior) would each select and implement $100 million in projects, with the remaining $300 million to be used for projects selected by NOAA and the Department of the Interior from proposals submitted by the states.

On 14 December 2011, the trustees announced eight early restoration projects—two each in Louisiana, Mississippi, Alabama, and Florida—that met the framework criteria. The proposed projects were selected, in part, because they were "shovel-ready" (i.e., could be implemented quickly) and soon would begin producing environmental benefits. Projects proposed for Phase I early restoration included marsh creation in Louisiana and Alabama, oyster restoration in Louisiana and Mississippi, dune restoration in Alabama and Florida, creation of artificial reef habitat in Mississippi, and boat ramp enhancement and construction in Florida. The total cost of the eight projects was estimated at $57 million, and public comment on the proposed projects was requested. The proposed projects represent only the first phase of a multi-year process. Their success will be monitored and they will be adapted as necessary.

[25] http://www.epa.gov/gcertf/pdfs/GulfCoastReport_Full_12-04_508-1.pdf

[26] http://www.gulfspillrestoration.noaa.gov/wp-content/uploads/2011/05/framework-for-early-restoration-04212011.pdf

Use of Clean Water Act penalties for restoration

Under the Oil Pollution Act of 1990, BP and the other responsible parties for the Deepwater Horizon oil spill are liable for costs associated with the removal of oil (i.e., cleanup costs) and for damages to natural resources and services caused by the spill, including the costs of assessing those damages. The Oil Pollution Act generally limits total liabilities to $75 million per spill, plus removal costs,[27] unless the responsible party for a spill showed gross negligence, willful misconduct, or a failure to comply with federal operating, construction, or safety regulations, in which case the limit does not apply (33 U.S.C. § 2704).

The responsible parties also may be subject to civil and criminal monetary penalties under the Clean Water Act, but rather than paying for clean-up or restoration of the spill in question, those penalties must be deposited into the Oil Spill Liability Trust Fund to be used for future oil spill cleanup activities. For that reason, those funds would not be available for addressing damages caused by the Deepwater Horizon spill or for restoration activities. The total amount of civil penalties that might be assessed for the Deepwater Horizon spill under the Clean Water Act would depend on findings of negligence and the calculation of barrels discharged, and could range from 5.4 to 21 billion dollars.[28] Criminal penalties under the Clean Water Act could add another two to four million dollars to that estimate.[29]

As mentioned above, the Secretary of the Navy's report recommended that the President urge Congress to use a portion of the Clean Water Act penalties for restoration and economic recovery of the Gulf. In turn, the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling (Oil Spill Commission) recommended in their January 2011 report to the President that 80 percent of Clean Water Act penalties be used specifically for long-term restoration of the Gulf. That recommendation has been taken up, with some variation, in legislation sponsored by various Congressional members.[30] If passed, the use of Clean Water Act penalties could foster significant progress in fully restoring the Gulf, an undertaking that the Oil Spill Commission reported could require a total of $15 to $20 billion, or $500 million annually for 30 years. Legislative options for implementing that recommendation were still under consideration at the end of 2011.

Lessons learned and actions taken to date

Congress held numerous investigations and hearings immediately after the Deepwater Horizon oil rig explosion to determine its cause. Other investigations and hearings evaluated the effectiveness of response efforts and the assessment process. All were carried out under great public scrutiny. The following summarizes some of the more prominent activities.

Congressional action: According to the Consortium for Ocean Leadership, Congress held at least 43 hearings related to the Gulf oil spill in 2010 and 20 more in 2011.[31] Congress also crafted extensive legislation—in 2010, 35 oil spill-related bills or resolutions were introduced in the House of

[27] http://www.epa.gov/osweroe1/content/lawsregs/opaover.htm

[28] The Clean Water Act provides for a civil penalty of up to $37,500 per day of violation or up to $1,100 per barrel of oil discharged. In the case of an operator's gross negligence or willful misconduct, the civil penalty becomes not less than $140,000 and not more than $4,300 per barrel of oil discharged. NOAA has estimated that approximately 4.9 million barrels of oil spilled over the course of 86 days, with approximately 800,000 barrels recovered at the wellhead.

[29] If criminal penalties are assessed, the responsible parties would be subject to a fine of between $2,500 and $25,000 per day of violation for a first violation and up to $50,000 per day for subsequent violations. For knowing violations of the Act, criminal fines range between $5,000 and $50,000 per day of violation for a first conviction, and up to $100,000 per day for subsequent violations.

[30] See www.oceanleadership.org/gulf-oil-spill/congressional-action/ for summaries of legislation introduced during the 111th and 112th Congresses pertaining to the Deepwater Horizon oil spill.

[31] http://www.oceanleadership.org/gulf-oil-spill/congressional-action/

Representatives and 19 in the Senate; in 2011, 25 bills were introduced in the House and 17 in the Senate.[32] Proposed legislation focused on a wide range of issues, among them industry liability for cleanup and damages, suspension of certain drilling activities, stronger regulation of the oil and gas industry, designation of areas that would be off limits to drilling activities, equipment to increase drilling safety, better oil spill prevention planning, reversing the drilling moratorium, enhanced research and development, and enhanced funding for the U.S. Coast Guard and NOAA.

Despite all the legislative activity, Congress passed only one bill directly responding to the Deepwater Horizon oil spill before the end of 2011. On 15 June 2010, Senate bill 3473 became Public Law 111-191, an act to amend the Oil Pollution Act of 1990 to authorize advances from the Oil Spill Liability Trust Fund for the Deepwater Horizon oil spill. In addition, two resolutions were passed in the 111th Congress, one by the Senate (S. Res. 523, 12 May 2010) and one by the House of Representatives (H. Res. 1347, 26 May 2010). Both honored the crew members who lost their lives in the Deepwater Horizon oil rig explosion and expressed condolences to their families. The House version also recognized the valiant efforts of the emergency responders at the disaster site.

Joint investigation of the explosion: On 27 April 2010, the Department of Homeland Security (Coast Guard) and the Department of the Interior (Minerals Management Service) launched a joint investigation into the explosion and sinking of the Deepwater Horizon drilling rig. The results of the investigation were issued in two volumes – the first by the Coast Guard in April 2011[33] and the second by the Bureau of Ocean Energy Management, Regulation and Enforcement in September 2011.[34]

In volume I the Joint Investigation Team determined that the explosion was ultimately caused by the loss of well control, but they also concluded that several system deficiencies and crew decisions may have contributed to the explosion or its impact, including poorly maintained electrical equipment onboard the rig, bypassing of gas alarms and automatic shutdown systems that could prevent an explosion, and lack of training of personnel on when and how to shutdown engines and disconnect the rig from the well to avoid or mitigate the damage from an explosion. The Team's initial findings pointed to a general failure of the rig's safety management system and a lack of emphasis on a "culture of safety" by the rig owners and operators.

In volume II the Bureau of Ocean Energy Management, Regulation and Enforcement's panel of investigators subsequently confirmed that the well blowout was caused proximally by a failure of a cement barrier in the production casing string—a steel pipe installed in a well to ensure well integrity and allow future production. That allowed hydrocarbons (oil and gas) to flow unimpeded up the well and onto the rig, causing the blowout. The panel attributed responsibility to BP (the operator of the rig), Transocean (the owner of the rig), Halliburton (contracted by BP to do the cementing), and Cameron (the manufacturer of the blowout preventer), and the Bureau found that BP, Transocean, and Halliburton violated several federal safety regulations. The panel recommended that stronger and more comprehensive federal regulations might have reduced the likelihood of the blowout, and included recommendations for stronger regulations to address well design, well integrity testing, kick detection and response, rig engine configuration, blowout preventers, and remotely-operated vehicles.

Department of the Interior investigations, reorganization, and new safety requirements: On 30 April 2010, the Department of the Interior established an Outer Continental Shelf Safety Advisory Board to review the Deepwater Horizon incident and to report, within 30 days, on "what, if any, additional precautions and technologies should be required to improve the safety of oil and gas exploration and production operations on the outer continental shelf." On 27 May 2010, the Department issued a report entitled "Increased Safety Measures for Energy Development on the Outer Continental Shelf."[35] The

[32] http://www.oceanleadership.org/gulf-oil-spill/congressional-action/

[33] https://homeport.uscg.mil/cgi-bin/st/portal/uscg_docs/MyCG/Editorial/20110914/2_DH%20Volume%201_redacted_3.pdf?id=eb9586805c8c65727097d3da41dd157a294b42de&user_id=2a47d4dbfd24ce2da39438e736cab2d6

[34] http://docs.lib.noaa.gov/noaa_documents/DWH_IR/reports/dwhfinal.pdf

[35] http://www.doi.gov/deepwaterhorizon/loader.cfm?csModule=security/getfile&PageID=33598

report recommended specific measures to enhance the safety of drilling operations based on preliminary findings regarding the causes of the Deepwater Horizon explosion. Recommendations called for measures to—

- ensure sufficient redundancy in the blowout preventers, including mandatory inspections, new safety features and equipment, and new testing, inspection, and reporting requirements;
- promote the integrity of the well and enhance well control through enhanced well control procedures, new requirements for casing and cement, and other features of an exploratory well; and
- facilitate a culture of safety through verification of compliance with safety requirements, new requirements to improve organizational and safety management, and development of a systems-based approach to safety and environmental management.

On 19 May 2010, Department of the Interior Secretary Ken Salazar signed a Secretarial Order to initiate the restructuring of the Minerals Management Service to split three potentially conflicting missions—energy development, enforcement, and revenue collection. The three new separate agencies were constituted as follows—

- **Bureau of Ocean Energy Management**: responsible for the sustainable development of the outer continental shelf's conventional and renewable energy resources, including resource evaluation, planning, and other activities related to leasing;
- **Bureau of Safety and Environmental Enforcement**: responsible for ensuring comprehensive oversight, safety, and environmental protection related to offshore energy activities; and
- **Office of Natural Resources Revenue**: responsible for royalty and revenue management for offshore energy leasing and development, including the collection and distribution of revenue, auditing and compliance, and asset management.

The Administration renamed the Minerals Management Service the Bureau of Ocean Energy Management, Regulation, and Enforcement in June 2010 as an interim measure while the formal reorganization was underway.

On 30 May 2010, the Department of the Interior issued a Notice to Lessees (NTL 2010-N04) announcing an immediate, six-month moratorium on drilling of all existing and new deepwater wells, and on the issuance of permits for new deepwater wells. The moratorium was intended to provide time for further investigations into the root causes of the Deepwater Horizon explosion and allow oil companies to implement new safety requirements.

To address the recommendations of the May 2010 safety report, the newly formed Bureau of Ocean Energy Management, Regulation, and Enforcement implemented several new regulations and requirements for offshore oil and gas operators. On 18 June 2010, the Bureau issued a Notice to Lessees (NTL 2010-N06) [36] requiring operators to certify compliance with existing safety regulations and with the 30 April 2010 Minerals Management Service/United States Coast Guard Safety Alert "Deepwater Horizon Explosion and Fire Resulting in Multiple Fatalities and Release of Oil." The Notice also required operators to submit information on their blowout preventer and well control system configuration for drilling rigs in use at the time the safety report was issued.

In October 2010 the Bureau issued two final safety-related rules and lifted the moratorium on deepwater drilling and permitting. The Bureau's workplace safety rule required oil and gas companies to implement safety and environmental management systems for all activities conducted on the outer continental shelf (75 Fed. Reg. 63610). That rule had been proposed earlier (in June 2009) by the Minerals Management Service, and the Marine Mammal Commission had commented in support of the rule in a letter dated 15 September 2009.

[36] http://www.boem.gov/Regulations/Notices-To-Lessees/2010/10-n06.aspx

That same month, the Bureau also issued an interim final rule to amend drilling regulations related to well control, including requirements for subsea and surface blowout preventers, well casing and cementing, secondary intervention, unplanned disconnects, recordkeeping, well completion, and well plugging (75 Fed. Reg. 63346). The Marine Mammal Commission commented in support of the rule on 13 December 2010, and recommended that in addition to imposing the new regulations, the Bureau conduct a systematic review and risk assessment of each offshore oil and gas operation and identify additional safety measures needed to address shortcomings in all aspects of operations. The Commission also recommended that the Bureau devise and implement new and creative techniques for promoting, tracking, and enforcing compliance with safety measures and regulations, including incorporation of non-regulatory incentives for compliance. Finally, the Commission recommended that the Bureau establish apprenticeships, internships, training programs, partnerships with academia and industry, and/or international exchange programs to recruit, train, and maintain the highly skilled workforce needed to oversee the offshore oil and gas industry, enforce regulations, and ensure strict adherence to safety measures and procedures.

In November 2010, the Bureau issued a Notice to Lessees requiring that companies verify compliance with regulations requiring demonstration of adequate spill response and well containment resources (NTL 2010-N10). In June 2011 the Bureau announced that it would begin deploying multi-person inspection teams for offshore oil and gas inspections rather than single inspectors. The Bureau also established an Ocean Energy Safety Advisory Committee in April 2011 (which met twice) and also embarked on an intensive recruitment campaign for inspectors, engineers, and environmental scientists.

On 1 October 2011, the the Assistant Secretary for Policy, Management, and Budget assumed the duties of the Office of Natural Resources Revenue and the Bureau of Ocean Energy Management and Bureau of Safety and Environmental Enforcement split the remaining responsibilities of the former Bureau of Ocean Energy Management, Regulation, and Enforcement. Both of the new Bureaus were kept under the Assistant Secretary for Land and Minerals Management.

At the end of 2011, the Bureau of Safety and Environmental Enforcement had not revised the former Bureau's interim final drilling rule, but many of its other safety reforms have addressed the Commission's concerns regarding industry safety practices and have strengthened enforcement of safety requirements. The Bureau of Safety and Environmental Enforcement implemented internal reforms, such as a recusal policy for employees with real and perceived conflicts of interest, the establishment of special teams to implement recommendations from external review bodies, and a new investigations and review unit to respond to allegations or evidence of misconduct and unethical behavior by the Bureau's employees and/or industry. The new safety and enforcement measures implemented by the Bureau will require an adaptive approach to ensure that regulations and requirements for oil and gas operators keep pace with advancing technologies for drilling and promote advancements in well containment and spill response.

Oil Spill Commission investigation and recommendations: As noted earlier, on 21 May 2010, the President established the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling (Oil Spill Commission). He directed the Commission to examine, within six months, the relevant facts and circumstances concerning the root causes of the Deepwater Horizon oil disaster, and to develop options for guarding against, and mitigating the impact of, oil spills associated with offshore drilling, taking into consideration the environmental, public health, and economic effects of such options. The Commission, co-chaired by Senator Bob Graham and former Environmental Protection Agency Administrator William K. Reilly, held six public meetings between July and December 2010. The Marine Mammal Commission provided extensive comments and recommendations for consideration by the Oil Spill Commission in a letter dated 1 November 2010.

In its 2011 final report, the Oil Spill Commission concluded that the Deepwater Horizon explosion was caused by a loss of well control, also known as a blowout, and that it could have been prevented (Oil Spill Commission 2011). The lack of an adequate risk management system by the operators of the well was symptomatic of failures in the safety culture of the industry as a whole, especially with respect to the challenges inherent in deepwater oil and gas exploration. The Oil Spill Commission concluded that fundamental reform was needed of the regulatory oversight process, as well as self-policing by the

industry. The spill revealed the inadequacy of current spill containment, response, and cleanup capabilities, and shortcomings in our scientific understanding of the environmental conditions in deepwater and other frontier environments (i.e., the Arctic).

The Oil Spill Commission made numerous recommendations to—

- improve the government's role in ensuring the safety of offshore operations;
- improve the industry's role in ensuring the safety of offshore operations;
- safeguard the environment;
- strengthen oil spill response, planning, and capacity;
- advance well-containment capabilities;
- overcome the impacts of the Deepwater Horizon spill and restoring the Gulf;
- ensure financial responsibility;
- promote Congressional engagement to ensure awareness of the risks of offshore drilling; and
- prepare for the expansion of oil and gas development into frontier areas.

In its report, the Oil Spill Commission recommended that government work with industry to develop a stronger safety culture including more rigorous risk management systems. It also recommended the development of international standards for drilling, production, and emergency response, and a pro-active, risk-based performance approach specific to individual facilities, operations, and environments. To address conflicts within the Minerals Management Service, it recommended the establishment of an independent agency within the Department of the Interior with oversight of drilling safety, consistent with the Department's ongoing reorganization of the Minerals Management Service and the creation of the independent Bureau of Safety and Environmental Enforcement. It also recommended that Congress provide adequate funding to the regulatory agencies for reviewing and permitting drilling and development activities. The Oil Spill Commission did not make specific recommendations regarding the number, training, qualifications, and practices of government regulators, as recommended by the Marine Mammal Commission, but it did recommend enhancement of government expertise and industry planning to ensure adequate well control and spill containment.

The Oil Spill Commission also recommended the establishment of a private organization to ensure continuous improvements in safety and operational integrity by developing, adopting, and enforcing industry standards of excellence. Such standards could include testing of equipment and technology, as recommended by the Marine Mammal Commission. The Marine Mammal Commission called for a national database of oil and gas operations. The Oil Spill Commission did not go that far, but it did call for requirements for industry reporting and data concerning offshore incidents and "near misses" to allow for better tracking of incidents and stronger risk assessments and analysis.

The Oil Spill Commission reviewed the National Environmental Policy Act process in place prior to the Deepwater Horizon explosion and concluded that it needed significant revision. Specifically, the Oil Spill Commission noted the Department of Interior's over-reliance on "tiering" as a substitute for detailed site-specific reviews, the routine application of categorical exclusions to potentially risky or harmful activities (i.e., deepwater drilling), the practice of area-wide leasing, and the lack of formal guidance for conducting National Environmental Policy Act reviews. The Oil Spill Commission recommended that the Department of the Interior revise and strengthen National Environmental Policy Act policies, practices, and procedures to improve its environmental analyses, transparency, and consistency at all stages of the leasing, exploration, and development process. It also called for greater interagency consultation (especially with NOAA) on oil and gas decision-making processes, the formation of a joint research program to address data gaps, regular independent reviews of the government's environmental studies programs, industry protocols for data collection, and industry fees to support the environmental science and regulatory review process. Although the Oil Spill Commission did not make specific recommendations regarding the quality and quantity of baseline population and health information for marine mammals and marine wildlife, the recommendations regarding enhanced environmental research

would help to address the Marine Mammal Commission's call for information standards to ensure that the environmental review process is not only transparent and accessible but also adequately informed.

The Deepwater Horizon was an important reminder of the inadequacy of oil spill response capabilities and the Marine Mammal Commission noted in its 1 November 2010 letter that the lack of preparation for addressing problems could and should have been anticipated by the oil and gas industry and government regulators. The Oil Spill Commission apparently agreed, recommending that the Department of the Interior create a rigorous, transparent, and meaningful oil spill risk analysis and planning process. It also recommended that the Environmental Protection Agency and the Coast Guard establish distinct plans and procedures for responding to a "spill of national significance," bolster state and local involvement in contingency planning and training, and create a mechanism for local involvement in spill planning and response. It concluded that Congress should provide mandatory funding for oil spill response research and development and should also create incentives for the private sector to make similar investments. The Oil Spill Commission also recommended that dispersants be tested and pre-approved and that the use of offshore barrier berms be prohibited.

The Oil Spill Commission also made several recommendations for overcoming the impacts of the spill and restoring the Gulf. In particular, the Commission recommended that independent scientists be given timely access to the response area to facilitate research and long-term monitoring. The Commission noted that a clear commitment to independent science would bolster public confidence and trust and enhance understanding of a spill's effects on wildlife and the marine ecosystem. The Oil Spill Commission also recommended that compensatory restoration under the natural resource damage assessment process be transparent and appropriate, that Clean Water Act penalties be used for long-term restoration, and that federal agencies balance economic and environmental interests for restoration of the Gulf through improved monitoring systems (such as the Gulf of Mexico Integrated Ocean Observing System) and the use of coastal and marine spatial planning tools.

The Oil Spill Commission report concluded with several recommendations regarding human health impacts, financial responsibility and liability of the responsible parties, revisions to payout limits of the Oil Spill Liability Trust Fund, and Congressional engagement and awareness of the risk of offshore drilling and moving oil and gas exploration to frontier regions. Regarding the latter, the Oil Spill Commission cautioned that increasing demands for domestic oil production have led to increased pressure to develop higher risk sources of oil, such as those found in the ultra-deepwater environments of the Gulf and the largely untapped reserves of the Arctic Ocean. It noted that the Arctic presents several challenges due to its remoteness, harsh conditions, and lack of infrastructure, trained personnel, and equipment to respond to an oil spill emergency. The Oil Spill Commission recommended an immediate, comprehensive, and coordinated federal research effort to provide scientific information needed for informed decision-making in the Arctic. It noted that Alaska native people, dependent on the marine environment for subsistence, must be actively involved in planning and response. The Oil Spill Commission recommended that (1) the Department of the Interior ensure that oil spill containment and response plans are adequate for each stage of development and satisfactorily tested in the Arctic, (2) the Coast Guard and industry carefully delineate and prepare for their respective responsibilities in the event of an accident, and (3) Congress provide the resources to establish Coast Guard capabilities in the Arctic. Finally, the Oil Spill Commission recommended that strong international standards be developed for oil and gas development throughout the Arctic.

Implementation of the Oil Spill Commission's recommendations has been hindered by partisan disagreement regarding the proper pace of oil and gas development on the outer continental shelf and concerns that a precautionary approach to drilling could affect economic recovery in the Gulf. However, some progress has been made. Following the release of the Oil Spill Commission's report, H.R. 501 was introduced in the House of Representatives and called for implementation of the recommendations of the Oil Spill Commission. Other bills were introduced to implement selected recommendations. None of those bills had passed by the end of 2011, but the Department of the Interior, NOAA, and industry had begun implementing some of the Oil Spill Commission's recommendations, including the reorganization of the Minerals Management Service into three independent agencies, the signing of a Memorandum of

Agreement between the Bureau of Ocean Energy Management, Regulation and Enforcement and NOAA on 19 May 2011 regarding scientific information used to support decision-making regarding oil and gas development,[37] and the development of a joint government-industry data sharing agreement for Arctic research signed 19 August 2011 by NOAA, Shell, ConocoPhillips, and StatOil.[38]

National Academy of Sciences: Early in 2011 the National Academy of Sciences Ocean Studies Board began a study of the Deepwater Horizon oil spill effects on the Gulf's ecosystem services. The study aimed to create "a framework to assist federal agencies in assessing the effects of the oil spill on ecosystem services within the context of other human activities."[39] The Academy planned to release its report early in 2012. Once completed the study is supposed to address the following questions—

- What methods are available for identifying and quantifying various ecosystem services, at spatial and temporal scales conducive to research, that provide meaningful information for the public and decision-makers?
- What kinds of valuation studies and metrics are appropriate to measure the recovery of ecosystem services over time with regard to each of the following: natural processes, mitigation, and restoration efforts? What baseline measures are available that would provide benchmarks for recovery and restoration efforts?
- Is there sufficient pre-spill baseline information available to separate oil spill impacts from impacts of other human activities? What methods are available to help distinguish impacts specific to the spill?
- What ecosystem services (provisioning, supporting, regulating, and cultural services) were provided in the Gulf of Mexico Large Marine Ecosystem prior to the oil spill? How do those differ among the subregions of the Gulf of Mexico?
- How did the spill affect each of those services in the short-term, and what is known about potential long-term impacts given the other stresses, such as coastal wetland loss, on the Gulf ecosystem?
- How do spill response technologies (e.g., dispersant use, coastal berm construction, absorbent booms, in situ burning) affect ecosystem services, taking into account the relative effectiveness of those techniques in removing or reducing the impacts of spilled oil?
- In light of the multiple stresses on the Gulf of Mexico ecosystem, what practical approaches can managers take to restore and increase the resiliency of ecosystem services to future events such as the Deepwater Horizon Mississippi Canyon 252 spill? How can the increase in ecosystem resiliency be measured?
- What long term research activities and observational systems are needed to understand, monitor, and value trends and variations in ecosystem services and to allow the calculation of indices to compare with benchmark levels as recovery goals for ecosystem services in the Gulf of Mexico?

Next steps

At its May 2011 annual meeting, the Marine Mammal Commission focused on efforts to respond to the BP Deepwater Horizon oil spill and to assess short- and long-term spill effects on the Gulf's marine mammals. The Commission heard presentations from federal and state agencies, non-governmental organizations, private researchers, and regional stranding network members regarding their role in the spill response and assessment, preliminary findings, and next steps. From those presentations, the Commission developed the following recommendations, which were directed primarily at NOAA as the lead federal agency for response, assessment, and restoration planning for marine mammals.

[37] http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Partnerships/MOU_BOEMRE_NOAA_May2011.aspx
[38] http://alaskafisheries.noaa.gov/sustainablefisheries/arctic/arcticmoa081911.pdf
[39] http://dels.nas.edu/Study-In-Progress/Effects-Deepwater-Horizon-Mississippi/DELS-OSB-10-02#

Balancing scientific and legal considerations: After the spill some controversy developed regarding the relationship between scientific and legal objectives in the assessment of the spill's effects. That relationship has become an issue in efforts to assess damages, assign economic values to lost services, and develop strategies for restoration and long-term monitoring of the Gulf. It also is relevant to the government's approach to oil and gas development in high-risk areas, such as the Arctic.

The controversy involved two related, but separate goals: (1) providing a science-based understanding of the effects of spilled oil and response activities on the marine ecosystem, and (2) gathering evidence for future legal proceedings regarding the cause of the spill and the nature and extent of damage. Many spill responders relayed to the Commission that they were required to work at the interface of science and law, and often the boundaries were not clear to them. The interplay between science and law also was confusing to many scientists outside the assessment process and to the public, especially regarding authorities, responsibilities, and priorities in the face of the calamity.

Science and law are both endeavors that seek to determine the truth—but they do so in somewhat different ways. By their nature, legal proceedings are adversarial, with each side of an issue shaping the facts to create a more compelling case. A number of legal proceedings are following or will follow the spill and, for the most part, they are or will be aimed at assessing responsibility for the spill and its adverse effects. Science, on the other hand, is not necessarily adversarial, but rather a means of collecting and sharing information for all to examine and use for describing a particular phenomenon or answering a particular question. In this case, the major questions were how to stop the spill and what were or will be its short- and long-term effects.

Scientists often found themselves at the center of the controversy. For example, some scientists (both federal and private) participating in spill response and assessment were uncertain about what data and samples could be collected and analyzed and what results shared. During much of the spill and response, many were under the impression that scientific efforts were unnecessarily constrained by legal concerns and that research opportunities were unnecessarily lost. The Commission does not have a sufficient basis for evaluating the merits of those concerns, but thinks they warrant follow-up.

At least four things might have contributed to the confusion. First, rumors always abound during such an event and require some time to sort, investigate, and either verify or dispel. Second, the agencies and organizations involved in the response and assessment have different roles and objectives, and those objectives may not have been clearly integrated and prioritized. Third, even within a single agency, objectives and information may not have been transferred effectively up and down the agency's organizational structure. And fourth, in a case such as the Deepwater Horizon, law and science simply may not be completely compatible.

Such matters are not easily reviewed during a spill when decisions must be made regarding both response and assessment and actions must be carried out expeditiously. Rather, they might be best reviewed after an event when problems are still fresh in people's minds and before their attention is redirected toward other concerns. Although the trustees were still actively engaged in assessment at the end of 2011, the Commission thought it important to review response and assessment efforts sooner rather than later. Important lessons may be lost if not evaluated, summarized, and recorded for future planning and reference. Our nation's ever growing demand for oil and gas resources increases not only the number of operations over the outer continental shelf, but also the risk of another major spill, not only in the Gulf but in other vulnerable areas such as the Arctic. It would be unfortunate to be faced with another spill of substantial magnitude in the near future, but especially so if agencies have not evaluated and corrected any shortcomings evident in their response to the Gulf spill and the assessment of its effects.

With all those concerns in mind, the Marine Mammal Commission recommended in a 14 October 2011 letter that NOAA, as the primary trustee with responsibilities for both marine mammal response and assessment, develop and implement a strategy to (1) review its actions during the course of the Gulf spill response and assessment, (2) clarify its legal and scientific objectives and the relationship between them, (3) characterize the lessons learned from the spill that should be incorporated into future response and

assessment plans, and (4) characterize its capacity for responding to, and assessing the effects of, future spills, especially those that may occur in the Arctic.

Updating contingency plans and response guidelines: In its letter to NOAA, the Commission stated that the results of such a review would be useful in updating national and regional contingency plans and oil spill response guidelines, which have been developed by multiple agencies in accordance with various laws, regulations, and directives. In the Gulf, response to oiled wildlife is covered generally in two regional contingency plans that do not include specific references to marine mammals. The plans designate the Fish and Wildlife Service as the lead agency for responding to endangered species and they charge NOAA with responsibility for the "living marine resources it manages and protects."[40] During the Gulf spill, the lack of specificity in the plans resulted in confusion within the Unified Command regarding NOAA's authority and responsibilities for marine mammals, sea turtles, and other protected species. NOAA officials were not always notified immediately in situations requiring Endangered Species Act consultations or the development of best management practices for activities affecting those species. An in-depth review of NOAA's response to the spill could help the agency clarify its responsibilities and authority in updated contingency plans. That review also could help clarify response authority and procedures specific to marine mammals, as outlined in NOAA's Marine Mammal Oil Spill Response Guidelines (Johnson and Ziccardi 2006).

Reckoning with the baseline problem: The *Exxon Valdez* oil spill illustrated the importance of good baseline information (Loughlin 1994, Matkin et al. 2008). More than two decades later, that lesson has not been heeded. The responsible agencies cannot provide a full accounting of the Deepwater Horizon spill's effects on wildlife, even for many of the Gulf's largest and most charismatic fauna, because they lack baseline information. Such information is adequate for only a handful of the Gulf's 57 marine mammal stocks (Waring et al. 2010).

In the Commission's view, the lack of baseline information is indicative of larger problems with our national research and management strategy in the Gulf of Mexico and our failure to meet the goal of managing marine ecosystems based on a strong scientific foundation. Management of the Gulf ecosystem cannot be considered science-based if the responsible agencies do not collect and analyze the data needed to guide management. Despite the fact that the Gulf is the base for industries generating billions of dollars annually, NOAA—our premier marine science agency—lacks the necessary infrastructure, equipment, and personnel to characterize the ecosystem, monitor industrial activities, and assess their impacts. In essence, our commitment to sound science as a basis for management does not match our willingness to exploit the Gulf's resources at some peril to its marine ecosystem.

With that concern in mind, the Marine Mammal Commission recommended in its 14 October 2011 letter that NOAA incorporate in its review of the Gulf spill (1) a careful and in-depth analysis of the factors that have precluded the collection of scientific baseline information adequate for managing the Gulf's marine mammals and marine resources, and (2) the steps necessary to address those factors.

Evaluating the natural resource damage assessment process: The natural resource damage assessment process is intended to establish the basis for compensating for spill effects. NOAA hosted one public meeting of scientific experts to identify potential spill effects on marine mammals and sea turtles, but subsequent meetings were limited to natural resource trustees and members of the Marine Mammal and Sea Turtle Technical Working Group. In its 14 October 2011 letter, the Commission recommended that, as part of its review, NOAA should evaluate how well that group functioned and whether it provided adequate guidance for assessing effects on marine mammals and sea turtles. The idea of an independent review of the group's work is consistent with scientific traditions and experience. In reviewing lessons learned from the *Exxon Valdez* spill, Hofman (1994) cited the need for early establishment of an independent peer review process to help identify critical research needs. Although it may not be possible to incorporate independent scientists directly into the damage assessment process, it is not too late to evaluate the Marine Mammal and Sea Turtle Technical Working Group and make recommendations for improving the work of such groups.

[40] http://www.nrt.org

Assessment of long-term effects: The natural resource damage assessments for marine mammals may be completed years before the effects of the Deepwater Horizon oil spill are fully realized. Long-term wildlife studies following the *Exxon Valdez* spill have revealed chronic, delayed, and indirect effects that were longer and more severe than expected or assumed (Peterson et al. 2003). Exposure to oil from that spill was still impeding recovery of certain sea otter and whale populations 15 years later (Ballachey et al. 2007, Matkin et al. 2008). The Deepwater Horizon oil spill differs in some important respects from the *Exxon Valdez* spill, but long-term effects remain a concern for Gulf marine mammals because of the amount of oil spilled, the quantity of dispersants applied at the surface and wellhead, the low recovery rates of spilled oil, uncertainty regarding the eventual disposition of both oil and dispersants, and uncertainty regarding the effects of the spill and spill response on ecosystem elements important to marine mammals.

As noted above, the Marine Mammal Commission drafted the report "Assessing the Long-term Effects of the BP Deepwater Horizon Oil Spill on Marine Mammals in the Gulf of Mexico: A Statement of Research Needs" to address uncertainty about the long-term effects of the Gulf spill. The Commission recommended that NOAA identify its highest priorities for assessing long-term spill effects on marine mammals, using the Commission's report as a guide.

Because the natural resource damage assessment process may be completed before the long-term spill effects are known, it may be necessary to re-open the damage assessment process to investigate evidence of unanticipated effects. For example, hundreds of dolphins stranded in the nearshore waters of the northern Gulf immediately before, during, and after the spill, and should long-term studies indicate that the spill has been a contributing factor, NOAA should be able to re-open the damage assessment process as needed to seek appropriate compensation. The Marine Mammal Commission recommended that NOAA work with the Bureau of Ocean Energy Management and other federal and state agencies and funding entities as appropriate to ensure the necessary long-term monitoring studies are conducted.

Standards for environmental information: The National Environmental Policy Act requires the Bureau of Ocean Energy Management to evaluate alternatives for resource development based, in part, on their anticipated environmental effects. In addition, the Marine Mammal Protection Act requires the Bureau to manage energy development to ensure that it has no more than negligible effects on marine mammals. In the Commission's view, anticipating and managing such potential effects should be science-based and should include, among other things, a thorough understanding of pre-development baseline conditions.

Despite decades of offshore oil and gas production in the Gulf, the Bureau, NOAA, and the oil and gas industry have yet to collect adequate information to determine if and how oil and gas production is affecting marine mammal species and stocks. Such information includes stock structure, distribution, abundance, movement patterns, age structure, demography (age structure, vital rates), and health (e.g., nutritional status, immune function, and exposure to contaminants, biotoxins, and pathogens). The Bureau has funded studies of marine mammals in the Gulf but they fall far short of what is needed for environmentally sound energy development. The Bureau's Studies Development Plan for Fiscal Year 2012–2014 does not include plans to address those deficiencies.[41]

On several occasions the Commission has recommended to the Bureau that it develop standards for baseline environmental information on marine mammals that may be affected by energy-related activities. To do so, the Bureau should collaborate with the federal agencies that have management and oversight responsibilities for marine mammals—NOAA, the Fish and Wildlife Service, and the Marine Mammal Commission. The Oil Spill Commission highlighted the importance of such interagency consultation in their "Deep Water" report. Consistent with the Oil Spill Commission's findings, the Marine Mammal Commission recommended in 2011 that the Bureau work with the above-named agencies to develop comprehensive standards for baseline information needed to evaluate the effects of offshore oil and gas operations on marine mammals and their habitat. The Commission offered its help to facilitate the development of such standards, and to meet with Bureau staff regarding next steps.

[41] http://www.boem.gov/uploadedFiles/2012-2014_Studies_Development_Plan.pdf

Analysis of marine mammal samples: After the spill, the Commission developed two seemingly opposing concerns. The first was that a desire for rapid natural resource damage assessment and associated compensation might circumvent a full assessment of damages and thereby lead to an incomplete restoration effort. Such an outcome could occur if sample collection and analysis were terminated before the expression of potential long-term effects. Such effects might occur if exposure occurred relatively slowly, or if animals were exposed and re-exposed over long periods to oil re-entering the water column during storms (for example). In the Commission's view, long-term studies are needed to ensure that this is not the case.

The seemingly opposing concern was that samples were not being analyzed expeditiously after the spill, leading to apprehension that exposure levels and consequences might be poorly described. In this regard, one of the key components of assessment is determination of whether marine mammals were exposed to various contaminants, such as polycyclic aromatic hydrocarbons and dispersants, during the spill and response. At the Commission's 2011 annual meeting, speakers informed the Commission that samples collected from marine mammals during and after the spill had yet to be analyzed for such contaminants. The Commission's understanding was that even at the end of 2011, more than a year-and-a-half after the spill, the trustees still had not approved a cooperative workplan for conducting the needed analyses.

The Commission understood that the delay reflected, in part, uncertainty regarding the best analytical methods for detecting certain types of contaminants. To address that concern, NOAA has been working with various agencies to evaluate the most appropriate tissue types for analyses and to conduct pilot studies to determine the feasibility of measuring polycyclic aromatic hydrocarbons and/or biomarkers. If some of the potential contaminants cannot be reliably detected in marine mammal tissues due to rapid elimination, then alternative methods for assessing exposure should be developed. Based on its concerns the Marine Mammal Commission recommended that NOAA continue to work with the National Institute of Environmental Health Sciences, Centers for Disease Control and Prevention, National Institute of Science and Technology, Environmental Protection Agency, Bureau of Ocean Energy Management, and other federal agencies and independent laboratories as appropriate to develop and standardize laboratory analytical methods to detect, quantify, and determine the toxicity of polycyclic aromatic hydrocarbons and dispersants in marine mammals and other marine wildlife. In addition, the Commission recommended that, if the parties responsible for the Deepwater Horizon spill would not support pertinent sample analyses, then NOAA should fully fund and expedite the analysis of such samples from stranded or live-captured marine mammals for evidence of exposure and persistence of polycyclic aromatic hydrocarbons and dispersants; and, as appropriate, include the results of the analyses in the natural resource damage assessment of the spill's effects. Even if those analyses do not contribute to the natural resource damage assessment, the scientific knowledge gained from the research would promote more effective responses to future spills.

Determining whether marine mammals were affected by the contaminants from the spill and/or response is important not only for the purpose of determining spill and response effects, but also for investigating the large die-off of bottlenose dolphins in the northern Gulf. Although that die-off began before the spill, it has been prolonged and severe, and none of the information analyzed to date is sufficient to rule out the spill and response actions as contributing factors. At the end of 2011, the National Marine Fisheries Service, working in coordination with the Working Group on Marine Mammal Unusual Mortality Events, was investigating the strandings and having tissue samples analyzed for various contaminants, biotoxins, and infectious agents (e.g., *Brucella*, morbillivirus) that have been associated with or suspected as causes of previous unusual mortality events in the northern Gulf. Results were not yet available at the end of 2011.

Restoration planning for marine mammals: The purpose of a natural resource damage assessment is to determine what restoration actions are necessary to return injured natural resources and services to baseline conditions and to compensate for interim losses to make the environment and public whole (15 C.F.R. § 990.30). For the most part, restoration for marine mammals will depend largely on actions taken to promote the recovery of a healthy Gulf ecosystem (i.e., one relatively free of oil and other spill-

contaminants; with suitable habitat for reproduction, resting, foraging; and with suitable diversity and abundance or biomass of prey). The lack of baseline information, as described above, effectively precludes an unambiguous determination of when such restoration is complete for marine mammals. Absent such information, scientists cannot characterize the full effects of the spill or determine when those effects have been alleviated. The only way to overcome that impediment to sound management is to develop a strategy for adequate stock assessment and long-term monitoring of the health of Gulf marine mammals. For that reason, the Commission believes that restoration activities must be integrated with stock assessment efforts and health assessments to provide managers with the best possible information on recovery from the spill. To that end, the Marine Mammal Commission recommended that NOAA develop a restoration plan for the Gulf that ensures not only thorough clean-up of the spilled oil, but also basic assessment of the Gulf's marine mammal stocks and the factors affecting their status.

Offshore Oil and Gas Development

A synopsis of offshore oil and gas development in the United States: 1896–2006

The first drilling for oil in ocean waters took place in 1896 off the coast of California (Minerals Management Service 2007). It involved a platform connected to land by a pier and, although the yield was modest, it proved that oil could be extracted from beneath the ocean floor. That effort set the stage for drilling offshore—a challenging but lucrative environment for exploiting oil and gas resources. Since then, offshore drilling has pushed the limits of technology and innovation, with the deepest wells now being drilled in waters more than 2,900 m deep in the Gulf of Mexico.[42]

Oil rigs have evolved over time from simple fixed platforms in coastal waters to submersible, mobile platforms that are more conducive to drilling in deeper waters far from shore (Figure III-8). Exploration increased offshore after World War II, when increasing demand to fuel automobiles and heat homes drove advancements in drilling technology (Penney 2008). U.S. oil companies made use of wartime technologies and equipment to exploit offshore oil and gas reserves, primarily in the Gulf of Mexico where resources were plentiful (Penney 2008).

Prior to 1953, individual states had issued leases for oil production in all offshore waters. The Submerged Lands Act and the Outer Continental Shelf Lands Act were both passed in 1953 to clarify state-federal jurisdiction over offshore oil and gas resources. The Submerged Lands Act reaffirmed the

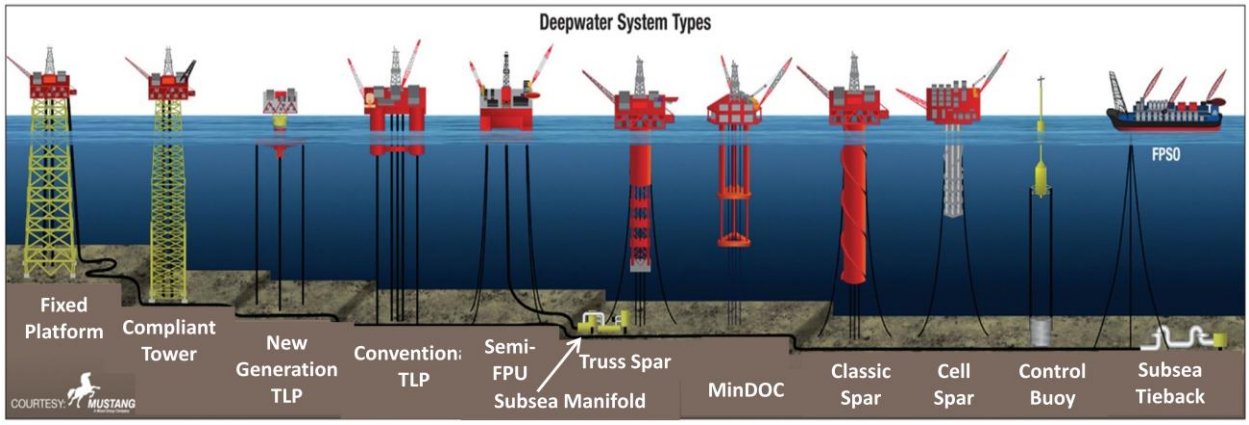

Figure III-8. Types of deepwater oil drilling rigs. (With permission from 2011 Deepwater Solutions for Concept Selection poster, Wood Group Mustang and Offshore Magazine)

[42] http://www.bsee.gov/Exploration-and-Production/Development-and-Production/Gulf/Gulf-of-Mexico-Deepwater-Information.aspx

states' authority to grant leasing rights within the boundaries of state waters, generally three miles from the coast.[43] The Outer Continental Shelf Lands Act gave the Department of the Interior jurisdiction over all offshore lands beyond state waters. The first federal lease sale was held in 1954 by the Department's Bureau of Land Management, but disputes over state's rights stalled leasing for several years (Priest 2008). The demand for leases was so great that when the Bureau resumed leasing in 1962, the sale earned the government $445 million in cash bonuses for a record two million acres leased (Priest 2008, Oil Spill Commission 2011). Most of the demand was in the Gulf of Mexico—production from Gulf resources reached nearly 10 percent of the U.S. total oil and gas production by 1970.[44]

As oil companies ventured into increasingly distant offshore waters in the Gulf and elsewhere, they took increasingly larger risks to extract and transport oil and gas resources cheaply and quickly. Offshore drilling required expensive rigs and skilled labor, yet oil prices were not keeping pace with expenses. Regulatory oversight and enforcement of offshore drilling in the U.S. was limited by the oil and gas industry and by understaffed and inexperienced regulators at the federal and state level (Oil Spill Commission 2011). The blowout of a Union Oil well in the Santa Barbara Channel in 1969 prompted a moratorium on offshore drilling and a complete overhaul of drilling regulations by the Department of the Interior. It also set the stage for passage of the National Environmental Policy Act and other laws in the 1970s to better address impacts from oil and gas development and oil spills (Clarke and Hemphill 2002, Kolbert 2010, Morgan 1994). The industry initially pushed back on new regulations, but a series of blowouts and fatal accidents in the early 1970s led to a concerted effort by regulators and industry to impose considerable new safety and training requirements for offshore drilling, both in the U.S. and around the world. As a result, the number of catastrophic accidents and associated fatalities decreased despite a steady push to drill in deeper and deeper waters (Oil Spill Commission 2011).

In the mid to late 1970s the increasing demand for oil and a 1973 embargo on foreign oil by the Organization of the Petroleum Exporting Countries (OPEC) again prompted more leasing and development of oil reserves. Many new oil and gas reserves were being discovered along the continental shelf edge in the Gulf of Mexico and their exploitation was hastened by new and increasingly cheaper technologies designed for drilling in deep water (defined as water depths between 200 m and 1,500 m,

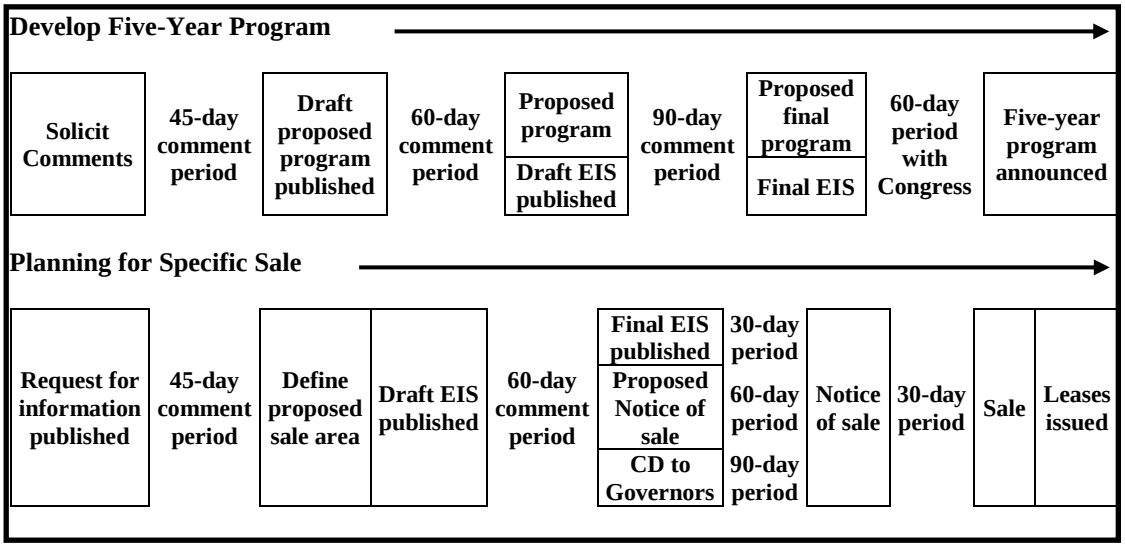

Figure III-9. The steps involved in planning, leasing, exploration, and development of oil and gas resources, under the Outer Continental Shelf Lands Act (Bureau of Ocean Energy Management)

[43] The state waters boundary for leasing off Texas and the west coast of Florida was set at three leagues, or 10.4 miles (16.7 km), based on historical claims.
[44] http://www.data.bsee.gov/homepg/data_center/production/production.asp

Bureau of Ocean Energy Management 2011a). Some regions of the U.S. expanded their leasing and development efforts, but others did not. In fact, concerns regarding the environmental impact of oil and gas development led at least one California environmental group to call for a halt to offshore lease sales.[45]

The Outer Continental Shelf Lands Act, as originally written, directed the Secretary of Interior to issue leases "for the prevention of waste and conservation of natural resources." However, the concern at the time was more about conserving oil and gas resources than about conserving the natural environment from which those resources were extracted. In 1978 political reaction to expanded leasing and development without adequate consideration of effects on coastal resources or input from coastal states led lawmakers to amend the Act. The 1978 amendments were intended to promote "expeditious and orderly development" of oil and gas reserves while protecting the environment and the interests of the coastal states (President Jimmy Carter 1978). The amendments also—

(1) made it easier for small and medium-sized energy firms to compete in the bidding process for leases;
(2) established a tax on oil revenues to be placed in the Offshore Oil Spill Pollution Compensation Fund to provide for damages caused by oil spills, and a Fishermen's Contingency Fund to compensate fishermen for damaged fishing gear associated with oil and gas exploration;
(3) directed the Secretary to prepare periodic (five-year) leasing programs that incorporate National Environmental Policy Act reviews at each stage of the leasing process, and ensure greater consideration of input by state and local agencies on the timing, size, and location of proposed lease sales and on proposed development and production plans (Figure III-9); and
(4) established an environmental studies program within the Department.

The Minerals Management Service was established in 1982 and consolidated functions that previously had been split between the Bureau of Land Management's Outer Continental Shelf Program and the U.S. Geological Survey Conservation Program. The formation of the new agency was spearheaded by James Watt, Secretary of the Department of the Interior under President Ronald Reagan, with the intent of creating a more efficient leasing program. Under Secretary Watt's direction, the Minerals Management Service began the practice of area-wide leasing, making available for leasing all unleased blocks within a planning area, rather than only those blocks nominated and selected for leasing. That practice helped spur new development in the Gulf, especially in deep-water environments in which the industry had limited interest (Oil Spill Commission 2011).

Attitudes towards offshore drilling were mixed in different coastal regions. Western coastal states were vocal in their opposition to oil and gas development, leading Congress to impose a moratorium on new offshore oil and gas leasing off the U.S. West Coast in 1982. Soon after that, Congress included the mid-Atlantic and the eastern Gulf of Mexico in the moratorium. Leasing continued in the central and western portions of the Gulf of Mexico and also in Alaska, despite some opposition in those areas. Nearshore wells in Cook Inlet and the Kenai Peninsula had been producing commercial quantities of oil and gas for years, and the discovery of a massive oil field in Prudhoe Bay on the North Slope of Alaska in 1967 seeded hopes of discovering additional offshore reserves in the Alaska region, especially in Arctic areas adjacent to Prudhoe Bay. Oil companies drilled 95 exploratory and test wells on the Alaska outer continental shelf between 1975 and 1993 (Figures III-10 and III-11).[46] Most of the wells were either dry or deemed not commercially productive, with the exception of the Northstar oil pool in the Beaufort Sea, which was discovered in 1984 and went into production in 2001.

In March 1989 the *Exxon Valdez* oil tanker ran aground, spilling about 11 million gallons of crude oil into Prince William Sound. The oil spread over 1,100 miles of non-continuous coastline extending to the Gulf of Alaska and the Alaska Peninsula. The spill raised significant concerns about the adequacy of existing oil spill prevention and response capabilities. Before the end of that year Congress banned all drilling in Bristol Bay, Alaska, and in August 1990 it passed the Oil Pollution Act by unanimous vote.

[45] http://www.getoilout.org
[46] http://www.boem.gov

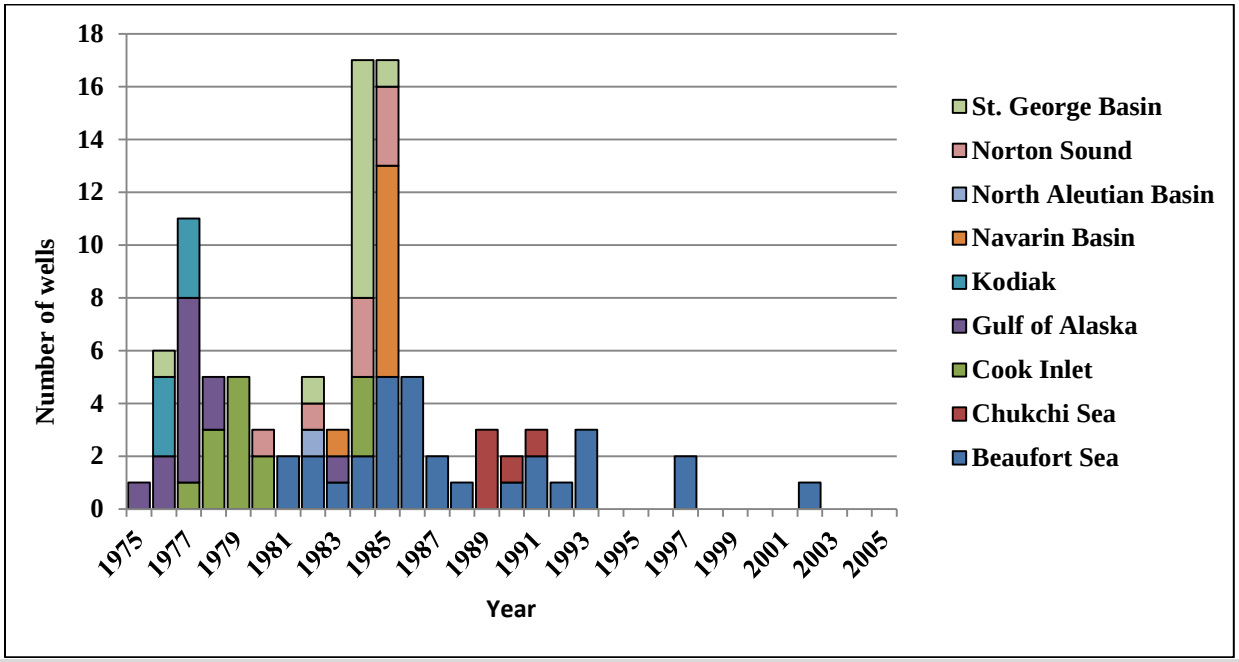

Figure III-10. Exploratory and deep stratigraphic test wells drilled in the Alaska outer continental shelf region, by planning area and year. (Bureau of Ocean Energy Management)

The Oil Pollution Act was designed to (1) help prevent future oil spills, and if spills did occur, (2) provide quick and efficient response and clean-up, (3) minimize damage to fisheries, wildlife, and other natural resources, (4) provide adequate compensation for victims of oil spills, and (5) assign costs for such efforts to the parties responsible for the spill. Among other things, the Act—

- required all oil tankers operating in U.S. waters to be constructed or retrofitted with stronger, double hulls;
- required the development of contingency plans, thereby ensuring an organized and coordinated response effort when spills occurred;
- increased penalties that could be levied for failing to report a discharge;
- assigned liability to the parties responsible for oil spills and other discharge events but also placed limitations on that liability, based on vessel or facility type (elr.info/legislative/federal-laws/oil-pollution-act, Morgan 1994);
- authorized the funding of the Oil Spill Liability Trust Fund and the use of the Fund for oil spill removal costs, natural resource damage assessments, restoration activities, and administrative costs; Sources of funds included transfers from other existing funds, penalties under various pollution-related statutes, per-barrel excise taxes on industry for oil produced or imported, and recovery of costs from the responsible parties for oil spill removal, damage assessment, and restoration activities;[47] and
- established an oil pollution and research program, to be administered by the U.S. Coast Guard.[48]

The reactions to the *Exxon Valdez* oil spill, including the Oil Pollution Act, had substantial implications for oil imports as well as exploration and production activities. Several oil companies

[47] http://www.uscg.mil/npfc/About_NPFC/osltf.asp
[48] http://www.iccopr.uscg.gov/

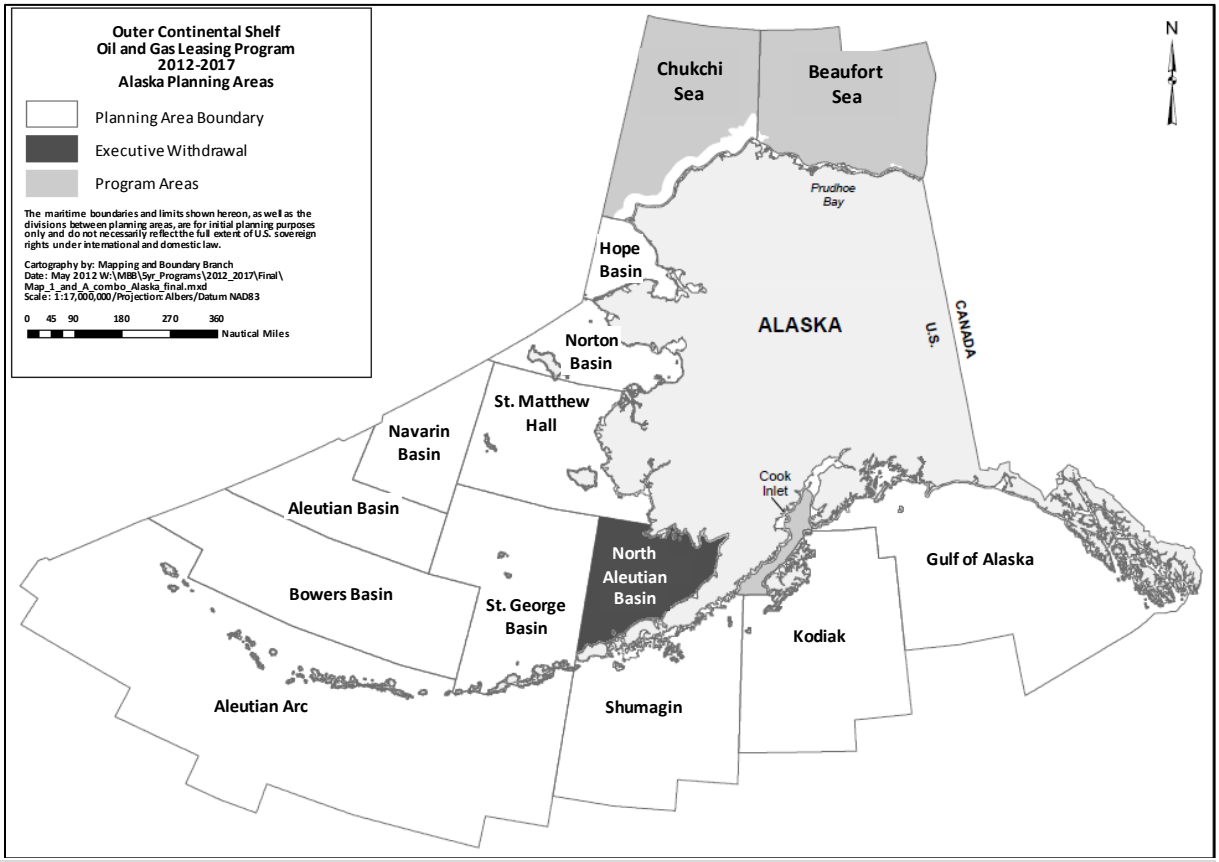

Figure III-11. Alaska outer continental shelf planning areas. (Bureau of Ocean Energy Management)

responded to the new requirements for vessel construction and demonstration of financial responsibility by threatening to stop all shipments of oil into the United States. Others reorganized to protect their parent companies from potential claims against their shipping subsidiaries (Morgan 1994). Nonetheless, over time, oil shipments to the U.S. remained steady, vessel safety improved and spill rates decreased.

The effects of the *Exxon Valdez* oil spill on exploration and production activities varied by region. High operating costs, low oil prices, and less than expected returns caused oil companies to abandon exploration activities in the Arctic by the mid 1990s. The Bristol Bay drilling ban further dampened interest in exploratory drilling in Alaska waters. For a short period of time production in the Gulf of Mexico also dropped off immediately after the spill because of a new executive moratorium on oil and gas leasing in the eastern Gulf,[49] and because oil companies moved their operations to foreign waters to avoid the financial requirements of the Oil Pollution Act.[50] However, production quickly rebounded and the central and western Gulf of Mexico remained an active area for leasing, exploration, and production throughout the 1990s. Advances in computing power and seismic technology, especially 3-D seismic and wide-azimuth technology (see below), led to the discovery and exploitation of previously untapped oil and gas reserves in the Gulf's shallow waters and new reserves in its deep (200–1,500m) and ultra-deep waters (>1,500 m). The new technology allowed geologists to pinpoint the location of "subsalt plays"—substantial petroleum reserves hidden under the massive salt bodies unique to the Gulf region. With a long-term view toward development, oil companies consolidated their resources and expertise and began

[49] President George H.W. Bush's 1990 executive moratorium also included oil and gas leasing in the offshore waters of the Pacific and the Atlantic.
[50] http://www.data.bsee.gov/homepg/data_center/production/production/summary.asp, Morgan 1994

amassing significant holdings in the Gulf, despite the technological difficulties associated with extracting oil from increasingly challenging environments.

Rising gas prices and concerns about energy security prompted Congress to pass the Energy Policy Act of 2005 and the Gulf of Mexico Energy Security Act of 2006. The Energy Policy Act aimed to reduce U.S. dependence on foreign oil and develop new sources of energy, including renewable energy, clean coal, and nuclear energy. It also provided tax incentives and royalty relief to encourage further oil and gas development in the Gulf of Mexico. The Gulf of Mexico Energy Security Act stipulated, in part, (1) leasing of certain portions of the central and eastern Gulf, (2) sharing of oil lease revenues with four Gulf coastal states (Texas, Louisiana, Mississippi, and Alabama) for coastal restoration and protection projects, and (3) banning oil and gas leasing within 125 miles off the Florida coast in the eastern planning area and a portion of the central planning area within 100 miles of the Florida coast until 2022.

As directed by the Energy Policy Act, the Department of the Interior prepared a report to Congress with a comprehensive inventory of oil and gas resources in the U.S. outer continental shelf (Minerals Management Service 2006). The report provided estimates of both known and undiscovered resources in each of the U.S. outer continental shelf planning areas. The report highlighted the importance of the Gulf of Mexico as the nation's leading source of known reserves and undiscovered resources. It also indicated relatively large undiscovered but technically recoverable resources in Alaska, primarily in the Chukchi and Beaufort Seas. The Bureau revised the assessment in 2011 and it shows the same general trends (Table III-4).

Regulatory framework for oil and gas development

The Outer Continental Shelf Lands Act, as amended, provides the statutory framework for oil and gas development on the outer continental shelf. The Act's goals, as identified by the Bureau (Matthews and Cameron 2010), are to—

- expedite exploration and development of the outer continental shelf to achieve national economic and energy policy goals, assure national security, reduce dependence on foreign sources, and maintain a favorable balance of payments in world trade;

Table III-4. Technically recoverable oil and gas resources on the outer continental shelf, 2011[51]

Region	Known resources			Undiscovered resources (mean estimate)	Total endowment (mean estimate)
	Cumulative production	Reserves	Reserves appreciation		
Oil (billion barrels)					
Alaska	0.01	0.03	0.00	26.61	26.65
Atlantic	0.00	0.00	0.00	3.30	3.30
Gulf of Mexico	15.96	9.25	9.52	48.40	83.13
Pacific	1.21	1.52	0.00	10.20	12.93
Total	**17.18**	**10.80**	**9.52**	**88.59**	**126.01**
Natural gas (trillion cubic feet)					
Alaska	0.00	0.00	0.00	131.45	131.45
Atlantic	0.00	0.00	0.00	31.28	31.28
Gulf of Mexico	171.82	22.85	48.47	219.46	462.60
Pacific	1.62	1.26	0.00	16.10	18.98
Total	**173.44**	**24.11**	**48.47**	**398.37**	**644.31**

[51] http://www.boem.gov/Oil-and-Gas-Energy-Program/Resource-Evaluation/Resource-Assessment/2011_National_Assessment_Factsheet-pdf.aspx

- preserve, protect, and develop oil and natural gas resources of the outer continental shelf in a manner that is consistent with the need to—
  - make such resources available to meet the nation's energy needs as rapidly as possible;
  - balance orderly resource development with protection of the human, marine, and coastal environments;
  - ensure the public a fair and equitable return on the resources of the outer continental shelf; and
  - preserve and maintain free enterprise competition; and
- encourage development of new and improved technology for energy resource production, which will eliminate or minimize the risk of damage to human, marine, and coastal environments.

The Act outlines a four-stage process for oil and gas development (Figure III-9). The first stage involves the preparation of a five-year leasing program that identifies the size, timing, and location of proposed lease sales that will best meet the nation's energy needs for the next five-year period. The leasing program must consider the "economic, social, and environmental values of the renewable and nonrenewable resources contained on the outer continental shelf, and the potential impact of oil and gas exploration on other resource values of the outer continental shelf and the marine, coastal, and human environments." To that end, the Bureau of Ocean Energy Management (formerly the Minerals Management Service) analyzes the environmental impact of proposed lease sales in accordance with the Outer Continental Shelf Lands Act and the National Environmental Policy Act. Outer continental shelf areas must be included in the five year program analysis in order for the Bureau to conduct lease sales in those areas. The Bureau may later cancel or delay any of the sales in the five year program, but cannot add sales in new areas without developing a new program and conducting analysis for those areas.

During the second stage, the Bureau plans for and conducts the individual lease sales specified in the five year program. It issues a call for information, further delineates the lease sale area, and conducts a site-specific environmental analysis. The lease sale is then conducted through a sealed-bid process and the Bureau determines whether the bids meet the fair market value criteria. If so, the lease is issued.

The third stage involves exploration and requires the lessee to submit an exploration plan outlining all planned activities for a specific lease(s), the timing of the activities, information concerning drilling vessels, the location of each well, and an analysis of both offshore and onshore impacts that may occur as a result of the plan's implementation. The Bureau must then decide whether a supplemental environmental review is required under the National Environmental Policy Act. It makes that determination based on whether the proposed activities fall within the range of actions described in an established categorical exclusion, or whether extraordinary circumstances exist that warrant additional review.[52] If approved, the lessee is responsible for obtaining any additional permits that may be required for exploration, including an incidental take authorization under the Marine Mammal Protection Act if exploration activities may impact marine mammals.

The fourth and final stage of the process is approval of a development and production plan, referred to in the Gulf of Mexico as a Development Operations Coordination Document. Again, the Bureau must review the lessee's plan and determine whether a supplemental environmental review is required and whether the plan is in compliance with other federal laws and regulations.[53] If the development plan is approved, the lessee is responsible for obtaining the required permits before it begins proposed activities.

[52] Extraordinary circumstances are defined by Department of Interior regulations implementing the National Environmental Policy Act at 43 CFR Part 46.215, and include activities that have "highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks."

[53] Some of the federal laws that lessees/operators must comply with throughout the development process include the National Environmental Policy Act of 1970, the Clean Air Act of 1970, the Coastal Zone Management Act of 1972, the Clean Water Act of 1977, the Federal Oil and Gas Royalty Management Act of 1982, the Marine Mammal Protection Act of 1972, and the Endangered Species Act of 1973.

Oil and gas leasing and development activities, 2007 to present

The first stage of oil and gas development involves the drafting and approval of a five-year leasing program, also known as the five-year program. The five-year program is the schedule of lease sales, by date and area, during the stipulated five year period. There are three "drafts" of the program schedule and supporting analysis: the draft proposed program, the proposed program, and the final proposed program. Following the announcement of the final proposed program, the Secretary must notify the President and Congress and wait 60 days before approving and adopting the schedule of proposed leases as the five-year program. The Bureau also prepares a programmatic environmental impact statement to accompany the five-year program. The final programmatic environmental impact statement is approved coincident with the announcement of the final proposed program documents.

The 2007–2012 and 2012–2017 leasing programs: The 2007–2012 five-year program approved by President Bush's Administration included 21 lease sales.[54] The then Minerals Management Service conducted lease sale 193 (Chukchi Sea) in February 2008. That sale was carried over from the previous five-year program and was the first in the Chukchi Sea since 1991. The sale was conducted despite litigation by the Native Village of Point Hope, the Center for Biological Diversity, the Alaska Wilderness League, and Pacific Environment over perceived inadequacies in the environmental impact statement.[55] Interest in the sale was greater than anticipated, drawing record offers on 487 leases and collecting bids worth about $2.7 billion on more than 2.7 million acres.

In July 2008 increasing concern about escalating fuel prices and the call for expanded drilling opportunities led President George W. Bush to lift his father's 1990 presidential moratorium on offshore drilling. Shortly afterward, under threat of a presidential veto if a similar longstanding Congressional moratorium on offshore oil and oil shale leasing were included in the fiscal year 2009 annual appropriations bill, Congress allowed the leasing moratorium to expire.

In January 2009 President Bush proposed a new five-year program for the period from 2010 to 2015 to increase access to energy resources. The draft proposed program included two additional lease sales in the mid-Atlantic planning area, leasing in what are referred to as the North and South Atlantic planning areas, and leasing off southern and northern California (Figure III-12). It also added an additional lease sale in the North Aleutian Basin of Alaska and evaluated expanded lease sales in the eastern and central Gulf of Mexico in the event that moratoriums implemented under the Gulf of Mexico Energy Security Act were lifted. Of the 31 sales proposed, 10 were in areas that, prior to 2008, were under executive and/or congressional restrictions. The draft proposed program also reiterated the Administration's commitment to the development of alternative energy sources, particularly offshore wind energy.

After taking office in January 2009, President Obama's Administration first extended the comment period on the 2010–2015 draft proposed program and then replaced it with a preliminary revised program to complete the 2007–2012 period (75 Fed. Reg. 16833). The 2007-2012 preliminary revised program eliminated all planned or proposed lease sales in the Pacific, North Atlantic, South Atlantic, North Aleutian Basin, Beaufort Sea, Chukchi Sea, and eastern Gulf of Mexico (except areas mandated for leasing under the Gulf of Mexico Energy Security Act). It retained lease sales in Cook Inlet, the mid-

[54] The Five Year OCS Oil and Gas Leasing Program for 2007-2012, approved in June 2007, included lease sales in Alaska (Beaufort Sea, Chukchi Sea, Cook Inlet, and North Aleutian Basin), the Pacific, the Gulf of Mexico (Western, Central, and Eastern), and the Atlantic.

[55] The U.S. District Court for the District of Alaska issued an Order on 21 July 2010 remanding lease sale 193 to what was then the Bureau of Ocean Energy Management, Regulation, and Enforcement, forcing the Bureau to satisfy its obligations under the National Environmental Policy Act to address three concerns: (1) the environmental impact of natural gas development; (2) whether information missing from the environmental impact statement for lease sale 193 was essential or relevant under 40 CFR § 1502.22; and (3) whether the cost of obtaining the missing information was exorbitant, or the means of doing so unknown. The Bureau issued a final supplemental environmental impact statement in August 2011 and the District Court lifted the injunction against permitting of exploratory drilling in the Chukchi Sea lease sale area on 26 October 2011.

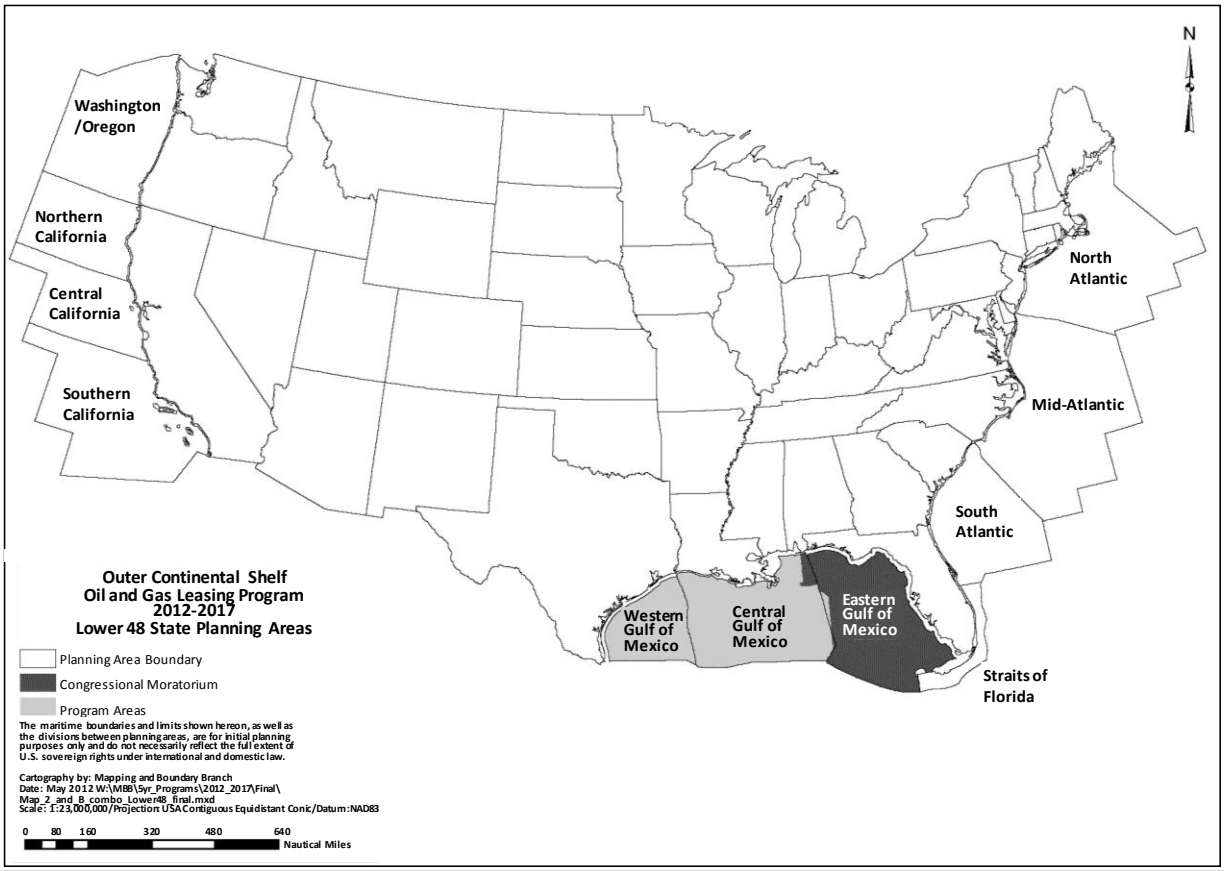

Figure III-12. Outer Continental Shelf Oil and Gas Leasing Program 2012-2017, lower 48 state planning areas (Source: BOEM)

Atlantic, the central and western Gulf of Mexico, and a mandated lease sale in the eastern Gulf of Mexico. Reaction to the preliminary revised program was mixed, with proponents supporting lease sales in the Atlantic, Cook Inlet, and the Gulf of Mexico as a path toward energy security, and opponents objecting to the inclusion of military training areas off Virginia and Cook Inlet, the latter being important for conserving the endangered Cook Inlet beluga whale.

The Deepwater Horizon exploded in the Gulf within weeks of the Obama Administration's announcement of the 2007-2012 preliminary revised program, bringing all leasing and deepwater drilling activities to a halt. Shortly thereafter the Administration reorganized the Minerals Management Service as the Bureau of Ocean Energy Management, Regulation, and Enforcement. Almost immediately, the newly formed Bureau cancelled its scheduled lease sales in the mid-Atlantic and western Gulf of Mexico to allow time to "develop and implement measures to improve the safety of oil and gas development in federal waters, provide greater environmental protection, and substantially reduce the risk of catastrophic events" (75 Fed. Reg. 44276). As noted in the previous section, in May 2010 BOEMRE also implemented an immediate, six-month moratorium on drilling of all existing and new deepwater wells and on the issuance of permits for new deepwater wells. Lessees and operators were required to certify their compliance with existing safety regulations and safety alerts and to submit information on their blowout preventers and the configurations of their well control systems for drilling rigs. The Secretary of the Interior lifted the moratorium in October 2010 after BOEMRE had verified the required compliance certifications and imposed new safety measures for workplace and drilling safety.

The Bureau then resumed leasing and permitting activities, issuing its final revised five-year program for 2007–2012 in December 2010. The 2007-2012 five-year program retained the remaining

lease sale in the western Gulf of Mexico and consolidated the two remaining lease sales in the central Gulf. Exclusions of lease sales in the North Aleutian Basin, Atlantic, and Pacific were extended through 2017. In February 2011, under heightened scrutiny, the Bureau resumed issuance of new deepwater drilling permits. It also developed a supplemental environmental impact statement for the remaining lease sale in the western Gulf and the consolidated lease sale in the central Gulf. The western Gulf lease sale was conducted in December 2011, and the consolidated central Gulf lease sale, the last lease sale in the five-year program, was scheduled for 2012. The Marine Mammal Commission submitted comments on the draft supplemental environmental impact statement for remaining lease sales in the Gulf of Mexico under the 2007–2012 five-year program, recommending that the Bureau develop a set of standards for baseline information needed to assess the effects of oil and gas operations, consider ways to improve oil spill prevention and response capabilities, and prepare for public review the lessons learned and adjustments made as a result of the Deepwater Horizon oil spill to improve management of offshore oil and gas operations.

The 2012–2017 five-year program: In April 2010, just prior to the Deepwater Horizon oil spill, the former Minerals Management Service began scoping for the 2012–2017 Five Year Program. It developed its draft proposed program based, in part, on comments received on the draft proposed program for 2010–2015 and comments received on its notice of intent to scope and prepare an environmental impact statement for the 2012–2017 five-year program (75 Fed. Reg. 16828). On 30 June 2010, the Marine Mammal Commission commented on the notice of intent, recommending that the Minerals Management Service include in its environmental impact statement a clear, detailed, and systematic description of the phases of oil and gas production and the infrastructure or equipment involved, that it develop a set of standards for baseline information to be obtained prior to the initiation of new energy-related operations, that it include a more detailed description of the data and methods used in its ecosystem sensitivity analysis, and that it use the environmental consequences section of the environmental impact statement to integrate all of the information in the preceding sections and systematically describe the risks associated with each phase of oil and gas development/production and each component of the related infrastructure, including support operations.

In November 2011, the Bureau of Ocean Energy Management announced its 2012-2017 proposed program with 15 proposed lease sales. The proposed program included two lease sales in the eastern Gulf of Mexico, annual area-wide lease sales in the central and western Gulf of Mexico, one lease sale each for the Beaufort and Chukchi Sea, and a special lease sale in Cook Inlet. Despite Congressional pressure, the Bureau did not include lease sales for the North Aleutian Basin, Atlantic, or Pacific. However, the Bureau confirmed plans to conduct a programmatic environmental impact statement on geological and geophysical (including seismic) surveys in the Mid- and South-Atlantic planning areas. The surveys would be used by industry and the Bureau to update available geological and geophysical data in some areas and acquire first time data in others to determine the resource potential of oil and gas and renewable energy development and marine mineral resource potential in those areas. In June 2012, the Bureau announced the final proposed program and programmatic environmental impact statement for the 2012-2017 five-year program. The final proposed program retained the 15 lease sales from the proposed program. Final approval of the 2012-2017 five-year program is expected in 2012.

Categorical exclusions for offshore drilling: Prior to 2010, the Minerals Management Service routinely issued categorical exclusions for exploration and development plans in the Gulf of Mexico, including deepwater wells. However, in August 2010 the Council on Environmental Quality issued a report reviewing the Service's National Environmental Policy Act policies, practices, and procedures as they relate to outer continental shelf oil and gas exploration and development. The Council used the Deepwater Horizon oil spill as a case study of the Service's approach to complying with the Act.[56] In its

[56] The Council on Environmental Quality had recently proposed guidance on the use of categorical exclusions government-wide (18 February 2010), and many of the recommendations in the Council's August 2010 "Report regarding the Minerals Management Service's National Environmental Policy Act policies, practices, and

report, the Council recommended that the Bureau review its use of categorical exclusions for oil and gas operations "in light of the increasing levels of complexity and risk—and the consequent potential environmental impacts—associated with deepwater drilling." The Bureau issued a memo in response to the Council's report stating that it would limit its use of categorical exclusions for offshore oil and gas development while it undertakes a comprehensive review of its National Environmental Policy Act process and the use of categorical exclusions.[57]

In October 2010 the Bureau announced its intent to conduct such a review and requested public comments (75 Fed. Reg. 62418). The Marine Mammal Commission commented on specific categories of actions for which categorical exclusions had been issued, and recommended that the Bureau discontinue the use of categorical exclusions for exploration, development, and production plans in the Gulf. The Commission further recommended that the Bureau review its requirements for safety and environmental management systems and its practices for inspecting those systems to ensure that they are functioning as designed and expected. The Commission also expressed concern that oil and gas operators in the Gulf of Mexico generally do not apply for and obtain incidental take authorizations under the Marine Mammal Protection Act for their operations. To provide a more accurate assessment of the direct and indirect effects of oil and gas operations on marine mammals and other marine resources in the Gulf of Mexico, the Commission recommended that the Bureau work with the National Marine Fisheries Service and the Fish and Wildlife Service to expedite implementation of the incidental take provisions of the Marine Mammal Protection Act in the Gulf, including enhanced information collection and analysis requirements. At the end of 2011, the Bureau had yet to issue a notice regarding the outcome of their review.

Seismic surveys: The advancement of 3D seismic acquisition technology, and more specifically, 3D wide azimuth technology, has significantly increased the success rate of wells drilled in the Gulf of Mexico, up from a 30 percent success rate in 1990 to 60 percent in 2010 (U.S. Energy Information Administration 2010). Those activities introduce sound into the water that can disturb or even injure marine mammals or interfere with their ability to hear important, natural sounds. Section 101(a)(5)(A-D) of the Marine Mammal Protection Act provides a mechanism for authorizing the "incidental," but not intentional, take of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographic region provided the takings would be (1) small in number, (2) have no more than a negligible impact on marine mammals, and (3) have no unmitigable adverse impact on subsistence harvests of those species. Survey operators can apply for an authorization to take marine mammals by Level A (injury) or Level B (harassment).[58]

Despite some progress, the National Marine Fisheries Service has yet to evaluate fully the impact of seismic survey activities in the Gulf of Mexico or to prescribe mitigation and monitoring requirements that would ensure that seismic activities are having no more than a negligible impact on Gulf marine mammal species and stocks. The lack of analysis is inconsistent with the requirements of the Marine Mammal Protection Act and is particularly disconcerting given the spatial and temporal extent of seismic activity in the Gulf. In 2002 the former Minerals Management Service petitioned the National Marine Fisheries Service for rulemaking under section 101(a)(5)(A) of the Marine Mammal Protection Act to authorize any potential take of sperm whales incidental to conducting seismic surveys during oil and gas exploration activities in the Gulf of Mexico (68 Fed. Reg. 9991). The National Marine Fisheries Service

procedures as they relate to Outer Continental Shelf oil and gas exploration and development," pertained to the Minerals Management Service's use of categorical exclusion in approving exploration and construction plans.

[57] Memo from Bureau of Ocean Energy Management, Regulation, and Enforcement Director Michael Bromwich, dated 16 August 2010, on the use of categorical exclusions in the Gulf of Mexico region (http://www.doi.gov/news/pressreleases/upload/GOM-memo.pdf).

[58] Under the Marine Mammal Protection Act, take means to "harass, hunt, capture, or kill, attempt to harass, hunt, capture, or kill any marine mammal." The term "Level A harassment" means any action which "has the potential to injure a marine mammal or marine mammal stock in the wild." "Level B harassment" means any action 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."

subsequently issued a notice of intent to prepare an environmental impact statement for the requested authorization (69 Fed. Reg. 67535), but an environmental impact statement was never published. In April 2011, the Bureau of Ocean Energy, Management, and Enforcement submitted a revised application to the National Marine Fisheries Service to take small numbers of cetaceans incidental to oil- and gas-related seismic and other geophysical surveys in the Gulf (76 Fed. Reg. 34656). The National Marine Fisheries Service and the Bureau of Ocean Energy Management were in the process of developing a joint programmatic environmental impact statement at the end of 2011.

The Marine Mammal Commission commented on the Bureau's 2011application, seeking clarification as to whether Level A takes were requested, or whether takes would be limited to Level B harassment. The Commission recommended that Level A and B harassment zones be identified in the proposed rule based on acoustic modeling and/or empirical data and, if based on modeling, should be updated after in-situ measurements for all sound sources were made and estimated sound pressure levels verified. The Commission recommended that the National Marine Fisheries Service require that the Bureau's mitigation measures apply to all marine mammals, not just those listed as threatened or endangered under the Endangered Species Act, and that passive acoustic monitoring be used to collect data on the occurrence, abundance, distribution, and movement of marine mammals during periods before, during, and after all of the proposed activities. The Commission also recommended that the National Marine Fisheries Service advise the Bureau of the need to work jointly with industry operators to consider, and potentially fund, the testing of new technologies (i.e., unmanned aerial or underwater vehicles) for use in far-field monitoring.

In contrast to the management approach used in the Gulf of Mexico, the National Marine Fisheries Service routinely evaluates the impact of seismic surveys in Alaska and prescribes mitigation and monitoring measures as appropriate. The Commission comments on those authorizations (or applications for them) and generally recommends issuance of the authorizations as long as they require the mitigation and monitoring measures needed to ensure the Act's requirements are met. However, in 2011, the Service issued notice of receipt of an application from Apache Alaska Corporation for a 3D seismic survey in Cook Inlet (76 Fed. Reg. 58473). In that case, the Marine Mammal Commission recommended that the Service defer issuance of the proposed incidental harassment authorization until such time as the Service can, with reasonable confidence, support a conclusion that the proposed activities would have no more than a negligible impact on the Cook Inlet beluga whale population. The Commission further recommended that in the event the Service issued the authorization, the applicant be required to re-estimate the harassment zones and the number of expected takes to account for the simultaneous, alternating use of two sound sources and the overlap of their acoustic footprints, and the full number of expected survey days. The Commission recommended also that the Service require the applicant to seek authorization to take the full number of marine mammals that, in fact, may be taken and to ensure that the monitoring measures included in the authorization are sufficient to account for all takes of marine mammals.

Exploratory and production drilling: Considerable drilling activities occur routinely in the Gulf of Mexico, but neither the industry nor the Bureau of Ocean Energy Management has received authorization from the National Marine Fisheries Service and under the Marine Mammal Protection Act for takes of marine mammals incidental to drilling activities. In contrast, all takes of marine mammals incidental to drilling activities in Alaska are subject to review by the National Marine Fisheries Service and the Service requires appropriate mitigation and monitoring measures to be implemented as a condition of issuance of incidental harassment authorizations.

Plans to drill exploratory wells in the Alaskan Arctic were delayed in 2010 and 2011 as the Bureau responded to ongoing litigation over lease sale 193 and concerns about the adequacy of oil spill response capabilities after the Deepwater Horizon oil spill. In December 2010 the Marine Mammal Commission submitted comments on the draft supplemental environmental impact statement for lease sale 193, recommending, among other things, that the Bureau adopt a slow, phased approach to oil and gas development in the Chukchi Sea. Oil companies also worked during that timeframe to implement the new safety standards for drilling operations and address concerns about the effects of an oil spill in icy waters.

In November 2011, the National Marine Fisheries Service published two notices announcing the receipt of applications from Shell Offshore, Inc., for incidental harassment authorizations associated with planned exploratory drilling in the Beaufort and Chukchi Seas during the 2012 open water season (July to October). In December 2011, the Marine Mammal Commission submitted comments on both applications, raising concerns about the noise levels associated with the drilling rigs and the ability to fully monitor the proposed harassment zones. The Commission recommended that the Service require negotiation of conflict avoidance agreements between Shell and the Alaska Eskimo Whaling Commission and the bowhead whale hunters it represents. The Commission also recommended that Shell develop and implement detailed, comprehensive, and coordinated wildlife management plans to minimize contamination of sensitive marine habitats and to respond to marine mammals in the event of an oil spill. To reduce the possibility of having to respond to a large oil spill in ice conditions, the Commission recommended that the Service require Shell to cease drilling operations in mid- to late-September in both areas. Finally, the Commission recommended that Shell be required to collect all new and used drilling muds and cuttings in the Chukchi Sea, as was required in the Beaufort Sea, and either inject them below the seafloor or transport them to a treatment/disposal site outside the Arctic and licensed by the Environmental Protection Agency.

Stages of oil and gas development and key risk factors for marine mammals

The National Environmental Policy Act and associated regulations require agencies to evaluate the potential effects of major federal actions on the human environment. To do so, agencies must describe and analyze the affected environment (including its physical, biological, and ecological aspects); the nature of the proposed action and supporting activities; the individual and cumulative risks associated with the proposed and related actions; and the measures to prevent, minimize, mitigate, or otherwise respond to those risks. Analyses of cumulative effects must take into account other human activities in the proposed action area. To be comprehensive, those analyses should include the expected physical, biological, ecological, and human-related effects of climate disruption.

Oil and gas development in the marine environment proceeds in stages that roughly parallel the regulatory process outlined in the Outer Continental Shelf Lands Act. The following is a description of the activities that occur at each stage of oil and gas development and a brief summary of the associated risks to marine mammals and potential environmental effects on the marine ecosystem (see also Table III-5). Also included is a brief summary of the potential effects of oil spills and leaks.

Exploration: Exploration for oil and gas is the process of searching for and characterizing hydrocarbon reserves. The exploration stage involves acoustic surveys, gravity and magnetic surveys, sediment sampling, exploratory drilling, and temporary capping and abandonment of the well. In the ocean as on land, petroleum geologists and geophysicists may use visual cues and other geological information to locate natural seeps, faults, or other features within sub-surface sediments that may contain hydrocarbon reserves.[59] Seismic surveys in the ocean use a controlled sound source, such as an airgun, to transmit sound waves to the ocean floor. The sound waves are then reflected back to a hydrophone or other listening device. The pattern of reflected waves can indicate boundaries between different types of sediments and other subsurface geologic features, particularly traps or pockets that could indicate the presence of hydrocarbons. Seismic surveys can vary in sound intensity and frequency and in the amount of geographic area covered, and the types of surveys used are dependent on site-specific considerations, such as the depth of the water, the depth of the geologic features of interest, and whether there are pre-existing seismic data. In general, 2-dimensional seismic surveys are used to collect seismic data over a broad area, 3-dimensional surveys are used to collect a much denser number of measurements over a smaller area, and 4-dimensional (or time lapse) surveys are used to collect dense measurements in the same small area repeatedly over time (International Association of Oil and Gas Producers and International Association of Geophysical Contractors 2011). Wide-azimuth seismic surveys collect

[59] Igneous and metamorphic rocks generally do not contain hydrocarbon reserves.

Table III-5. Stages of oil and gas development and activities, the purpose of each activity, and associated environmental effects

Stage of oil and gas development and activity	Purpose of activity	Environmental effects of concern for marine mammals
Exploration		
Seismic surveys	Locate and characterize geological structures that may contain hydrocarbon reserves	Acoustic disturbance from seismic sound source
		Disturbance from vessel and aircraft activity
Sediment sampling	Coring or sampling of surface and subsurface sediments to determine geophysical properties	Physical alteration or disturbance of bottom habitat
Exploratory drilling	Confirm presence of hydrocarbons; characterize physical properties of reservoir to determine economic feasibility	Disturbance from vessel and aircraft activity
		Physical alteration or disturbance of bottom habitat
		Chemical alteration and/or contamination of water or bottom habitat (from drilling muds and waste)
		Pollution from trash and debris
		Oil and gas spills and leaks
Well abandonment	Temporary or permanent capping and abandonment of exploratory well	Oil and gas spills and leaks
Construction and installation of platforms, pipelines, and other equipment		
Site survey and planning	Locate and characterize site-specific geological features and hazards, biologically sensitive areas, and archaeological resources	Acoustic disturbance from seismic sound source
		Disturbance from vessel and aircraft activity
Platform and equipment installation	Install (and anchor) drilling platform and equipment to seafloor to support long-term hydrocarbon production, storage, and offloading	Acoustic disturbance from pile driving
		Disturbance from vessel and aircraft activity
		Physical alteration or disturbance of bottom habitat
		Pollution from trash and debris
		Oil and gas spills and leaks
Pipeline seafloor survey	Locate and avoid bottom hazards, bottom-set fishing gear, biologically sensitive areas, and archaeological resources	Acoustic disturbance from sonar scanners
		Disturbance from vessel and aircraft activity
Pipeline installation	Install pipeline for transport of hydrocarbons to port or refinery	Disturbance from vessel and aircraft activity
		Physical alteration or disturbance of bottom habitat
		Pollution from trash and debris
		Oil and gas spills and leaks
Production and transport of hydrocarbons		
Seismic surveys	Monitor reserve volume and pressure during extraction	Acoustic disturbance from seismic sound source
		Disturbance from vessel and aircraft activity
Drilling	Extraction of oil and gas reserves for refinement and commercial sale	Disturbance from vessel and aircraft activity
		Physical alteration or disturbance of bottom habitat
		Chemical alteration and/or contamination of water or bottom habitat (from drilling muds and waste)
		Pollution from trash and debris

Stage of oil and gas development and activity	Purpose of activity	Environmental effects of concern for marine mammals
		Oil and gas spills and leaks
		Increased abundance or attraction of certain prey species to platforms
Transport	Transport of hydrocarbons to port or refinery via pipelines or tankers	Disturbance from vessel activity (tankers)
		Oil and gas spills and leaks (tankers and pipelines)
		Increased abundance or attraction of certain prey species to platforms
		Invasive species from tankers
Decommissioning and site clearance		
Explosive removal	Remove temporary or permanent structures or equipment from seafloor	Acoustic disturbance from explosives
		Disturbance from vessel and aircraft activity
		Pollution from trash and debris
		Oil and gas spills and leaks
Non-explosive removal	Remove temporary or permanent structures or equipment from seafloor	Disturbance from vessel and aircraft activity
		Pollution from trash and debris
		Oil and gas spills and leaks
Well abandonment	Permanent capping and abandonment of well	Oil and gas spills and leaks
Platform re-purposing (i.e., Rigs-to-Reefs)	Convert obsolete or non-productive platforms to artificial reefs	Increased abundance or attraction of certain prey species to platforms

seismic data from many different angles, and are used in the Gulf of Mexico to investigate oil trapped below salt bodies and other subsurface structures.

Seismic airguns emit high energy, low frequency acoustic pulses that travel long distances and may disrupt important marine mammal behaviors (i.e., feeding, resting, migrating, breeding, calving) and—at close range—can cause physical or physiological injury (Gordon et al. 2004). Noise also can mask biologically important sounds, such as communication calls between conspecifics (Richardson et al. 1995). Baleen whales are the most likely to be affected by seismic activity because of their sensitivity to low frequency sounds, but other cetaceans also may be adversely affected if close to the sound source.

Alternatives to marine seismic surveys may include the use of marine vibrators (vibroseis, which has been used on land for years), deep-towed acoustics/geophysics systems, low-frequency passive acoustic systems, and controlled source electromagnetic systems. Some have the potential to replace seismic airguns, but all are still in various stages of development and some are not yet commercially available for use (Weilgart 2010). There is indication that certain alternatives may have lesser impacts on marine mammals and other organisms as compared to seismic surveys (e.g., LGL and MAI 2011), but those effects have yet to be fully evaluated in a commercial setting.

Once seismic surveys are completed, confirmation of hydrocarbon reserves and decisions regarding the economic feasibility of developing an oil field can only be achieved by actual drilling. Exploratory drilling in offshore waters generally involves a single well drilled by a mobile offshore drilling unit. Drilling occurs over weeks, months, or even years depending on the depth of the well and other geophysical features, and can be delayed by weather, availability of equipment or personnel, safety concerns, or other issues. After exploratory drilling has ceased, wells are capped and abandoned either temporarily or permanently. Exploratory drilling poses risks to marine mammals from the sound generated during drilling and disturbance from surface and subsurface support vessels, aircraft, and other equipment. Drilling also can result in oil spills, which may affect marine mammals directly by contact, inhalation, or ingestion, or indirectly by effects on marine mammal prey or habitat. (See the previous section for a more thorough discussion of the potential effects of an oil spill on marine mammals.)

Construction and installation: If suitable oil and gas reserves are found, the next stage of development involves construction and installation of drilling platforms and transport systems (e.g., pipelines). Construction begins with site surveys and planning, which can involve high resolution geophysical surveys and associated noise effects. Pile driving during construction of shallow water platforms can be a significant source of loud, mid-frequency noise detectable up to 40km from its source (McIwem 2006). Both shallow and deep-water construction can require increased aircraft activity, increased vessel traffic (including remotely operated vessels) at the surface and at depth, and also increased debris from construction and support activities. Construction and anchoring of infrastructure and equipment also can alter or degrade bottom habitat. If oil is to be transported by pipeline, then construction also may involve pipeline building and, depending on circumstances, burial. If oil is to be transported by vessel, then, depending on circumstances, mooring systems may be required.

Production and transport: The production stage involves the drilling of multiple wells, extraction of crude oil and gas from the reservoir, and transport of the oil to refineries and the gas to markets either directly through pipelines or in tankers. Depending on the size of an oil reservoir and the recovery rate, an oil platform may be productive for three or four decades or longer. Seismic studies are repeated on a regular basis to guide drilling activities and monitor changes in the reservoir. Both drilling and seismic activities generate noise that may be harmful to marine mammals. Vessel and aircraft activity can create a constant source of disturbance, and vessel activity can increase the potential for vessel strikes and fuel spills. Drilling produces muds and cuttings that can be discharged near the well site, injected back into the ground, or collected and disposed of off-site. Depending on how they are managed, the muds and cuttings can introduce heavy metals and other toxic materials into the marine ecosystem (Neff 2010).

Decommissioning and site clearance: When economic conditions and conditions within the reservoir dictate, drilling and extraction of oil and gas are discontinued and the platform and associated infrastructure are decommissioned (e.g., platforms shut down and removed; pipelines emptied of oil, sealed, and buried; sites cleared of support equipment). This stage of development can result in disturbance of sediments and discharge of metals associated with the severance, removal, toppling, and/or destruction of platforms, wellheads, cables, and other equipment and structures. Decommissioning can involve various types of non-explosive cutter tools but, increasingly, a variety of explosives are being used to augment or replace mechanical cutters to sever and remove underwater structures (Minerals Management Service 2005). Both non-explosive and explosive methods can introduce significant noise into the marine environment. Abandoned wells have the potential to leak oil and gas, as noted above. Under certain circumstances, platforms (or portions of them) are left in place.

Hydrocarbon and other chemical spills and leaks: Spills and leaks can occur at all stages of oil and gas development, with varying effects based on the type of materials spilled and the amount (generally referenced as very large (>150,000 barrels), large (> 1,000 barrels), and small (<1,000 barrels)). Large and very large spills can occur from a blowout or other loss of well control or accidents that occur during loading, transport, and unloading of oil or gas from platforms to shore via vessels or pipelines. Smaller spills and leaks of oil, gas, or other chemicals also can occur from events such as storage tank accidents, transfer mishaps between supply vessels and drilling rigs, leaks from fuel tanks on support vessels, or from temporarily or permanently abandoned wells.

Spills and leaks can cause acute injury or mortality or longer term, sublethal effects and can degrade marine habitat. Methane and other gas leaks are generally less problematic for marine organisms than oil or other chemicals because of their volatility and rapid dissipation; however, methane is an important greenhouse gas and a significant contributor to climate disruption (Reay et al. 2010).

Response activities to contain oil spills and clean up surface, subsurface, or shoreline oil also have the potential to affect marine species through increased vessel and air traffic and noise. During the Deepwater Horizon spill, chemical dispersants were used both at the surface and at depth to disperse oil. However, little is known about the direct effect of dispersants on the marine environment (National Research Council 2005). The use of booms and skimmers to contain and collect surface oil and the in-situ burning of oil have the potential to disturb marine species. Burning reduces the overall amount of oil in

the marine environment, but it also leaves behind a residue of uncertain composition and toxicity (Benner et al. 1990, Wang et al. 1999) and puts additional chemicals into the air.

Mitigation, monitoring, and reporting

In many cases, action agencies can prevent or reduce the adverse effects of oil and gas development by using targeted mitigation measures. Mitigation may include ramping up the sound source to alert marine mammals that may be in the area, shutting down or powering down the sound source if marine mammals approach the sound source close enough to be injured,[60] and prohibiting airgun operations during nighttime or low visibility conditions. To minimize the probability of vessel strikes, vessels may be required to slow down or avoid multiple changes in direction within a certain distance from marine mammals. Airplanes operating in the area may be required to fly above a certain altitude to avoid disturbing marine mammals that may be at the surface. Proposed activities also may be prohibited from sensitive areas at sensitive times. Although the development of general and site-specific mitigation measures are based on observations of individual animals exposed to various industrial activities, the effectiveness of mitigation to avoid adverse impacts on marine mammal populations often is uncertain.

Monitoring serves two main functions. First, it may be necessary to prompt mitigation measures. For example, monitoring is necessary to determine when marine mammals are too close to a sound source and the source must be shut down. Second, it provides information needed to determine the effects of an activity (i.e., the number of marine mammals taken and the nature of the takes). For sound producing activities, the size of the area to be monitored is determined using either in-situ sound measurements or modeling based on the properties of the sound source (source level and frequency) and the propagation of sound through the water. In certain circumstances, visual observations may be supplemented by passive acoustic monitoring to increase the probability of detecting marine mammals (e.g., in low visibility conditions). Passive acoustic monitoring also may provide an index of an activity's effects.

Marine mammal sightings are documented and reported to the agency issuing the incidental take authorization (i.e., the National Marine Fisheries Service or the Fish and Wildlife Service). Reporting is typically required on a periodic basis during a project and at its completion. Immediate reporting and suspension of operations may be required if a dead or seriously injured marine mammal is found in the vicinity of an operation and the death or injury might have been caused by the operation.

In January 2011, the Council on Environmental Quality issued guidance on the appropriate use of mitigation and monitoring and clarified the appropriate use of mitigated "Findings of No Significant Impact" under the National Environmental Policy Act. The guidance states that agencies may commit to mitigation measures to achieve an environmentally preferable outcome, but that agencies must document and monitor mitigation commitments to determine if the mitigation was implemented and effective. Failure to document and monitor mitigation measures "may fail to advance the National Environmental Policy Act's purpose of ensuring informed and transparent environmental decision-making" and also may undermine the integrity of the National Environmental Policy Act review.

In accordance with the Council's guidance, the Marine Mammal Commission has made repeated recommendations to the National Marine Fisheries Service that they track and assess the oil and gas industry's implementation of mitigation and monitoring measures required under both the National Environmental Policy Act and the Marine Mammal Protection Act. Such tracking and assessment are

[60] Under current National Marine Fisheries Service guidelines, "exclusion zones" for marine mammals around industrial sound sources are defined as the distances within which received sound levels are ≥180 dB re 1 μPa (rms) for cetaceans and ≥190 dB re 1 μPa (rms) for pinnipeds. Those criteria are based on the assumption that sound energy at lower received levels will not injure the animals or impair their hearing abilities but that higher received levels might have some such effects. "Harassment zones" are defined as the distances within which received sound levels are ≥160 dB re 1 μPa (rms) for impulsive sound sources and ≥120 dB re 1 μPa (rms) for non-impulsive sound sources. Distances < 500 m from seismic sonar arrays are judged to be within the marine mammal exclusion zones in the Gulf of Mexico [http://www.nmfs.noaa.gov/ocs/mafac/meetings/2010_06/docs/mms_2007_ntl.pdf]

necessary to ensure that mitigation and monitoring measures are executed as expected and have the intended effect.[61]

Information needs

As noted in the previous section, the individual and cumulative effects of oil and gas activities on the survival and reproduction of marine mammal populations over time are largely unknown, despite the long history of oil and gas development activities in U.S. waters. The lack of baseline information is one of the main obstacles to understanding such effects. Such information should include their stock structure, distribution, abundance, movement patterns, age structure, reproductive rates, survival rates, and health (nutritional status, immune function, and exposure to contaminants, biotoxins, and pathogens).

Describing baseline conditions is not a trivial task. Because the physical and biological properties of ecosystems vary, such conditions should include both measures of central tendency (e.g., mean, median, mode) as well as patterns in and variability about those measures. Often, patterns are most apparent over space and time (e.g., coastal versus pelagic, shallow versus deep, open water versus ice-covered). Assessment of baseline conditions is further complicated by directional trends in ecosystems, such as those caused by climate disruption. Although pristine baseline conditions may no longer exist, assessing conditions at the beginning of an activity (e.g., an oil and gas operation) is still important for measuring possible effects. Failure to do so may simply perpetuate the sliding baseline phenomenon.

The resistance to collection of baseline information stems from two main sources. First, the necessary studies often are expensive and require considerable support of scientists and infrastructure. Such problems are complicated further in places like the Arctic, where the logistics of such studies are themselves a considerable challenge. Although the United States generally advocates for science-based decision making, the necessary studies have simply not been funded. The lack of baseline information on marine mammals was a major concern expressed after the *Exxon Valdez* spill in 1989, and will still be a resounding problem in assessing the effects of the Deepwater Horizon spill.

Second, the necessary studies also require considerable time—years, if not decades for highly variable ecosystems. In contrast, the time frame for decisions in the oil and gas industry and the agencies managing the industry is considerably shorter, and the demand for oil repeatedly outweighs a more deliberate, well-informed approach—the pending decisions regarding oil and gas operations in the Arctic being an example. There, federal regulators and industry have forged ahead with exploration and development activities with only limited information on pre-development environmental conditions. Environmental assessments have been concentrated in limited areas and periods during breaks in exploration and development activities. And the data generally are not integrated into a more robust, comprehensive assessment of the affected ecosystem. In short, our nation's approach appears to be dominated largely by urgent demand and, in the Commission's view, that approach is not consistent with the goal of sustaining healthy marine ecosystems.

The Commission also believes that the Bureau of Ocean Energy Management—the regulator of oil and gas development in offshore waters—must work with the industry to support the research needed to ensure that the activities it permits and manages are environmentally safe. Although the responsibility for research and management of marine mammals also falls on the National Marine Fisheries Service and the U.S. Fish and Wildlife Service, it has long been clear that the Service has not been able to fulfill its role to the extent needed because of inadequate funding. If that dilemma is to be resolved, it will require either that Congress provide more funding for the Service directly, or that Congress and the Bureau devise a means for obtaining the needed resources from the industry.

Gulf of Mexico: The need for such research support is clearly evident in the Gulf of Mexico, where the research effort to date has been sufficient to provide reasonable baseline data for only a handful of the

[61] See, for example, the Commission's recommendations to the National Marine Fisheries Service regarding Shell Offshore, Inc.'s application for an incidental harassment authorization associated with proposed exploratory drilling activities in the Beaufort and Chukchi Seas (letters dated 9 December 2011).

57 marine mammal stocks identified there. The Deepwater Horizon oil spill highlighted how little we know about the Gulf of Mexico marine ecosystem, its various biological components, and their vulnerability to oil and gas operations, including spilled oil. Prior to the spill, the Minerals Management Service (2008) described the potential impacts of oil and gas operations on marine mammals as follows:

> Routine events related to a proposed action [in the Central or Western Planning Areas], particularly when mitigated as required [by the Minerals Management Service], are not expected to have long-term adverse effects on the size and productivity of any marine mammal species or population endemic to the northern Gulf of Mexico. Characteristics of impacts from accidental events depend on chronic or acute exposure, resulting in harassment, harm, or mortality to marine mammals, while exposure to dispersed hydrocarbons is likely to result in sublethal impacts. The effects of the incremental contribution of a proposed action, including the 181 South Area, combined with [other] activities may be deleterious to cetaceans occurring in the Gulf of Mexico. Biological significance of any mortality would depend, in part, on the size and reproductive rates of the affected stocks, as well as the number, age, and size of animals affected.

The information referenced in that statement is available only for a few stocks (i.e., sperm whales, a few bottlenose dolphin stocks). The Marine Mammal Commission has written to the Bureau on several occasions recommending that it implement a coordinated and comprehensive assessment of ecosystem baseline conditions before oil and gas operations (including exploration) progress further. Although the Bureau has made efforts to do so in the Gulf (e.g., cetacean surveys in the mid-1990s; recent studies of sperm whale responses to seismic surveys (Jochens et al. 2008)) and although those efforts provided much valuable information, they did not produce enough of the right kind of data to ensure an adequate baseline for assessing the effects of oil and gas development. More information is needed on abundance, distribution, movement patterns, population structure, vital rates, foraging patterns, contaminant loads, health and condition, and vulnerability to other threats. Therefore, on 3 January 2011 the Marine Mammal Commission repeated a recommendation to the Bureau that it consult with the National Marine Fisheries Service, the Fish and Wildlife Service, and the Marine Mammal Commission to develop a set of standards for baseline information needed to assess the effects of oil and gas operations on marine mammals and their environment.

To address data needs for oil and gas development in the Gulf of Mexico, the Bureau's Environmental Studies Program initiated or continued the following research projects in recent years—

- Seismic survey mitigation measures and marine mammal observer reports: this study was undertaken to synthesize and summarize submitted seismic survey observer reports for the years 2003 to 2008. A final report is expected in 2012, and the results will be used to determine the effectiveness of required mitigation measures and to develop recommendations for new and/or improved measures.
- Sperm whale acoustic prey study: this study was undertaken to characterize the species composition and biomass of mid-water squid and small pelagic fish in the Gulf of Mexico that constitute the apparent forage base for sperm whales. It was initiated in 2009 and conducted in 2010, before the Deepwater Horizon oil spill occurred. It provided critical pre-spill information on distribution and contaminant levels of sperm whale prey species, thereby emphasizing the value of baseline studies.
- Sperm whales and bottlenose dolphins in the Gulf of Mexico: this study was undertaken to obtain information about sperm whales from areas less affected by human activities in the eastern Gulf, and to collect information on the relatedness, seasonal movements, and population structure of target estuarine and coastal stocks of bottlenose dolphins. The study was initiated in response to the Deepwater Horizon oil spill and was ongoing at the end of 2011.

Alaska: The Arctic, and particularly Alaska, remains an area of intense interest for oil and gas development. Oil and gas activities in the Arctic present unique risks to marine ecosystems and great

challenges regarding oil spill prevention and response. Arctic marine ecosystems are particularly vulnerable to oil and gas operations, with all their incumbent risks, because of their unique biota, remoteness, harsh conditions, and lack of infrastructure. The Arctic also is home to Alaska Native communities who depend on the living marine resources for subsistence purposes and may be greatly affected by oil and gas operations.

The Bureau and the oil and gas industry have collected a great deal of information in Alaska about marine mammal distribution and effects of exploratory and development activities.[62] However, most of that information has been focused on bowhead whales, and collected in the summer and early autumn, during the open-water period. An ecosystem-wide, integrated synthesis of available information from year-round monitoring would help identify important data gaps that exist for other Arctic marine mammals, particularly for lesser-studied species such as beluga whales, walruses, polar bears, and ice seals. It also would help the agencies better understand and predict the long-term, cumulative effects of the proposed activities, in light of increasing human activities in the Arctic and changing climatic conditions.

In 2011, the U.S. Geological Survey completed its evaluation of the science needs to inform decisions on outer continental shelf energy development in the Chukchi and Beaufort Seas (Holland-Bartels and Pierce 2011). To predict the expected effects of oil and gas and other activities more accurately, the Survey stated that a broader synthesis and integration of available information on bowhead whales and other marine mammals is needed. That synthesis should incorporate such factors as ambient sound levels, natural and anthropogenic sound sources, abundance, movement patterns, the oceanographic features that influence feeding and reproductive behavior, and traditional knowledge. The Survey recommended also that the development of an inventory/database of seismic sound sources used in the Arctic would be a good first step toward a better understanding of long-term, population-level effects of seismic and drilling activities.

The Bureau's Environmental Studies Program for Alaska is described in detail in its Annual Studies Plans (Bureau of Ocean Energy Management 2010). The Bureau's Alaska region expends a significant portion of the Bureau's annual budget for environmental studies, and the projects it undertakes address a variety of physical, biological, and social issues. Projects in 2010 and 2011 pertaining directly to marine mammals include—

- Chukchi offshore monitoring in drilling area (COMIDA): this study was undertaken to investigate the distribution and relative abundance of marine mammals in the Chukchi Sea Planning Area during the open water months of June-October, when various species are undertaking seasonal migrations through the area. Based primarily on aerial surveys, the project was conducted by researchers from the National Marine Fisheries Service's National Marine Mammal Laboratory. The study was initiated in 2008 and a final report was published in February 2011 (Clarke et al. 2011).
- Bowhead whale aerial survey program (BWASP) extension: the Minerals Management Service (later Bureau of Ocean Management) has conducted aerial surveys of the fall migration of bowhead whales in the Beaufort Sea each year since 1987. The project was extended in 2011 to inform decisions on environmental assessment and exploration monitoring for oil and gas activities in the Beaufort Sea. This is another example of a series of studies that illustrate the value of good baseline information.
- Marine mammal/physical oceanography synthesis: this study was undertaken to increase scientific understanding of the relationships between oceanographic conditions, lower trophic prey species, and marine mammal distribution and behavior in the Chukchi Sea lease area and adjacent waters, and to enhance capability to predict future changes in oceanographic features. The study will synthesize research from previous and ongoing studies in the region, including aerial surveys and passive acoustic monitoring of bowhead whales, walrus, and pinnipeds, as well as other ecosystem

[62] http://www.afsc.noaa.gov/NMML/cetacean/bwasp/index.php; www.afsc.noaa.gov/NMML/cetacean/bwasp/flights_COMIDA.php

studies. Here, too, this study will begin to provide important baseline information on the ecology of the potentially affected marine ecosystem.

Atlantic: If oil and gas development moves into the Atlantic, baseline information should be collected prior to exploration and development. In 2009, the Bureau, in collaboration with the Navy, committed to providing multi-year funding to the National Marine Fisheries Service for the Atlantic Marine Assessment Program for Protected Species (AMAPPS). That program has been undertaken to address data needs for development of both renewable energy and oil and gas, including abundance and seasonal distribution data for marine mammals and other wildlife. It was due to start in 2010 but was delayed until 2011 because the ship designated for the survey was diverted to the Gulf of Mexico to assist in the Deepwater Horizon oil spill response. The Commission commends that type of joint effort and believes similar efforts should be a high priority for the Bureau in all established or proposed energy development areas.

Current oil and gas production, consumption, and reserve levels

In 2011, oil and gas production from all U.S. offshore resources was 24 percent and 8 percent, respectively, of total domestic production,[63] the remainder being from land-based sources. Considering only offshore areas, the Gulf of Mexico still holds the largest reserves of both oil and gas, followed by Alaska (Figure III-13) (Bureau of Ocean Energy Management 2011b). Oil production has been steady in the Gulf and it remains the most important offshore region in the U.S. for oil and gas production, followed by the Pacific and Alaska (Figures III-14 and III-15). In 2010, the Gulf contributed 29 percent of total domestic oil and 12 percent of total domestic gas production.[64]

By country, the United States is third in production of oil but first in consumption (Tables III-5 and III-6). It imports oil and petroleum products because it does not produce enough to meet its demand. Oil and gas imports peaked in 2005, but have been decreasing since then.[65] In 2011 the United States

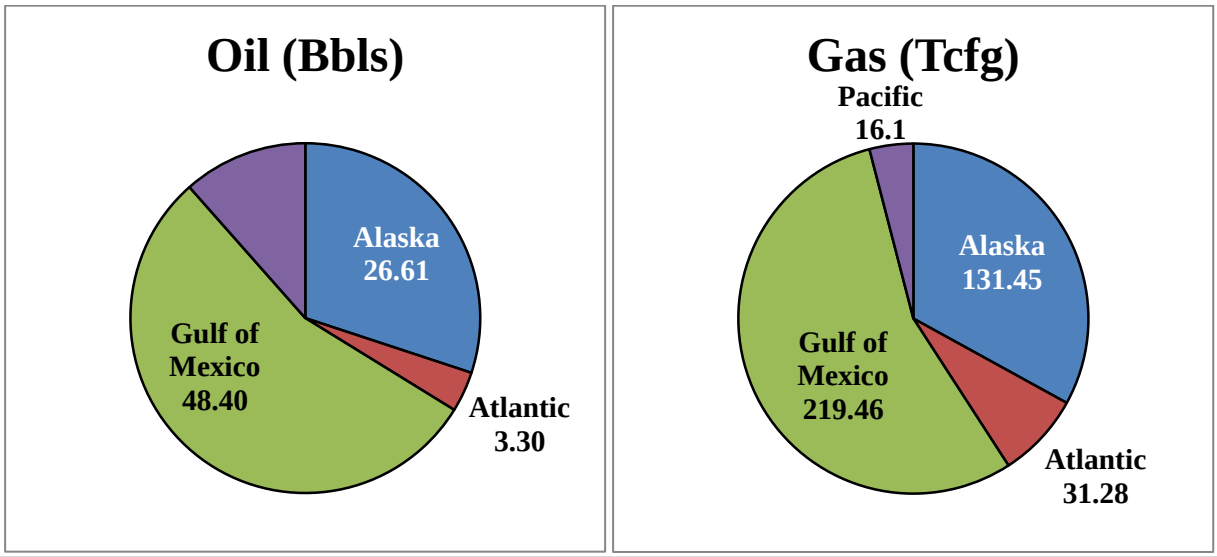

Figure III-13. Mean undiscovered technically recoverable resources by type and region, 2011: Oil in billions of stock tank barrels (Bbls) and gas in trillion standard cubic feet of gas (Tcfg). (Bureau of Ocean Energy Management 2011b)

[63] http://www.eia.gov/special/gulf_of_mexico/data.cfm#petroleum_fuel_facts
[64] U.S. Energy Information Administration, http://www.eia.gov/special/gulf_of_mexico/index.cfm
[65] http://www.eia.gov/energy_in_brief/foreign_oil_dependence.cfm

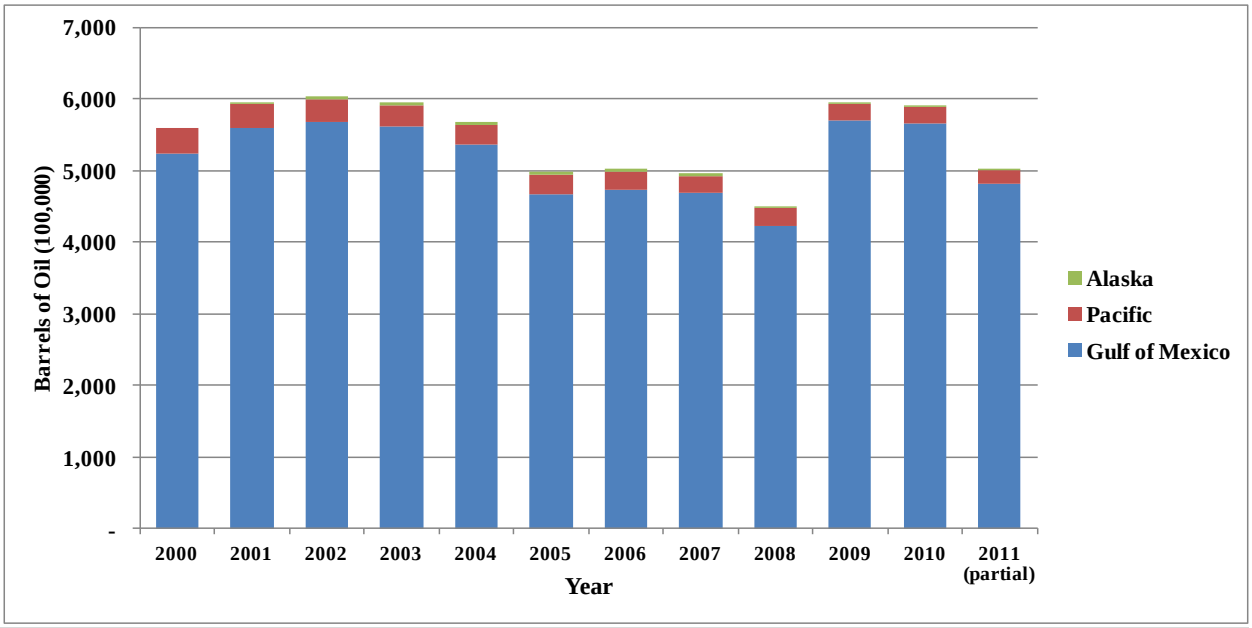

Figure III-14. Oil production by U.S. outer continental shelf region from 2000-2011 (Bureau of Ocean Energy Management)

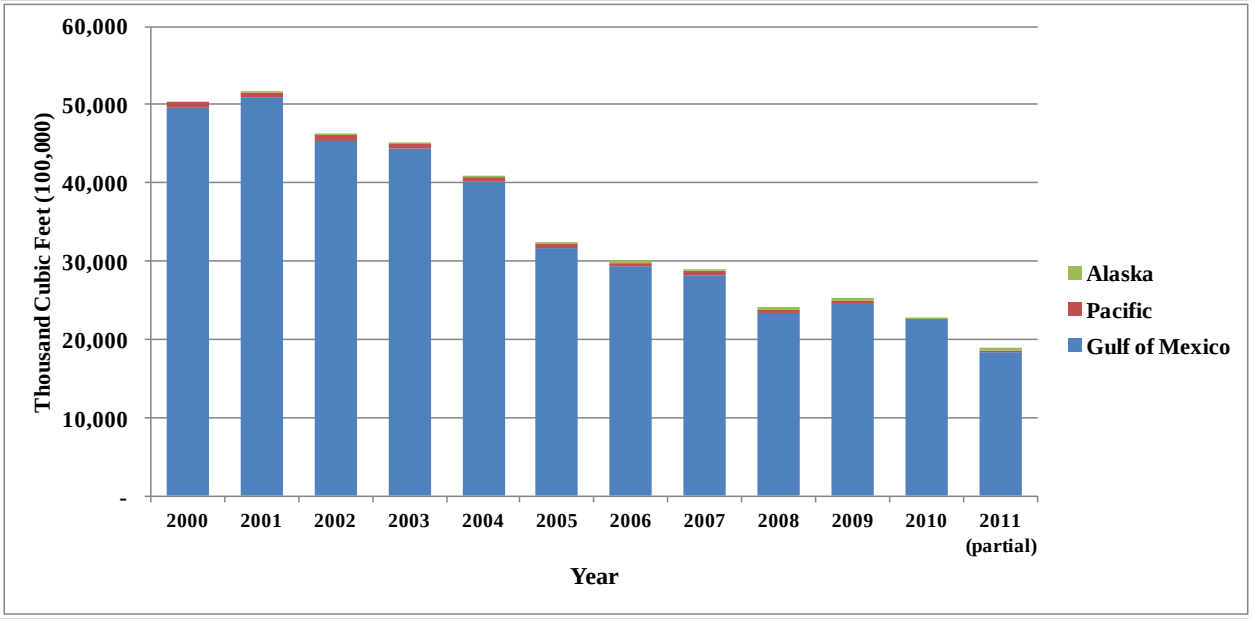

Figure III-15. Natural gas production by U.S. outer continental shelf region from 2000-2011 (Bureau of Ocean Energy Management)

imported about 11,400 thousand barrels of oil and petroleum products per day, 60 percent of its total demand. Major suppliers included Canada (29 percent), Saudi Arabia (14 percent), Venezuela (11 percent), Nigeria (10 percent), and Mexico (8 percent). At the same time, the United States does not consume all of the oil it produces, and in 2011 it exported about 2,900 thousand barrels per day. Net imports (imports minus exports) were about 8,500 thousand barrels per day. The major uses of petroleum in the United States are for industrial purposes (30 percent) and transportation of goods and people (28 percent) (U.S. Energy Information Administration 2010).

Table III-6. Top 15 producers of oil in the world, 2011 (U.S. Energy Information Administration)

Rank	Country	Production (1,000 barrels/day)	Percent of worldwide total
1	Saudi Arabia	11,153	12.8%
2	Russia	10,229	11.7%
3	United States	10,088	11.6%
4	China	4,303	4.9%
5	Iran	4,234	4.9%
6	Canada	3,665	4.2%
7	United Arab Emirates	3,096	3.6%
8	Mexico	2,959	3.4%
9	Kuwait	2,682	3.1%
10	Brazil	2,641	3.1%
11	Iraq	2,635	3.0%
12	Nigeria	2,528	2.9%
13	Venezuela	2,470	2.8%
14	Norway	2,007	2.3%
15	Algeria	1,884	2.2%

Table III-7. Top 15 consumers of oil in the world, 2011 (U.S. Energy Information Administration)

Rank	Country	Consumption (1,000 barrels/day)	Percent of Worldwide Total
1	United States	18,835	21.4%
2	China	9,790	11.1%
3	Japan	4,481	5.1%
4	India	3,292	3.7%
5	Russia	3,145	3.6%
6	Saudi Arabia	2,817	3.2%
7	Brazil	2,594	2.9%
8	Germany	2,423	2.7%
9	Canada	2,239	2.6%
10	South Korea	2,227	2.5%
11	Mexico	2,078	2.4%
12	France	1,824	2.0%
13	Iran	1,694	1.9%
14	United Kingdom	1,602	1.8%
15	Italy	1,455	1.8%

Moving toward energy independence

Efforts to reduce the United States' dependency on foreign oil generally are viewed as vital to the nation's energy security. At the same time, efforts to develop offshore U.S. oil and gas reserves pose considerable challenges as well as risks to marine ecosystems. Because of the risks posed to marine mammals and ecosystems, the Marine Mammal Commission has commented on several occasions to the Bureau of Ocean Energy Management that the United States has faced an impending energy crisis for decades but has neither responded with adequate foresight and commitment to address the crisis in its earlier stages nor shown the foresight to reduce our national dependence on hydrocarbons and minimize

the production of greenhouse gases.[66] A thoughtful and farsighted energy plan is needed to move the nation beyond efforts aimed simply at finding the next oil field. If left unchanged, the present course could have a number of undesirable consequences, including such things as spills (e.g., *Exxon Valdez*, Deepwater Horizon) as well as poorly regulated emissions from the use (burning) of fossil fuels. For those reasons, the Commission has recommended that the Bureau work with the Department of Energy to develop a long-term national energy strategy that will reduce the environmental risks being imposed by the nation's current dependence on oil and gas for energy.

Offshore Development of Renewable Energy

The global development of certain types of renewable energy sources—wind, wave, solar, geothermal, biofuel, waste-to-energy, and tidal energy—represents a positive move away from more traditional, non-renewable sources of energy, especially fossil fuels. Not only are fossil fuel resources in finite supply, but locating, extracting, and transporting them poses considerable risk to the environment and human health. Burning fossil fuels produces carbon dioxide and other greenhouse gases that contribute to climate disruption. Increased production of renewable energy is intended to bring our nation closer to the goal of energy independence.[67] Such dependence has been decreasing steadily, but much remains to be done—in 2010, 49 percent of the oil consumed in the United States was from foreign sources.[68] Despite the need for energy independence, the United States has been slow to develop renewable energy sources, primarily because of the considerable investment and new infrastructure required before this emerging industry can deliver reliable and consistent energy supplies at a rate competitive with fossil fuels. Not surprisingly, political support for renewable energy—crucial for its expansion—wavers with the cost of fuel.

Renewable energy production levels and targets

The United States, China, and the European Union are leading the development of renewable energy capacity. In China, renewable energy accounted for 26 percent of electric power generation in 2010, and 9 percent of final energy consumption. China leads the world in production of wind turbines and solar panels, and their goal is to have 15 percent of final energy consumption from renewable energy (including nuclear energy) by 2020.[69] The European Union has a dual goal of 20 percent of electricity generated from renewable energy sources and a 20 percent reduction in energy consumption by 2020.[70] Seven of the 27 European Union countries—Denmark, Germany, Hungary, Ireland, Lithuania, Poland, and Portugal—were on track to reach the 2010 interim target, based on information provided to the European Commission in January 2011.[71] Half of the European countries likely will meet or exceed their targets by 2020 because of advances in energy efficiency and because, in the next decade, renewable energy is now projected to grow faster than originally expected.[72]

The Department of Energy has identified target scenarios for wind energy development (54 gigawatts and 20 percent renewable energy from wind by 2030) (Department of Energy 2008, 2011).

[66] Most recently, the Marine Mammal Commission recommended that the Bureau of Ocean Energy Management (and its predecessors) work with the Department of Energy and related agencies to develop a national energy policy, in the Commission's comments on (1) the Environmental Impact Statement for the Outer Continental Shelf Oil and Gas Leasing Program for 2012–2017, dated 30 June 2010, and (2) the Draft Supplemental Environmental Impact Statement for the Chukchi Sea Planning Area Oil and Gas Lease Sale 193, dated 6 December 2010.
[67] http://www.huffingtonpost.com/2011/04/06/obama-energy-independence_n_845702.html
[68] http://www.eia.gov/energy_in_brief/foreign_oil_dependence.cfm
[69] http://www.martinot.info/china.htm#targets
[70] European Commission Directive 2009/28/EC, 23 April 2009, eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=Oj:L:2009:140:0016:0062:en:PDF
[71] http://ec.europa.eu/energy/renewables/reports/reports_en.htm
[72] http://ec.europa.eu/energy/renewables/reports/reports_en.htm

However, the United States does not have a national renewable energy target despite legislation introduced in both the House of Representatives and the Senate in the 111th Congress to establish a Federal Renewable Energy Standard.[73] Instead, individual states are driving renewable energy development by establishing their own targets. By the end of 2011, 29 states plus the District of Columbia and Puerto Rico had established renewable energy standards; another eight states had renewable energy goals (Table III-8).[74] Overall, renewable energy sources contributed 10.4 percent of total domestic electricity generated in 2010, with the majority of that coming from hydropower sources (6.3 percent).[75] Although energy production from hydropower is expected to remain relatively stable, non-hydropower renewable energy contributions to domestic electricity are expected to increase from about 4 percent in 2010 to 9 percent by 2035.[76]

Regulatory framework for renewable ocean energy

In 2005 Congress passed the Energy Policy Act, which recognized the significant potential for offshore renewable energy to address increasing energy demands in the United States and to move the country closer to energy independence. The Act delegated to the Department of the Interior the responsibility and authority for leasing and granting easements and rights-of-way for renewable energy development on the outer continental shelf.[77] The Act also required that the development of renewable energy be carried out in a way that is safe, protects the environment, prevents waste, conserves natural resources, is coordinated with other federal agencies, protects national security interests, protects correlative rights on the outer continental shelf, considers and/or prevents interference with other reasonable uses (such as military operations, shipping, and oil and gas exploration), provides for public notice and comment, and ensures oversight, inspection, research, monitoring, and enforcement of the lease, easement, or right-of-way.

The Energy Policy Act also calls on the Department to follow a process for offshore renewable energy leasing similar to that for oil and gas leasing, but with some important differences. Leases are to be issued on a competitive basis, as with oil and gas, unless the Secretary determines that there is no competitive interest. The Department is required to coordinate all leasing and permitting with federal, state, and local officials, and to provide 27 percent of all revenues collected to adjacent coastal states.

Since the Act's passage, the Bureau has taken several steps to facilitate the development of renewable energy on the outer continental shelf. In 2007 it issued an interim policy to authorize the installation of offshore data collection and technology testing facilities (such as meteorological towers) to assess renewable energy resources. Final regulations implementing the Act were issued in 2009, outlining the process by which leases, easements, and rights-of-way would be issued to support production and transmission of renewable energy and how revenues would be shared with coastal states (74 Fed. Reg. 19638). The Secretary of the Interior signed the first commercial lease for offshore wind energy in October 2010 with Cape Wind Associates. The next month the Secretary launched the Department's "Smart-from-the-Start" initiative to expedite the development of other offshore wind energy projects off

[73] Bills introduced in the 111th Congress that would establish a Federal Renewable Energy Standard were H.R. 2454 ("American Clean Energy and Security Act of 2009") and S. 1462 ("American Clean Energy Leadership Act of 2009").

[74] Renewable portfolio standards require utilities to use renewable energy or renewable energy credits to account for a certain percentage of their retail electricity sales -- or a certain amount of generating capacity -- according to a specified schedule; renewable portfolio goals are similar but not legally binding (Source: Department of Energy Database of State Incentives for Renewables and Efficiency, http://www.dsireusa.org/).

[75] http://www.eia.gov/renewable/state/pdf/srp2010.pdf

[76] http://www.eia.gov/forecasts/archive/aeo12/pdf/0383%282012%29.pdf

[77] Public Law 109-58, 8 August 2005. Outer continental shelf refers to all submerged lands, subsoil, and seabed lying between the seaward extent of state water boundaries out 200 nautical miles to the U.S. Exclusive Economic Zone. State waters typically end three miles from shore (nine miles in the case of Texas and the Gulf Coast of Florida). For more details, http://see www.boemre.gov/offshore/mapping/OCSPolicyInfo.htm.

Table III-8. U.S. states with renewable energy standards/goals (Department of Energy database of state incentives for renewables and efficiency)

State	Standard or goal	Renewable energy (RE) target (percent)	Year
Arizona	Standard	15	2025
California	Standard	33	2020
Colorado	Standard	30	2020
Connecticut	Standard	27	2020
Delaware	Standard	25	2026
District of Columbia	Standard	20	2020
Hawaii	Standard	40	2030
Illinois	Standard	25	2025
Indiana	Goal	15	2025
Iowa	Standard	105 MW	--
Kansas	Standard	20	2020
Maine	Standard	40 10(new resources)	2017 2017
Maryland	Standard	20	2022
Massachusetts	Standard	15 (new resources + 1 percent annually thereafter)	2020
Michigan	Standard	10 plus 1,100 MW	2015
Minnesota	Standard	25	2025
Missouri	Standard	15	2021
Montana	Standard	15	2015
Nevada	Standard	25	2025
New Hampshire	Standard	23.8	2025
New Jersey	Standard	20.38	2021
		5,316 GWh solar	2026
New Mexico	Standard	20 (investor-owned utilities) 10 (co-ops & large municipalities)	2020
New York	Standard	29	2015
North Carolina	Standard	12.5 (investor-owned utilities) 10 (co-ops & municipalities)	2021 2018
North Dakota	Goal	10	2015
Ohio	Standard	25	2025
Oklahoma	Goal	15	2015
Oregon	Standard	25 (large utilities) 5-10 (smaller utilities)	2025
Pennsylvania	Standard	~18	2021
Puerto Rico	Standard	20	2035
Rhode Island	Standard	16	2020
South Dakota	Goal	10	2015
Texas	Standard	5,880 MW	2015

State	Standard or goal	Renewable energy (RE) target (percent)	Year
Utah	Goal	20	2025
Vermont	Goal	20	2017
Virginia	Goal	15	2025
Washington	Standard	15	2020
West Virginia	Goal	25	2025
Wisconsin	Standard	~10 (varies by utility)	2015

the Atlantic Coast. That initiative streamlined the regulatory process for leasing of sites with only one qualified and interested developer. It also emphasized a stakeholder-driven, iterative process for identification of both potential lease sites and potential conflicts as part of the planning and analysis stage prior to offering lease sales, consistent with the coastal and marine spatial planning process envisioned in the Administration's new National Ocean Policy, as outlined in Executive Order 13547.

In its letters, the Marine Mammal Commission has commended the Administration for its efforts to accelerate the development of offshore renewable energy and meet the Administration's goal of generating 80 percent of the nation's electricity from clean energy sources by 2035.[78] The Commission has commented frequently on the need for a long-term national energy strategy and agrees that renewable energy sources must be an important part of that strategy. Nevertheless, as with any new industrial activity proposed in U.S. coastal and offshore waters, the Commission believes that the development of alternative energy sources should proceed in a thoughtful and deliberate manner.

Ocean renewable energy sources, potential impacts, and status of development

The Commission's main concerns with regard to offshore alternative energy focus on potential interactions of marine mammals with geological and geophysical surveys conducted by industry to assess the suitability of sites for offshore renewable energy development, and the construction, operation, and decommissioning of renewable energy facilities in coastal and offshore waters. Energy sources include those derived from wind and hydrokinetics (waves, tides, and currents).

Wind energy: Wind energy is a potentially large source of renewable energy from offshore waters. Wind energy turbines used commercially in offshore waters generally are horizontal-axis wind turbines with a fixed or floating structure supporting a tower with three large blades. As with wind turbines generally, the blades rotate in the wind, converting kinetic energy to mechanical energy. The mechanical energy is used to produce electricity, which is then transmitted to land.

Offshore wind turbines have certain benefits compared to land-based wind operations. Once constructed, they tend to be larger and more stable than those used on land. Because they are larger, they also produce more energy. If sited far enough offshore they may raise less concern among the public and land owners about visual impacts. On the other hand, power companies will require considerable new infrastructure to transmit electricity generated offshore to land. Although the United States leads the world in wind energy generation, with 40.2 GW generated in 2010, all of that energy was generated on land.[79] At the end of 2011, the U.S. had yet to generate any wind energy from offshore wind resources, despite considerable offshore wind resources (Figure III-16). The world leaders in offshore wind energy development in 2010 were the United Kingdom (1.2 GW), Denmark (0.9 GW), Netherlands (0.2 GW), China (0.1 GW), and Japan (0.02 GW) (Figure III-17).[80]

[78] State of the Union address, 25 January 2011. Clean energy includes renewable energy sources, yet also includes non-renewable sources such as natural gas, clean coal, and nuclear power.
[79] http://www.un-energy.org/sites/default/files/share/une/ren21_gsr2011.pdf
[80] http://www.un-energy.org/sites/default/files/share/une/ren21_gsr2011.pdf

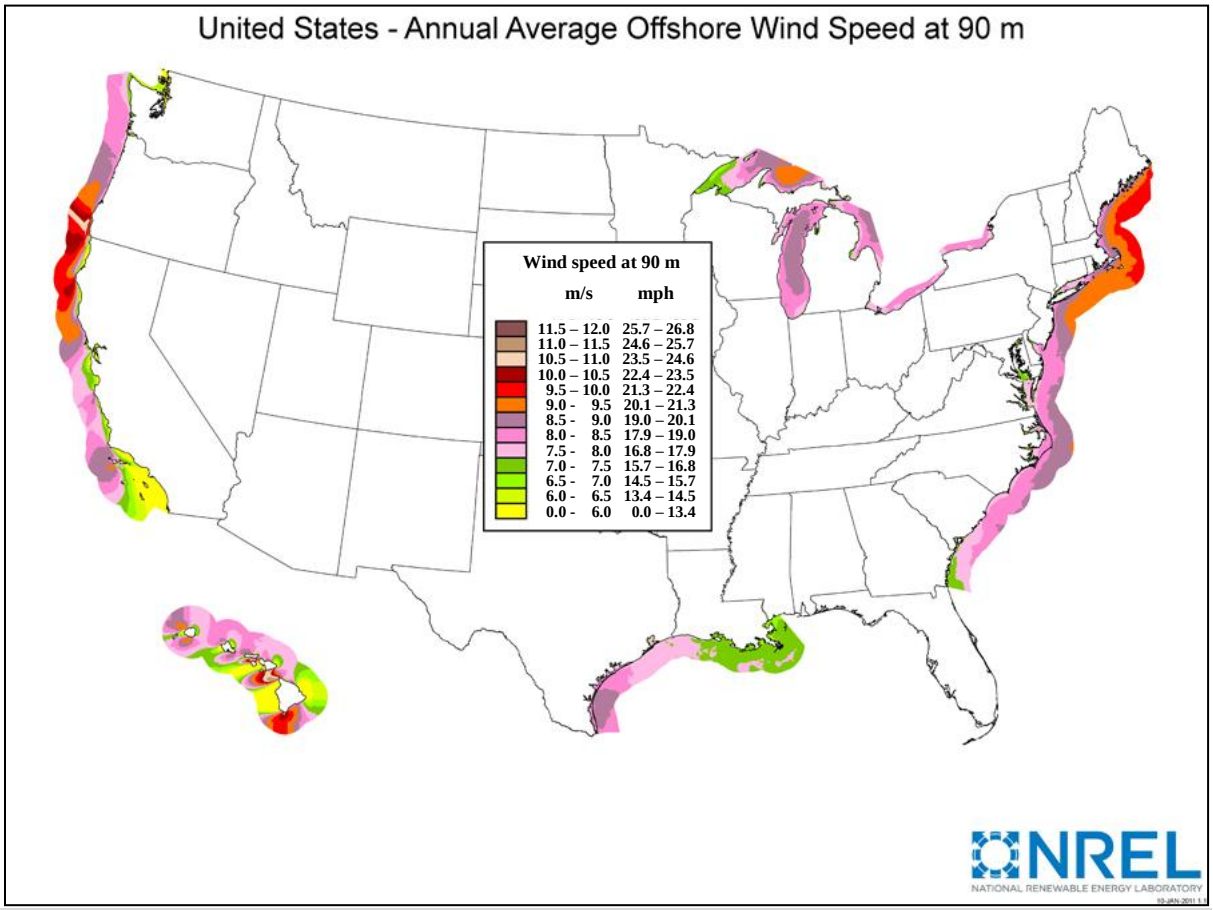

Figure III-16. U.S. offshore wind resources at 90 m above the surface (Schwartz et al. 2010/National Renewable Energy Laboratory)

Risks to marine mammals: Offshore wind is not without potential risks to marine mammals. Sub-bottom profilers used for geophysical surveys and site characterization generate source levels (201–205 dB re 1µPa at 1 m) and frequencies (0.5–24 kHz) comparable to other sound sources that pose risks to marine mammal physiology (e.g., hearing) and behavior (e.g., habitat use) (Cox et al. 2006, Gordon et al. 2004) and may lead to more serious consequences (e.g., stranding). Pile driving for construction of meteorological towers and wind turbines generates low-frequency sound impulses that are detectable up to 40 km from the source (McIwem 2006), could impair hearing in marine mammals at close range (Madsen et al. 2006), and could lead to changes in behavior at intermediate distances, including temporary displacement (Scheidat et al. 2011) . Increased vessel activity associated with

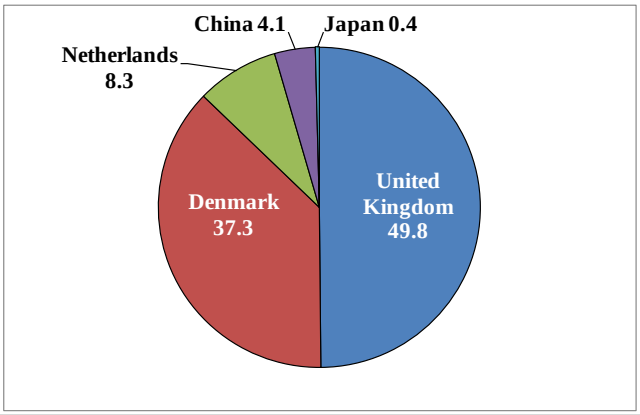

Figure III-17. Percent of total offshore wind energy generated in 2010, by country (REN21 2011)

construction of meteorological towers, deployment of meteorological buoys, and construction and operation of wind turbines may contribute to disturbance and increase the risk of vessel collisions with marine mammals (Laist et al. 2001). Cables transmitting energy generated from wind turbines to shoreside facilities generate electromagnetic energy, which has the potential to affect elasmobranchs (sharks and rays) and other fish species, marine mammals, sea turtles, and invertebrates (Normandeau et al. 2011). Pile driving, anchoring of wind platform structures, and the laying of transmission cables can temporarily or permanently disturb benthic habitats and prey species. Apart from potential impacts to marine mammals, wind energy also has the potential to interact with birds and bats, and to disturb benthic habitats.

The federal leasing process: The Bureau of Ocean Energy Management regulates leasing of wind energy sites on the outer continental shelf. The Bureau can issue limited leases for the installation of offshore data collection and technology testing facilities under its 2007 interim policy. However, those leases confer no commercial rights to further development. The Bureau conducts leasing for commercial development of wind energy sites in four stages: (1) planning and analysis of potential lease areas (also known as wind energy areas under the Smart-from-the-Start program), (2) lease issuance, (3) approval of a site assessment plan, and (4) approval of a construction and operation plan.

During the planning stage, states can request that the Bureau establish a regional task force comprised of federal, state, and tribal representatives to identify potential lease sale areas that the Bureau then uses as the basis for its proposed lease area. The task force also can provide input to the Bureau on unsolicited lease requests, and on matters pertaining to site assessment, construction, and operations. In addition, the task force can provide input on the environmental effects of proposed activities, data gaps and information needs, protocols for monitoring and environmental studies, lease terms and conditions, and mitigation measures. Members of the public can attend task force meetings as observers.

Once the Bureau identifies a potential lease area, it assesses competitive interest in leasing the area by publishing either a Request for Interest or a Call for Information and Nomination.[81] Both of those documents also seek comments on the proposed lease area. Alternatively, an applicant can submit an unsolicited lease request. If the applicant is qualified, the Bureau will discuss the request with the appropriate task force before publishing a Request for Competitive Interest and comments on the proposed lease area. The Bureau may decide to defer further processing of an unsolicited lease request until a Call for Information and Nominations is issued.[82]

When more than one qualified applicant is interested in competing for a lease, the Bureau will determine the area to be made available, publish proposed and final lease sale notices, and hold a lease sale (auction). When only one applicant expresses interest, the Bureau will publish a Determination of No Competitive Interest and issue the lease non-competitively. Once a lease is issued, developers must submit a site assessment plan and/or a construction and operation plan within a certain timeframe. Site assessment plans must describe proposed activities to test technologies or assess physical resources (including plans for the construction of meteorological towers or the deployment of meteorological buoys), and must include relevant data from geological and geophysical surveys, baseline environmental surveys, and archaeological surveys. Once the developer is ready to install wind turbines, they must submit and obtain approval for their construction and operation plan, which also must include conceptual plans for decommissioning.

Cape Wind: Cape Wind, to be located off Cape Cod, Massachusetts, in Nantucket Sound, was the first offshore wind facility proposed for U.S. waters. Proposed in 2001, the developers experienced delays

[81] In 2011 the Bureau stopped publishing Request for Interest notices, as they were determined to be redundant (76 Fed. Reg. 28178). Instead the Bureau started publishing either a Request for Competitive Interest (if an unsolicited proposal has been received) or a Call for Information and Nominations (in states where competitive interest is likely and a preliminary wind energy area has been identified).

[82] The Bureau also has published a Request for Competitive Interest when only one qualified applicant has responded to a Request for Interest; however, as noted above, the Bureau is no longer publishing Requests for Interest.

early in the planning and environmental review phase, with opposition from Native Americans, residents and visitors of Martha's Vineyard and Nantucket Island, environmentalists, and fishermen. The project was further delayed when, in 2005, Congress shifted regulatory authority for offshore renewable energy to the Department of the Interior, prompting further environmental reviews. On 28 April 2010 the former Minerals Management Service signed a Record of Decision[83] choosing its preferred alternative for the project, which involved the installation of up to 130 wind turbine generators, each capable of generating 3.6 megawatts of energy for a total capacity of about 468 megawatts (enough to provide 75 percent of the electricity demand for Nantucket Island, Martha's Vineyard, and Cape Cod).[84] On 6 October 2010 the Secretary of the Interior signed a lease with Cape Wind Associates. The National Marie Fisheries Service issued an Endangered Species Act biological opinion in December 2010 concluding that the proposed action was not likely to adversely affect right, humpback, or fin whales. The Bureau subsequently approved a construction and operation plan on 18 April 2011. Under the plan, geological and geotechnical surveys were scheduled to start in fall 2011, with construction of the wind turbines to start in 2012.

The National Marine Fisheries Service announced receipt of an application from Cape Wind Associates on 14 September 2011 for the take of small numbers of marine mammals (minke whales, Atlantic white-sided dolphins, harbor porpoises, gray seals, and harbor seals) by harassment, under section 101(a)(5)(D) of the Marine Mammal Protection Act (76 Fed. Reg. 56735). The take would result from geological and geotechnical surveys to be conducted from fall 2011 through fall 2012. The Service proposed to issue the authorization, subject to certain conditions. The Commission reviewed the application, which involved the collection of high-resolution data along 4,292 km of track lines using side scan sonar, a magnetometer, depth sounders, and sub-bottom profilers. The Commission recommended that the Service require Cape Wind Associates to take additional actions to ensure that the calculations of harassment zones for the sub-bottom profilers and the associated number of takes were correct. The Commission also recommended shut-down of operations during impaired visibility conditions and monitoring of marine mammals during all proposed geophysical and geotechnical survey activities. The Commission's complete list of recommendations can be found in Appendix A. The Service completed its environmental assessment and, on 27 December 2011, published a notice of intent to issue a marine mammal incidental harassment authorization to Cape Wind Associates effective 1 January 2012 (76 Fed. Reg. 80891). In response to the Commission's recommendations, Cape Wind Associates agreed to conduct hydroacoustic monitoring during the initial deployment of the survey equipment to verify source levels and recalculate the harassment zones if needed. The surveys are scheduled to start in 2012.

Other offshore wind energy activities: In November 2009 the Minerals Management Service (now the Bureau of Ocean Energy Management) issued four limited leases (three in New Jersey and one in Delaware) for data collection and technology testing activities on the outer continental shelf under the Bureau's interim renewable energy policy.[85] None of those had been acted on at the end of December 2011. Ten regional task forces have been established for interagency consultation on wind energy areas on the outer continental shelf—Maine, Massachusetts, Rhode Island, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, and Washington/Oregon/California. At the end of 2011, six of those task forces had identified areas suitable for leasing. Table III-9 summarizes the status of offshore wind energy planning and leasing activities by state.

Wind energy development has been progressing at a different pace in each state. For example, in anticipation of wind energy development in both state and federal waters, the New Jersey Department of Environmental Protection commissioned a large-scale, two-year study of baseline ecological and natural resources, which was completed in 2010 (Geo-Marine, Inc. 2010). Rhode Island and Massachusetts have developed management plans to help inform decision-makers regarding resources and issues associated

[83] The Record of Decision signals formal federal approval of an Environmental Impact Statement (EIS) or Environmental Assessment (EA) concerning a proposed action.
[84] http://www.boem.gov/Renewable-Energy-Program/Current-Projects/Index.aspx
[85] The Bureau granted leases to Deepwater Wind LLC (New Jersey), Fishermen's Energy of New Jersey LLC, Bluewater Wind Delaware LLC, and Bluewater Wind New Jersey Energy LLC.

Table III-9. Status of U.S. wind energy development projects on the outer continental shelf, by state (Bureau of Ocean Energy Management)

Document	ME	MA	RI (/MA)[1]	NY	NJ	DE	MD	VA	NC	WA/ OR/CA
Interim policy lease(s)					Nov 2009 (3 leases)	Nov 2009 (1 lease)				
Regional task force established	Sep 2010	Nov 2009	Nov 2009	Nov 2010	Nov 2009	Oct 2009	Apr 2010	Dec 2009	Jan 2011	Mar 2011
Potential lease area identified by task force	No[2]	Yes	Yes	No	Yes	Yes	Yes	Yes	No	
Unsolicited request	Yes 2011	No	Yes (2) 2010[3]	Yes 2011	Yes 2010[3]	No	No	Yes 2009[3]	No	
Request for interest		Dec 2010; Mar 2011	--			Apr 2010	Nov 2010			
Request for competitive interest	Planned for 2012					Jan 2011				
Determination of no competitive interest						Apr 2011[4]				
Notice of intent to prepare an EA[1]		Aug 2011	Aug 2011		Feb 2011	Feb 2011	Feb 2011	Feb 2011		
Notice of availability of draft EA					Jul 2011	Jul 2011	Jul 2011	Jul 2011		
Call for information & nominations		Planned for 2012	Aug 2011		Apr 2011	--	Planned for 2012	Planned for 2012		
Leasing area identified			Planned for 2012		Planned for 2012	--				
Proposed sale notice										
Final sale notice										
Lease sale (auction)										
Lease issuance		Oct 2010 (Cape Wind Assoc.)[6]				Planned for 2012				
Other										
Baseline studies					Yes[2]					
Management plans		Yes[8]	Yes[9]							

Lease areas for Rhode Island and Massachusetts were developed jointly as an "Area of Mutual Interest" pursuant to a 26 July 2010 Memorandum of Understanding between the two states.

[2] The state of Maine established an Ocean Energy Task Force in 2009 and has identified three potential lease areas in state waters (Boon Island, Damariscove Island, and Monhegan Island).

[3] The Bureau will use the information received from the Call for Information and Nominations to determine whether there is competitive interest in the proposed leased areas.

[4] Bluewater Wind Delaware, LLC was determined to be the only qualified applicant that responded to the Request for Competitive Interest.

[5] The purpose of the Environmental Assessment is to issue leases and approve site assessment plans for the proposed wind energy areas.

[6] The steps involved in the issuance of the Cape Wind Associates lease did not follow the same steps outlined in the table for other wind energy area projects.

[7] Geo-Marine, Inc. 2010.

[8] Final Massachusetts Ocean Management Plan (http://www.mass.gov/eea/ocean-coastal-management/mass-ocean-plan/final-massachusetts-ocean-management-plan.html)

[9] Rhode Island Ocean Special Area Management Plan (http://seagrant.gso.uri.edu/coast/osamp.html)

with renewable energy development. The Bureau published Calls for Information and Nominations in 2011 to determine competitive interest in wind energy areas off New Jersey, Rhode Island, and Massachusetts with proposed lease sale areas to be announced in 2012. The Bureau determined in 2011 that there was no competitive interest for wind energy development in Delaware offshore waters and therefore is expected to issue a non-competitive lease to Bluewater Wind Delaware, LLC in 2012. Maine and New York both received unsolicited requests in 2011 for commercial leases; those requests were still

under review in December 2011. In 2011 the Bureau anticipated leasing and site assessment activities in all four mid-Atlantic states (New Jersey, Delaware, Maryland, and Virginia) and published a draft environmental assessment for those activities in July 2011.

To provide the "backbone" grid to connect several of the proposed wind farms off the mid-Atlantic, Atlantic Grid Holdings LLC submitted an unsolicited proposal to the Bureau in March 2011 to construct a high voltage direct current, underwater transmission system. The company was seeking a right-of-way grant from the Bureau for this activity. In December 2011 the Bureau published a notice seeking comments on the proposal. Figure III-18 illustrates the proposed Atlantic Wind Connection and associated wind energy areas in the mid-Atlantic.

The Commission submitted comments to the Bureau on three wind energy-related actions in 2010 and 2011, pertaining to notices published regarding Rhode Island, Massachusetts, and the four mid-Atlantic states. The Commission's complete list of comments by action can be found in Appendix A. In summary, the Commission encouraged the Bureau to continue its proactive and collaborative approach for identifying specific leasing areas for wind energy development and to choose wind energy areas that minimize the likelihood of noise-related injuries and vessel strikes to marine mammals, especially endangered species such as the North Atlantic right whale. The Commission recommended that the Bureau require lessees to apply mitigation measures to protect all marine mammals, not just those listed as endangered or threatened under the Endangered Species Act, and to determine exclusion and buffer zones for all sound sources using operational- and site-specific information, modifying those zones as necessary using in-situ sound measurements. The Commission recommended that the Bureau also require lessees to use acoustical monitoring to characterize ambient sound levels before, during, and after proposed activities, and to monitor for the presence and movements of cetaceans in the vicinity of specific proposed wind energy areas. As with oil and gas activities, the Commission stressed the need to develop a set of standards for the collection of baseline information on marine mammals and their environment and to identify and address any significant data gaps before initiating the leasing process. The Bureau had not responded to those comments nor completed its environmental assessment by the end of 2011.

Wind energy development in state waters: Wind energy development in state waters is regulated by individual state agencies and follows state processes. State processes may include the establishment of task forces or other advisory bodies to assist in the identification of potential wind development areas. States also may require baseline studies or the collection of other information needed to determine potential environmental and socioeconomic impacts.

At least two coastal states were moving forward with wind energy development within state waters in 2010 and 2011. New Jersey-based Fisherman's Atlantic City Windfarm, LLC was preparing to construct six wind turbines 2.8 miles off Atlantic City, New Jersey, with each turbine capable of producing 3.6 megawatts. Coastal Point Energy was planning to construct a single 750 kilowatt wind turbine eight miles off Galveston, Texas. Ultimately, Coastal Point plans to build a 300 MW wind farm on 12,350 leased acres at the Galveston Wind Project site, and the Baryonyx Corporation has proposed a three-turbine, 18MW wind farm be installed off Padre Island, Texas.

Hydrokinetic energy: Hydrokinetic energy is generated from the movement of water (e.g., tides, waves, and currents).[86] While this technology is still in the development stage, several prototype projects are in use or being tested.

Tidal energy generators are the most common, primarily because of the predictable nature of tides.Tidal power generators are typically either in the form of permanent barrages (dam-like structures) or tidal stream generators (similar to wind turbines, only underwater). Dynamic tidal power is a new technology, conceptually designed to capture energy more efficiently from strong coastal tides and currents using alongshore T-shaped dam-like structures.

Wave energy devices are generally installed at or near the ocean surface and convert energy from the

[86] Hydropower, or power generated from the movement of water across dams, is generated from inland rivers and so is not included in this discussion of ocean energy sources.

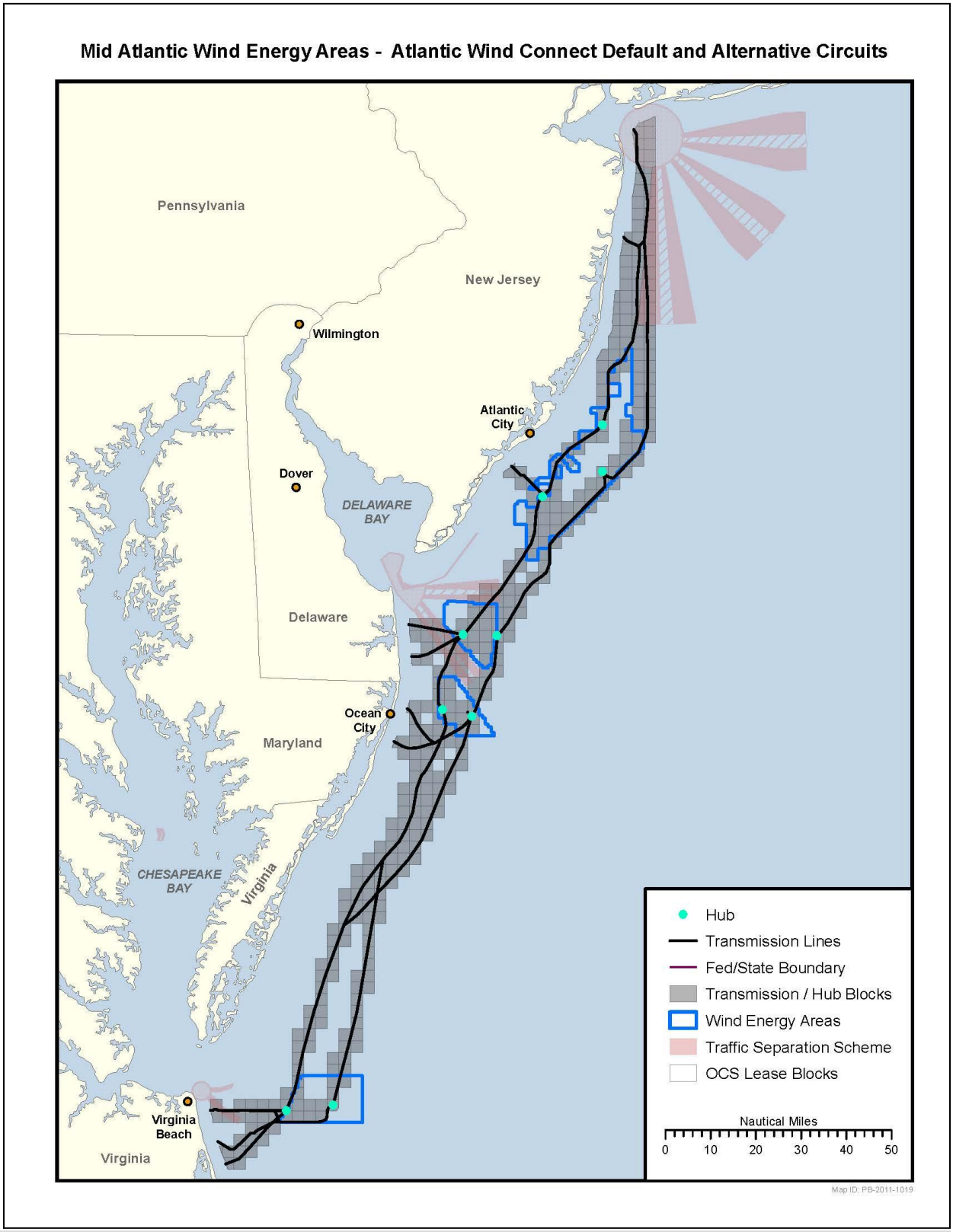

Figure III-18. Map of mid-Atlantic wind energy areas and the proposed Atlantic Wind Connection high voltage direct current transmission system. (Bureau of Ocean Energy Management)

up and down movement of waves into other energy types, usually electricity.[87] Current efforts to test those devices are focused on four main wave generators—terminators, point absorbers, attenuators, and over-topping devices. Terminators are positioned perpendicular to the waves and capture or reflect the wave power using an oscillating water column or other piston-like structure; they are generally used in nearshore waters. Point absorbers resemble anchored buoys with piston-like structures at either the ocean surface or at depth. Attenuators are long, floating structures mounted parallel to the waves so that the flexing action creates energy. Over-topping devices are similar to attenuators except they are mounted in a semi-circle to create a reservoir effect.

Current generators are the least advanced of the hydrokinetic technologies; underwater turbines or water-wheel structures are the most common devices being tested. They can either be suspended from bottom-mounted mooring systems or mounted directly to the seabed.

Worldwide, only a handful of hydrokinetic operations (most based on tidal energy) are generating reliable energy from the ocean. Leaders in tidal power generation in 2011 were South Korea (> 254 megawatts), France (240 megawatts), and Canada (20 megawatts).[88] China, Russia, and the United Kingdom also generated tidal power, but at much lower amounts (3.2, 1.7, and 1.2 megawatts, respectively).[89] Wave energy was generated at much lower levels globally, with top producers including the United Kingdom (1300 kilowatts), Canada (1065 kilowatts), Korea (500 kilowatts), Portugal (400 kilowatts), and Spain (296 kilowatts)—Denmark, Sweden, and New Zealand all generated < 200 kilowatts.[90] In the United States, small-scale and pilot hydrokinetic projects have been located on each coast, with tidal energy topping the list of permitted projects.[91]

Risks to marine mammals: The potential impacts of commercial scale hydrokinetic energy projects on marine mammals and marine ecosystems are poorly known. Several studies have been conducted around test facilities in the U.K.[92] However, one might expect impacts similar to those from wind energy, depending on the site characterization requirements and the design of the hydrokinetic device. If the structure is to be mounted to the seafloor, bottom surveys would be needed to characterize subsurface structure, with potential impacts from sound generated by sub-bottom profilers. Mounting of permanent structures on the seafloor for tidal or current turbines may involve pile driving, which generates sound that could impair hearing in marine mammals at close range or lead to changes in behavior at intermediate distances. Operation of underwater turbines has the potential to injure or kill marine mammals by direct interactions with the turbine foils. Wave attenuators or over-topping devices could present an entanglement or entrapment hazard. And activities associated with site characterization, construction, and maintenance of hydrokinetic energy presents a heightened risk to marine mammals from vessel collisions, electromagnetic disturbance, habitat degradation, and impacts on prey species.

Leasing and licensing process: Leasing of hydrokinetic energy sites is regulated either by the Bureau of Ocean Energy Management (for federal waters) or by individual states (for state waters). The Bureau follows the same process for leasing and limited leasing of hydrokinetic sites as described above for wind energy. Projects start with a federal/state/tribal planning process to identify potential lease areas before moving on to a request for competitive interest and a lease sale. Alternatively, applicants can submit an unsolicited lease request and if there is no competitive interest, the Bureau negotiates and issues a lease directly to the applicant. The states follow their own leasing processes.

Licensing of energy projects in both federal and state waters is regulated by the Federal Energy Regulatory Commission. Applicants that have been issued a lease (or for which a lease is imminent) start the license process by submitting a pre-application document to the Federal Energy Regulatory

[87] http://ocsenergy.anl.gov/guide/wave/index.cfm
[88] http://www.un-energy.org/sites/default/files/share/une/ren21_gsr2011.pdf
[89] http://www.cresp.org.cn/uploadfiles/73/613/zhejiang.html; http://www.osec.ch/de/filefield-private/files/53139/field_blog_public_files/14171; http://www.seageneration.co.uk/
[90] http://www.ocean-energy-systems.org/oes_documents/annual_reports/2010_annual_report/
[91] http://www.ferc.gov/industries/hydropower/gen-info/licensing/hydrokinetics.asp
[92] http://mhk.pnnl.gov/wiki/index.php/DOE_MHK_Webinar_Series

Commission. At the same time, applicants submit a site assessment plan to the Bureau. The information required by the agencies in those two documents is similar, and applicants usually submit the two documents at the same time so that the agencies can coordinate the environmental review process. The Federal Energy Regulatory Commission encourages (but does not require) applicants that are seeking to study development of a hydrokinetic project to apply for a preliminary permit. The purpose of a preliminary permit is to secure priority of application for a license while the applicant conducts studies and prepares to apply for a license. Preliminary permits can be issued for up to three years.

Once the studies are completed and the information to prepare a license has been collected, the applicant files a final license application with the Federal Energy Regulatory Commission. The Commission's license application takes the place of the Bureau's requirement for a construction and operation plan. The Commission can issue licenses for either long-term commercial projects or short-term pilot projects. Pilot project licenses provide industry with the opportunity to expedite application processing and license issuance for small footprint projects to assess environmental effects and assist in information gathering for future commercial development. Alternatively, limited testing of hydrokinetic technologies can be conducted without a Commission license if the technology being tested is experimental, the project will operate for only a short time and is being undertaken for the purpose of collecting data to prepare a commercial license application, and the electricity generated would not be transmitted into or displaced from the interstate electricity grid.[93]

Hydrokinetics projects in nearshore and offshore waters: At the end of 2011, the Federal Energy Regulatory Commission had issued 31 preliminary permits for hydrokinetic projects in nearshore and offshore waters—25 for tidal energy and 6 for wave energy (Table III-10). Another 11 permits were pending—9 tidal and 2 wave (Table III-11). As noted above, proponents of projects with preliminary permits were collecting information to support a license application. No hydrokinetic projects had been licensed at the end of 2011, although three applications were pending—2 tidal and 1 wave (Table III-12).

Baseline information requirements for renewable energy development

At each stage of renewable energy development, the Bureau (for wind energy and for site assessment of hydrokinetics) and the Federal Energy Regulatory Commission (for hydrokinetics) must conduct environmental reviews of proposed actions as required by the National Environmental Policy Act of 1969.[94] Existing information on the status of marine mammal stocks falls well short of that needed to assess potential environmental impacts of renewable energy development. Lack of research infrastructure and inadequate funding are significant impediments to surveys and other assessment studies. As a result, most studies to date have focused on specific topics rather than consistent, long-term collection of baseline information. Collection of baseline information to provide the knowledge needed to detect any adverse impacts associated with energy development and otherwise provide a strong foundation for responsible management of marine ecosystems requires a long-term commitment of effort and resources.

The Marine Mammal Commission has long argued that the industry and regulatory agencies have a shared responsibility to support the research needed to investigate the potential effects of energy development. In fact, the former Minerals Management Service has contributed significantly to marine mammal science over past decades. However, the resources still fall short of what is needed, and the Commission believes that the Bureau and the industry need to find additional means to support essential research. The industry, in particular, should provide more support because the risks stem from their activities. Addressing the environmental risks in a responsible manner should be considered a cost of doing business for industry.

[93] http://www.ferc.gov/industries/hydropower/gen-info/licensing/hydrokinetics/pdf/mms080309.pdf

[94] Proposed wind projects must also comply with other federal and state laws, such as the Marine Mammal Protection Act, the Endangered Species Act, the National Environmental Policy Act, the Coastal Zone Management Act, the Magnuson-Stevens Fishery Conservation and Management Act, the National Historic Preservation Act, the Clean Water Act, the Clean Air Act, and others.

Table III-10. Hydrokinetic projects issued preliminary permits as of December 2011, by state (Federal Energy Regulatory Commission)

Project name	Developer	Location	Permit issued	Permit expires	Type of energy	Capacity (KW)
Alaska						
Cook Inlet Tidal Energy	Ocean Renewable Power Co. Alaska, LLC	Cook Inlet	13 Oct 2010	30 Sep 2013	Tidal	1000
East Foreland Tidal Energy	Ocean Renewable Power Co. Alaska 2, LLC	Cook Inlet	11 Mar 2011	28 Feb 2014	Tidal	100,000
Gastineau Channel Tidal	Natural Currents Energy Services, LLC	Gastineau Channel	30 Apr 2010	31 Mar 2013	Tidal	400
Icy Passage Tidal	Natural Currents Energy Services, LLC	Pacific Ocean (AK)	30 Apr 2010	31 Mar 2013	Tidal	300
Killisnoo Tidal Energy	Natural Currents Energy Services, LLC	Killisnoo Inlet	21 Jan 2011	31 Dec 2013	Wave	250
Turnagain Arm Tidal	Turnagain Arm Tidal Energy	Cook Inlet	5 Feb 2010	31 Jan 2013	Tidal	2,200,000
California						
Fort Ross (South)	Sonoma County Water Agency	Pacific Ocean (California)	9 Jul 2009	30 Jun 2012	Wave	5000
San Francisco Bay Tidal Energy	Golden Gate Energy Co	San Francisco Bay	4 Feb 2010	31 Jan 2013	Tidal	10,000
San Onofre OWEG Electricity Farm	JD Products, LLC	Pacific Ocean (CA)	29 Oct 2010	30 Sep 2013	Wave	3,186,000
Hawaii						
Oceanlinx Maui	Oceanlinx Hawaii, LLC	Pacific Ocean	25 Nov 2009	31 Oct 2012	Wave	2700
Maine						
Cobscook Bay Tidal Energy	Ocean Renewable Power Co. Maine, LLC	Cobscook River	13 Jan 2011	31 Dec 2013	Tidal	750
Half Moon Tidal Energy	Tidewalker Assoc.	Passamaquoddy Bay	3 Dec 2010	30 Nov 2013	Tidal	9000
Homeowner Tidal Power Electric Generation	Shearwater Design Inc.	Kennebec River	1 Jul 2009	30 Jun 2012	Tidal	60
Kendall Head Tidal Energy	Ocean Renewable Power Co. Maine, LLC	Atlantic Ocean (ME)	13 Jan 2011	31 Dec 2013	Tidal	1200
Pennamaquan Tidal Power Plant	Pennamaquan Tidal Power, LLC	Pennamaquan River	1 Mar 2011	28 Feb 2014	Tidal	21,100
Town of Wiscasset Tidal Resources	Town of Wiscasset	Sheepscot River	28 May 2009	30 Apr 2012	Tidal	10,000
Western Passage OCGen Power	Ocean Renewable Power Co. Maine, LLC	Atlantic Ocean (Maine)	13 Jan 2011	31 Dec 2013	Tidal	1200
Massachusetts						
Cape Cod Tidal	FFP Mass 1, LLC	Hog Island Channel	9 Dec 2010	30 Nov 2013	Tidal	20,000
Muskeget Channel Tidal Energy	Town of Edgartown	Muskeget Channel	2 Aug 2011	31 Jul 2014	Tidal	4940
New Hampshire						
General Sullivan and Little Bay Bridges UNH Tidal Energy Device Testing	University of New Hampshire	Piscataqua River	30 Sep 2009	31 Aug 2012	Tidal	0
New Jersey						
Cohansey River Tidal Energy	Natural Currents Energy Services, LLC	Cohansey River	1 Sep 2011	31 Aug 2014	Tidal	3000
Highlands New Jersey Tidal Energy	Natural Currents Energy Services, LLC	Shrewsbury River	11 Jan 2011	31 Dec 2013	Tidal	3000
Hoffman's Marina Tidal	Natural Currents Energy Services, LLC	Manasquan River	11 Jan 2011	31 Dec 2013	Tidal	200
Salem Tidal Energy	Natural Currents Energy Services, LLC	Salem River	2 May 2011	30 Apr 2014	Tidal	3000
New York						
Astoria Tidal Energy	New York Tidal Energy Co.	East River	10 Jan 2011	31 Dec 2013	Tidal	200
Astoria Tidal Energy	New York Tidal Energy Co.	East River	10 Jan 2011	31 Dec 2013	Tidal	2000

Project name	Developer	Location	Permit issued	Permit expires	Type of energy	Capacity (KW)
Wards Island Tidal Power	Natural Currents Energy Services, LLC	East River	17 Apr 2009	31 Mar 2012	Tidal	96
Oregon						
Coos Bay OPT Wave Park	Oregon Wave Energy Partners 1, LLC	Pacific Ocean (Oregon)	10 Aug 2010	31 Jul 2013	Wave	100,000
Douglas County Wave and Tidal Energy	Douglas County	Umpqua River	6 Oct 2010	30 Sep 2013	Wave	3000
Washington						
Admiralty Inlet Tidal Energy	Public Utility District No. 1 of Snohomish County	Puget Sound	8 Jul 2010	30 Jun 2013	Tidal	1000
Deception Pass Tidal Energy	Public Utility District No. 1 of Snohomish County	Puget Sound	4 Aug 2010	31 Jul 2013	Tidal	6400

Table III-11. Hydrokinetic projects pending permits as of December 2011, by state (Federal Energy Regulatory Commission)

Project name	Developer	Location	Permit filed	Type of energy	Capacity (KW)
California					
Green Wave Mendicino	Green Wave Energy Solutions, LLC	Pacific Ocean (CA)	26 Sep 2011	Wave	100,000
Green Wave San Luis Obisbo Wave Park	Green Wave Energy Solutions, LLC	Pacific Ocean (CA)	26 Sep 2011	Wave	100,000
Maine					
Lubec Narrows Tidal Energy Project	Ocean Renewable Power Company, LLC	Johnson Bay/Lubec Narrows	2 Dec 2011	Tidal	600
Treat Island Tidal Energy Project	Ocean Renewable Power Company, LLC	Passamaquoddy Bay	2 Dec 2011	Tidal	2,250
New Jersey					
Avalon Tidal Energy Project	Natural Currents Energy Services, LLC	Ingram Thoroughfare	15 Jul 2011	Tidal	3000
BW2 Tidal Energy Project	Natural Currents Energy Services, LLC	Maurice River	13 Jul 2011	Tidal	1000
Cape May Tidal Energy Project	Natural Currents Energy Services, LLC	Cape May Canal	18 Jul 2011	Tidal	3000
Dorchester - Maurice Tidal Energy Project	Natural Currents Energy Services, LLC	Maurice River	13 Jul 2011	Tidal	1500
Margate Tidal	Natural Currents Energy Services, LLC	Beach Thoroughfare	13 Jul 2011	Tidal	3000
Maurice River Tidal Energy Project	Natural Currents Energy Services, LLC	Maurice River	18 Jul 2011	Tidal	3000
New York					
Orient Point Tidal Energy Project	Natural Currents Energy Services, LLC	Long Island Sound	6 Dec 2011	Tidal	5000

Table III-12. Pending and issued licenses for hydrokinetic projects as of December 2011 (Federal Energy Regulatory Commission)

Project name	Developer	Location	License filed	License issued	Type of energy	Capacity (KW)
Reedsport OPT Wave Park	Ocean Reedsport OPT Wave Park, LLC	Pacific Ocean (OR)	29 Jan 2010	Pending	Wave	
Roosevelt Island Tidal Energy Project - Pilot	Verdant Power, LLC	East River, NY	29 Dec 2010	Pending	Tidal	1,050
TideWorks	TideWorks, LLC	Sasanoa River, ME	15 Jan 2010	Pending	Tidal	22,000

Guidelines for biological surveys: The industry needs appropriate guidelines for environmental studies. In April 2011 the Bureau issued guidelines for shallow hazard surveys, geological surveys, geotechnical surveys, and archaeological resource surveys required for development of wind energy

resources.[95] It did not, however, issue guidelines for biological surveys, even though lessees also must submit the results of biological surveys with their site assessment and construction and operation plans. The Marine Mammal Commission understands that the Bureau is in the process of developing those guidelines and provided comments on a draft version in March 2011. In its 11 August 2011 letter to the Bureau, the Commission requested an opportunity to review and provide comments on future drafts to facilitate their completion. Clear and comprehensive guidelines should help the Bureau and industry avoid significant gaps in baseline information. The Commission recommended also that the Bureau work with lessees to ensure the availability of adequate baseline information before moving forward with wind energy site characterization and assessment projects. The Bureau awarded a project entitled "Developing Environmental Protocols and Monitoring to Support Ocean Renewable Energy and Stewardship" under the National Ocean Partnerships Program in 2010. At the end of 2011 the Bureau expected to continue to work with the Commission on these guidelines and it expected to complete the guidelines in 2013.

Research and environmental monitoring: As noted in the previous section, the Bureau plays an essential role in environmental research and monitoring of offshore renewable energy development. Its Environmental Studies Program can provide significant information on baseline environmental conditions in renewable energy leasing areas and can support research into the effects of renewable energy development on marine mammals and the effectiveness of mitigation and monitoring measures. As also noted in the previous section, in 2009 the Bureau, in collaboration with the Navy, committed to providing multi-year funding to the National Marine Fisheries Service for the Atlantic Marine Assessment Program for Protected Species (AMAPPS). The Bureau also supported a number of other research and monitoring studies completed or ongoing in 2011 to help identify and address data gaps on the effects of renewable energy development on marine mammals.[96] They included—

- a marine mammal and sea turtle data search and literature synthesis including stranding and nesting sites (Atlantic Coast);
- development of a national marine mammal data archive (nationwide);
- high definition video surveys for seabirds, marine mammals, and sea turtles (Atlantic Coast);
- marine mammal and seabird surveys of potential alternative energy sites (northern California, Oregon, and Washington);
- a review of the effects of electromagnetic fields from transmission lines on elasmobranchs and other marine species, including marine mammals (worldwide) (Normandeau et al. 2011);
- opportunistic study of hearing in sea otters (*Enhydra lutris*) (Pacific Coast) and measurement of auditory detection thresholds for tonal and industry sounds (Chukchi Sea);
- characterization of potential impacts of noise producing construction and operation activities for renewable energy development (Gulf of Mexico);
- mitigation of underwater pile driving noise during offshore construction of offshore wind farms (nationwide) (Stokes et al. 2010);
- support for the second international conference on the effects of noise on aquatic life (worldwide); and
- support for the 19th biennial conference on the biology of marine mammals (worldwide).

Commission staff participated in several Bureau-related projects related to wind energy. The Commission's energy policy analyst served in an advisory capacity to the University of Rhode Island, which was funded by the Bureau to develop "environmental protocols and modeling tools to support ocean renewable energy and stewardship." Commission staff provided extensive comments on the Bureau's draft guidelines for the assessment and monitoring of protected species and fish and their

[95] http://www.boem.gov/Renewable-Energy-Program/Regulatory-Information/GGARCH.aspx
[96] http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Renewable-Energy/Renewable-Energy.aspx

habitats in the Atlantic for offshore wind development. In December 2010, the Commission endorsed the nominations of two members to the Bureau's Scientific Advisory Committee for the Environmental Studies Program and Commission staff attended the Bureau's 2011 meeting of the Committee, where ongoing and proposed research projects were reviewed. Commission staff also attended the Bureau's two-day Atlantic Wind Energy Workshop, which provided updates on current research and management actions (Cahill et al. 2011).

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Chapter IV

SPECIES OF SPECIAL CONCERN IN U.S. WATERS

Section 202 of the Marine Mammal Protection Act directs the Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, to make recommendations to the Departments of Commerce and the Interior and other federal agencies regarding research and management actions needed to conserve species and stocks of marine mammals.

To meet this charge, the Commission devotes special attention to particular species and populations that are vulnerable to the effects of human activities. Chapter V presents information pertaining to species occurring primarily in foreign and international waters. This chapter focuses on species occurring in U.S. waters. Such species may include marine mammals listed as endangered or threatened under the Endangered Species Act or as depleted under the Marine Mammal Protection Act. In addition, the Commission often directs attention to other species or populations of marine mammals not so listed when they face special conservation challenges.[1]

North Pacific Right Whale (*Eubalaena japonica*)

Marine mammal scientists recognize three right whale species. The North Pacific right whale (*Eubalaena japonica*) also is highly endangered and may number in the hundreds (IWC 2001).The North Atlantic right whale (*E. glacialis*) is highly endangered and consists of about 400 individuals. In contrast, the southern right whale (*E. australis*) probably numbers well over 10,000 range-wide (combining regional estimates reported for South Africa, Australia, New Zealand, and Argentina/Brazil at the IWC workshop on southern right whales in Buenos Aires in September 2011; IWC in press).

Between 1835 and 1910, commercial whalers discovered and nearly extirpated the North Pacific right whale (Scarff 2001, Josephson et al. 2008). During that period more than 15,500 right whales were killed in the North Pacific Ocean and Bering Sea. The vast majority of those whales were killed during a 20-year period from 1845 to 1865 when as many as 300 to 400 ships were deployed for that purpose. No calving ground for right whales in the North Pacific was reported by the whalers, and such grounds remain unknown today. It is likely that by 1910 no more than a few hundred right whales survived throughout the ocean basin. North Pacific right whales are believed to comprise two separate populations or stocks: one with summer feeding grounds in the southeastern Bering Sea and Gulf of Alaska, and the other with feeding grounds in the western North Pacific and in the western Bering Sea and the Okhotsk Sea.

In 1935 a global ban on hunting right whales went into effect under the League of Nation's Convention for the Regulation of Whaling, and this ban has been carried forward to the present by the International Whaling Commission under the International Convention for the Regulation of Whaling, which was signed in 1946 and became effective in 1948. However, despite the ban, whalers from the former Soviet Union killed at least 371 right whales in the Gulf of Alaska and southeastern Bering Sea off Alaska and another 127 right whales off Russia between 1963 and 1967 (Doroshenko 2000). These illegal

[1] During review of a draft of this report, a representative of the Fish and Wildlife Service suggested that the Antillean manatee warrants consideration as a "species of special concern." The Commission concurs with that suggestion and will report on the Antillean manatee in its 2012 annual report.

kills undoubtedly decimated the two populations for a second time. Today, both the North Pacific right whale and the North Atlantic right whale (*E. glacialis*) are highly endangered. At the population level, the eastern North Pacific right whale population is at grave risk of extinction, with an estimated 31 whales remaining (described below; see Wade et al. 2011).

Current status

Scientists know little about the right whales surviving in the western North Pacific offshore of Russia. Right whale sightings in the eastern North Pacific nearly ceased in the decades following the episode of illegal whaling in the 1960s. However, in 1996, four right whales were observed feeding together in the southeastern Bering Sea on the western edge of Bristol Bay (Goddard and Rugh 1998). Since then the National Marine Fisheries Service has organized a series of aerial and/or ship-based surveys for right whales in the southeastern Bering Sea. Service scientists have focused on developing a photo-identification catalogue, collecting and analyzing genetic samples, tagging and tracking individuals with satellite telemetry, and monitoring acoustically to detect vocalizing right whales (Moore et al. 2006; Munger et al. 2008). In 2008 the Service designated areas where right whales have been seen most often since 1980 as critical habitat (Figure IV-1).

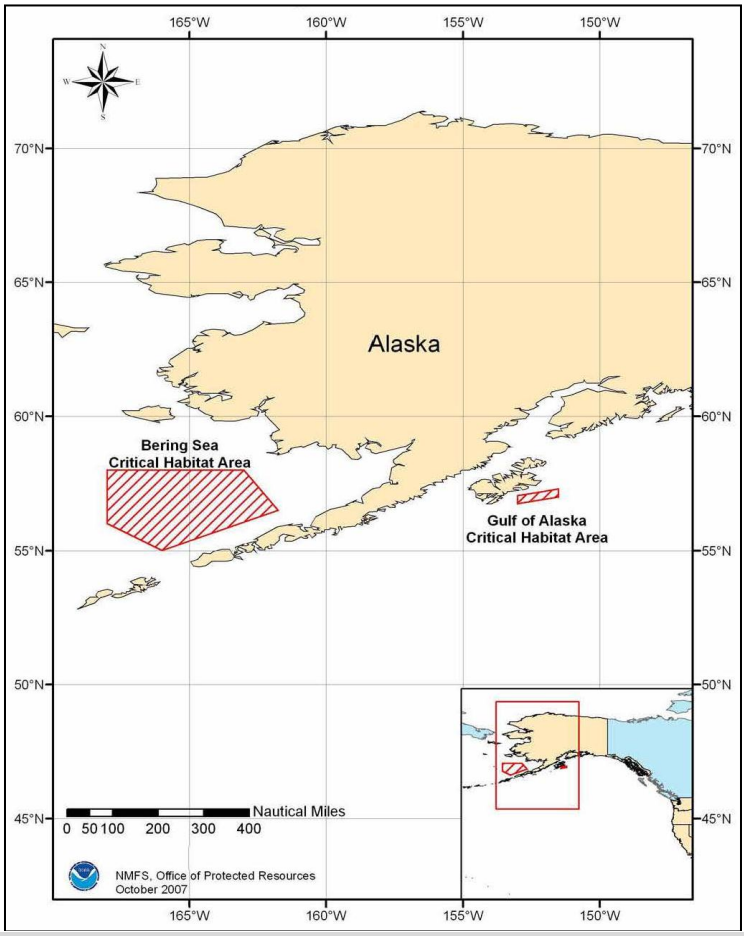

Figure IV-1. North Pacific right whale critical habitat areas designated by the National Marine Fisheries Service in 2008. (Source: National Marine Fisheries Service)

In 2008 the Department of the Interior's Minerals Management Service (now the Bureau of Ocean Energy Management) was planning an offshore oil and gas lease sale in the North Aleutian Basin of the southeastern Bering Sea, one of two areas where North Pacific right whales have been seen in recent years. The Minerals Management Service entered into an agreement with the National Marine Fisheries Service to fund a multi-year (i.e., 2007–2011) study of the distribution, abundance, and habitat use of right whales in the southeastern Bering Sea. Research activities conducted prior to 2010 are discussed in previous Marine Mammal Commission annual reports. To protect the area's rich biological resources and fisheries, in March 2010 President Obama withdrew the North Aleutian Basin from the Bureau of Ocean Energy Management's five-year leasing plan. As a result, the Interior Department cut its funding for the right whale study from about $1.5 million to less than $400,000. Given the reduction in funding, and limited funding from the National Marine Fisheries Service, 2010 vessel surveys were shortened substantially and aerial surveys were canceled.

In August 2010 the National Marine Fisheries Service conducted a 24-day survey to photograph and collect biopsy samples from right whales, apply satellite tags, and service acoustic buoys previously deployed to monitor right whale vocalizations. Several right whale calls were heard during the survey but the animals could not be located and were not observed visually. However, the survey successfully retrieved several acoustic buoys, collected their acoustic data, and then redeployed them. In mid-September 2010, one right whale was sighted in critical habitat when the same research vessel transited the area on another research project. Scientists on the vessel also recorded right whale vocalizations, which they attributed to the same whale.

In 2010 Service scientists published an important analysis of sightings and biopsy samples collected over the past decade (Wade et al. 2011). They estimated that the eastern North Pacific right whale population numbers just 31 whales (95 percent confidence limits 23–54) based on photo-identification records or 28 (95 percent confidence limits 24–42) based on genetic analyses. They also estimated that the population consists of 8 females (95 percent confidence limits 7–18) and 20 males (95 percent confidence limits 17–37). They concluded that the eastern North Pacific right whale population is the world's smallest and most endangered large whale population and that its dire state is a direct result of illegal Soviet whaling in the 1960s. Their findings and conclusions underscore the need for improved international management to ensure that the population's apparent lack of recovery is not related to current human activities.

In 2011 the Services further reduced funding for North Pacific right whale research, restricting activities largely to compilation and analysis of past data and continued passive acoustic monitoring. The only survey work in 2011 was a one-week cruise that encountered poor sighting conditions, detected no right whales visually, but collected new acoustic data.

Preliminary analyses suggest that during summer and early fall right whales feed primarily on copepods at or near the ocean bottom over the middle-continental shelf in the southeastern Bering Sea, but rarely move into water shallower than about 50 m. They also indicate that a small number of right whales can make thousands of calls in over periods of just tens of hours. Further study is needed to determine the function of such extensive vocalizations.

The distribution of North Pacific right whales in winter and spring months is not known. Scientists recently matched photographs of an individual whale taken on 2 April 1996 off Hawaii and on 30 July 1996 in the Bering Sea (Kennedy et al. 2011). This photographic match provides the first documentation of movement between low and high latitudes by an individual whale from this population and thus confirms that at least part of the population undertakes long distance movements (Kennedy et al. 2011) similar to the migrations of other right whales.

The year 2011 was the final year of funding from the Bureau of Ocean Energy Management through its interagency agreement with the National Marine Fisheries Service. Because of budget reductions for protected species research within the Service, no further field work to study or monitor North Pacific right whales was being planned at the end of 2011, although passive acoustic monitoring has continued by piggy-backing on other studies supported by the Bureau of Ocean Energy Management. In addition, the Service has decided not to request funds for work in future years. Such research is essential to determine whether vessel traffic, fishing gear, oil and gas development, and other human threats might be affecting North Pacific right whale populations and impeding their recovery.

North Atlantic Right Whale (*Eubalaena glacialis*)

As noted previously, the North Atlantic right whale currently numbers about 400 individuals and is highly endangered. Historically, the North Atlantic right whale consisted of two populations, both of which migrated between winter calving grounds along subtropical coastlines and summer feeding grounds in northern temperate waters. The eastern population is thought to have calved off southern Europe and northwestern Africa. The western population calves in winter, primarily off the southeastern United States

(northeastern Florida and Georgia), and feeds in summer, primarily off New England and southeastern Canada.

The eastern North Atlantic right whale population was driven extinct by whaling that started at least as early as the 11th century and continued through the early 20th century. The last records of whales thought by some to have belonged to this population include an adult female and a mother-calf pair that were killed by shore-based whalers off Madeira in the mid 1960s and a whale of unknown sex and age that was killed off the Azores in 1969 (Brown 1986, Reeves et al. 2007). The western population also was subject to centuries of whaling and may have been reduced to fewer than 100 animals by the early 1900s (Reeves 2001).

The status of the western North Atlantic population appears to be improving. In the 1990s, scientists could identify about 325 individual whales. The number of observed calves at that time averaged about 11 or 12 per year and the number of observed carcasses averaged between two and three per year. Knowlton et al. (1995) estimated the population growth rate at 2.5 percent per year. After 2000, annual calf counts doubled to an average of about 23 calves per year, including a record 39 calves born in the winter of 2008–2009. In 2010 and 2011, scientists counted 19 and 21 calves, respectively. The recent population estimates of 400 or more whales plus the increased calf counts are positive signs and support the idea that the status of the population is improving.

Summer feeding areas used by most North Atlantic right whales are relatively well known, but wintering areas are well known only for females bearing calves and some juveniles. In December 2008 an aerial survey team from the National Marine Fisheries Service observed 44 right whales in the central Gulf of Maine. These sightings may have revealed a previously unknown winter mating area (NOAA 2008). In 2010, the Marine Mammal Commission provided partial funding for four vessel surveys undertaken by the New England Aquarium and the Canadian Wildlife Institute to look for right whales in the central Gulf of Maine area during the winter of 2010–2011. Preliminary analyses indicate that at least 13 different whales were photographed. In addition, on one of the survey days, a National Marine Fisheries Service aerial survey team counted 28 right whales in the region. Accumulating information suggests that this area is used regularly in winter by at least some right whales. Furthermore, if females identified there can be matched with calving mothers in the southeastern U.S. in the winter of 2011–2012, the evidence would support the hypothesis that this region is indeed a winter mating ground for the species.

All right whales worldwide have been protected by an international ban on commercial hunting since 1935 when the League of Nations' Convention for the Regulation of Whaling went into effect (Burnie 1985). The ban continues to the present day under the 1946 International Convention for the Regulation of Whaling. Although perhaps half a dozen North Atlantic right whales were taken contrary to the ban between 1935 and 1970 (Reeves et al. 2007), commercial whaling is no longer considered a threat to North Atlantic right whales. Each year, however, a few North Atlantic right whales are killed or seriously injured by entanglements in commercial gillnets or shellfish trap lines and by ship strikes. Thus, entanglement and ship strikes are the principal threats to conservation of this species and likely responsible for the population's low rate of recovery.

Under the Marine Mammal Protection Act and Endangered Species Act the National Marine Fisheries Service has lead responsibility for protecting right whales. To improve protection from ship strikes and entanglements, the Service has adopted several new regulations over the past four years. In particular, it now (1) restricts vessel speeds in certain areas along the east coast where right whales are most likely to be hit, (2) bans the use of gillnets in much of the calving grounds during the calving season, and (3) requires use of certain types of rope in most east coast trap fisheries to lessen the risk of lethal entanglement. Additional efforts to protect the species in 2010 and 2011 are discussed below, after the section describing right whale deaths and serious injuries from ship strikes and entanglement in fishing gear in 2010 and 2011.

Documented right whale deaths and injuries in 2010 and 2011

Figure IV-2 summarizes right whale deaths confirmed by observed carcasses since 1970. Since 2000, scientists and other observers have confirmed 48 deaths, half of which they have attributed to either ship strikes (16 deaths) or entanglements in fishing gear (9 deaths). Not all carcasses are recovered and examined closely—some are seen only briefly floating offshore. Thus, at least a few confirmed deaths attributed to "unknown" causes likely are related to ship strikes or entanglements. In addition, because an unknown number of whales die unseen and either sink or are eaten by scavengers before being reported, the deaths included in Figure IV-2 under-represent total mortality caused by ships and fishing gear by an uncertain amount. Also, each year some live right whales are seen entangled or injured to varying degrees as a result of interactions with ships or fishing gear.

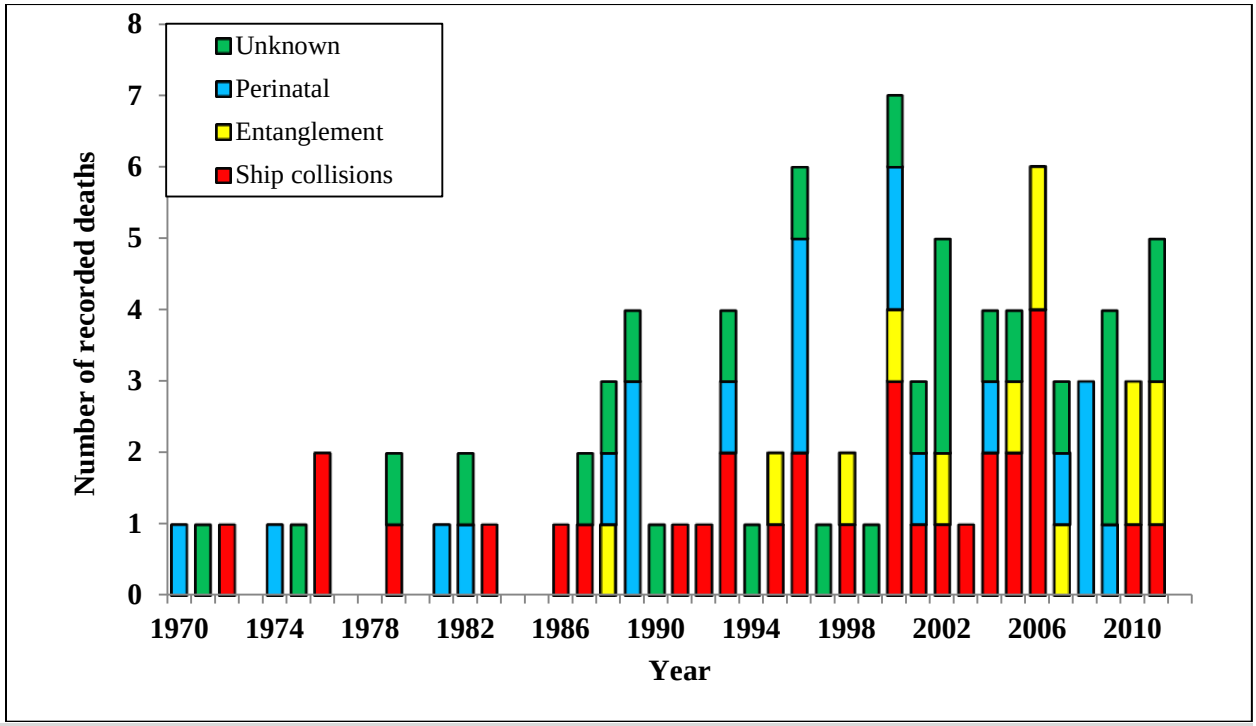

Figure IV-2. Known sources of mortality for North Atlantic right whales, 1970–2011 (Source: Marine Mammal Commission unpublished data)

Recent right whale deaths: In 2010 and 2011 eight right whale deaths were confirmed: four were attributed to entanglement, two to ship strikes, and two were unknown causes. In 2010, the first death was an adult male found by the Coast Guard on 27 June floating about 35 nmi east of Cape Cod, Massachusetts, and towed ashore for necropsy. It was too badly decomposed to be matched to individuals in the right whale photo catalogue. Scientists collected tissue samples to determine if they could identify the individual using genetic analyses, but they had not completed those analyses by the end of 2011. The whale had entangling line wrapped around its rostrum and line had caused severe wounds to its right flipper. Its death was attributed to entanglement.

The second death in 2010 involved an unidentified yearling seen floating off northern Maine near the town of Jonesport on 2 July. Lacerations detected during a necropsy after it later washed ashore indicate that it died of injuries from a ship collision.

The third death involved an unidentified adult male that washed ashore on 12 August near Digby, Nova Scotia, along Canada's Bay of Fundy. Although initial reports of a fractured rostrum suggested that

the whale had been struck by a ship, necropsy results indicated the fracture occurred after the whale had died and that it was instead a victim of entanglement in fishing gear that may have caused it to drown. The evidence of the entanglement included line marks on the whale's underside and linear abrasions at the base of its flipper causing decomposition of the underlying tissue.

The first death in 2011 involved a two-year old female (#3911) first sighted alive, but in poor condition, by an aerial survey team on Christmas day, 2010, ten nmi east of Jacksonville Beach, Florida. The whale had line, possibly from a trap pot, trailing from its mouth and cutting deeply into its right flipper. Other entangling gear included trap/pot fragments and associated gangions (some of which was found inside the animal's mouth). Over the next three weeks scientists made extensive efforts to track and disentangle the animal. On 15 January they were able to sedate the whale and remove 150 feet of line. It was found dead on 1 February 2011 floating 11 nmi off Palm Coast, Florida. It was towed ashore for a necropsy and the results indicated that it had died from entanglement-related injuries.

The second death in 2011 involved a badly decomposed whale photographed on 19 February floating 80 miles east of Charleston, South Carolina. It could not be retrieved and therefore was listed as having died of unknown causes.

The third death in 2011 involved a juvenile whale that stranded on the Cape Romaine National Wildlife Refuge, South Carolina, on 16 March. It had died of entanglement injuries. Line of unknown origin was bound tightly, in multiple wraps, around its right flipper.

The fourth death in 2011 was an adult female (#1308) that stranded on Nags Head, North Carolina, on 27 March. Multiple fractures of the skull and vertebrae indicated it had been killed by a ship. This was only the second whale known to have been killed by a ship in U.S. waters since the Service adopted new rules to restrict vessel speed in 2008 and the first known to have been killed near one of the regulated areas. The whale had been sighted earlier in 2011 with a newborn calf that presumably also died once deprived of its mother's care.

The last known death in 2011 also involved an adult female (#1303) known to have given birth to at least six calves since she was first identified in 1979. The carcass was photographed floating 10 km east of Chincoteague Island, Virginia, on 17 May. The observers did not report the whale until several days later and efforts to relocate it and determine cause of death were unsuccessful.

Recent right whale injuries: In addition to the known right whale deaths just described, three other whales were seen alive but entangled in 2010 and 10 others in 2011. In 2010 the first observed living, entangled whale was an adult male (#2470) sighted by an aerial survey team on 13 May about 100 km (60 mi) east of Cape Cod, Massachusetts. It was photographed with a series of wraps around its flukes and 150 feet of trailing line. It had last been seen gear-free in late January in the central Gulf of Maine. A disentanglement team arrived within two hours of the sighting and was able to cut the lines from the whale's back allowing all of the gear to fall free. Although the whale did not appear to be thin, which might suggest trouble feeding, it had broad patches of whale lice on its body and tail and a number of raw wounds suggesting that it was in poor condition. It was resighted multiple times in 2011 with improved health and healed wounds.

A whale research group spotted the second living entangled whale in September 2010. This adult female (#1503), sighted at Jeffreys Ledge off the New Hampshire coast, was in poor condition and had line wrapped around its rostrum and caught in its baleen. Poor weather prevented the disentanglement team from responding and the whale has not been sighted again. Its previous sighting with no gear attached had been on 13 April in Cape Cod Bay.

A whale research group also spotted the third entangled whale, an adult male (#3120), at Jeffreys Ledge on 20 October 2010. It appeared to be in good condition but had line draped loosely over its back and netting (possibly with a buoy attached) that was caught on its flukes. A disentanglement team could not respond because the report was not received until late in the day. An aerial survey team spotted the whale again at Jeffreys Ledge on 29 November, but the entangling debris was not detected until photographs were analyzed the next day. The animal was sighted again—this time gear-free—on 19 September 2011.

The 10 new right whale entanglements in 2011 were the most recorded in a single year. Disentanglement efforts were not possible for most of those cases. However, four cases were minor and the whales either shed or appeared to have shed the gear by themselves within a few months. One was an adult female (#3010) with a calf first seen entangled on 19 January off St. Augustine, Florida. On that day it was trailing rope with a small black buoy, but it was seen a month later free of the gear and still with her calf.

The second of those four cases was also an adult female (#3712) and was first seen entangled off St. Augustine on 30 January. On that date it had a small amount of netting and attached floats over its back, but it was resighted gear-free on 10 April off Massachusetts.

The third case involved a juvenile (#3893) seen in Cape Cod Bay on 17 March and entangled in a gillnet float rope. This whale was resighted in the Bay at the end of April and was apparently gear-free.

The fourth case involved a one-year old whale (#4040) seen 22 April in Cape Cod Bay with a single line through its mouth and trailing back on either side 50 feet behind the flukes. A disentanglement team located the whale the same day and was able to cut the line and pull it free, successfully removing all line and leaving the animal in good condition.

Five other cases involved whales that were still entangled when last sighted in 2011 or were not resighted. One was a juvenile male (#3993) seen on 13 February, 22 miles off Tybee Island, Georgia, with line trailing down its right side ending 10 feet past its flukes. The second was a juvenile male (#3302) first photographed by whale researchers on 22 April south of Martha's Vineyard with line crossing the head just aft of the blowhole and resighted still entangled on 9 November in the central Gulf of Maine, Canada. The third was an adult female (#3123) seen on 29 April in Cape Cod Bay with either rope or netting possibly caught in the mouth or on the right flipper. It was resighted still entangled on 19 September in the Bay of Fundy. The fourth was a juvenile (#4090) reported by a whale-watching boat on 18 September on Jeffreys Ledge off New Hampshire. It appeared at the time to be anchored (held fast) by gillnet gear, but it could not be relocated after that sighting. The fifth case involved an adult male (#3111) found entangled in the Bay of Fundy, Canada, on 27 September by a disentanglement team that was searching for another entangled whale. The whale had line trailing from its mouth to 20 feet behind its flukes. Although the whale appeared to be lethargic and in poor condition, it successfully evaded disentanglement efforts and was not resighted before the end of 2011.

Figure IV-3. A three-year-old North Atlantic right whale (#3853) photographed off Hilton Head, South Carolina, on 25 January 2011with potentially lethal propeller wounds from a ship collision. It had been seen uninjured five days earlier in the same area. It was not seen again in 2011. (Photo courtesy of EcoHeath Alliance under NOAA permit # 594-1759)

The tenth whale seen entangled was a juvenile female (#3760) seen entangled 35 nmi off Brunswick, Georgia, on 13 February with monofilament line exiting both sides of the mouth. A disentanglement team was able to reach the animal the same day and cut the line at one point, but no gear was removed. However, the whale was confirmed to have shed some gear by 25 April.

One other whale, a juvenile male (#3853), was seen by a right whale aerial survey team with 14 large propeller slashes on its back 15 miles off Hilton Head Island, South Carolina, on 20 January (Figure IV-3). It had been seen uninjured just five days earlier in the same general area. Despite the injury, it seemed to behave normally. However, it was not resighted in 2011 and its fate is uncertain.

In addition to the 14 new entanglements documented in 2010 and 2011, various parties resighted nine other whales that had last been seen entangled in previous years. Six of those were confirmed to have been gear-free and in good condition. Two others were sighted gear-free in fair condition, and one other was seen still entangled.

Records collected by the New England Aquarium from 2000 to the end of 2011 describe a total of 65 live North Atlantic right whales either entangled or with serious injuries from entanglement. Table IV-1 summarizes the fate of those whales. Forty-six cases have been resolved because the whales were either resighted gear-free in good condition (35 cases), were found dead (8 cases), or are assumed dead (3 cases[2]). Sixteen cases remain unresolved either because the whales were last seen still entangled (8 cases) or because they were last sighted free of gear but had not yet fully recovered from their injuries (8 cases). Three other entanglements involved unidentified whales whose fate could not be determined. Since 2000 (including the whales observed entangled in 2010 and 2011), disentanglement teams have been able to remove at least some gear from about one-third of all observed entanglements. Another third involved minor entanglements and disentanglement efforts were deemed unwarranted because the gear was considered likely to fall off by itself. For the remaining third, disentanglement efforts were considered warranted but were precluded by weather, the whale's location when sighted, the time of day when the whale was sighted, or other factors.

Mitigating Ship strikes

Ship strikes are a major cause of right whale mortality. Since 1990, 24 of 68 documented right whale deaths were attributed to strikes by large ships based on evidence of propeller slashes and/or bone fractures. Undoubtedly, other right whales have been killed by ship strikes but their deaths were unaccounted for because the carcasses were not observed or, if observed, could not be examined sufficiently to determine cause of death. The loss of so many animals from such a small population is a significant impediment to species' recovery.

In the mid-1990s, the Marine Mammal Commission began recommending that the National Marine Fisheries Service adopt seasonal limits on the speed of large vessels in high-use right whale habitat. Action on those recommendations was slow, in part because it was unclear what speed might be considered safe for right whales and if such a measure would significantly reduce ship strike risks. To help address those questions, the Commission supported a compilation of records of ship strikes on large whales worldwide. The results revealed that such strikes were far more common than previously recognized for several large whale species, particularly fin, humpback, and sperm whales as well as right whales; that most deaths were caused by large ships; that whales usually were not seen in time for vessel

Table IV-1. Fate of North Atlantic right whales observed entangled between 2000 and 2011. (Unpublished data compiled by the New England Aquarium)

Status as of last sighting through 2010	No gear removed	Some gear removed	All or most gear removed	Total
Gear free—good condition	21	8	6	35
Gear free—fair or poor condition	4	1	1	6
Entangled—good condition	4	1	-	5
Entangled—fair or poor condition	3	1	1	5
Known or assumed dead	7	1	3	11
Unidentified right whales not resighted	3	-	-	3
Total	42	12	11	65

[2] Whales are assumed to have died if they are not resighted (as confirmed by photo-identification) for six or more years.

operators to avoid hitting them; and that according to records for which vessel speed at the time of the strike was known, the incidence of strikes declines sharply at vessel speeds below 13 knots and strikes become highly unlikely at vessel speeds below 10 knots (Laist et al. 2001). Subsequent analyses have supported those findings (Jensen and Silber 2003; Vanderlaan and Taggart 2006).

With that information, the Service began developing a ship strike strategy in 2004. In part, it included (1) outreach efforts to make mariners aware of the problem and actions they could take to avoid ship strikes on whales, (2) reorienting vessel traffic lanes through right whale habitat to minimize the chances of large vessels encountering whales, and (3) establishing regulations to limit the speed of large vessels (greater than 65 feet in length) to 10 knots or less in times and areas where encounters with right whales were most likely. The rules to limit ship speed were particularly contentious as such measures had never before been developed explicitly to protect large whales. Nevertheless, the Service, to its great credit, adopted a final rule in December 2008. It included seasonal speed restrictions in and around areas designated as right whale critical habitat under the Endangered Species Act, as well as areas off major ports along the species' coastal migratory corridor between the southeastern U.S. calving grounds and New England feeding grounds (Figure IV-4a, b, c).

However, the speed rule generated some controversy and, at the direction of the White House, the final rule stipulated that the speed requirements expire after five years. Before that time, the Service was to analyze the measure's effectiveness and determine if it should be continued, modified, or allowed to lapse. In 2010 and 2011, the Service continued collecting and analyzing relevant data to help make its determination. However, reliably assessing the rule's effectiveness likely will require more than five years of data because the number of documented ship strikes per year is low and variable. That does not mean that the ship rule is unnecessary—the human-caused death of any right whale constitutes an impediment to recovery. At the end of 2011, two observed right whale deaths had been attributed to ship collisions since the rules went into effect in late 2008 (i.e., about 0.67 deaths per year). This is less than half the rate of confirmed vessel-related deaths between 2000 and 2007 when no rules applied (i.e., 14 ship-strike deaths or 1.75 whales per year).

Mitigating Entanglements in fishing gear

Twelve of the 68 confirmed right whale deaths documented since 1990 (i.e., 18 percent) have been attributed to entanglement in commercial fishing gear, mainly lines from lobster traps and gillnets. However, documentation of entanglement-caused deaths may be less likely than documentation of deaths caused by ship strikes. Whales unable to free themselves from gear may deplete their fat reserves before they die, which means that their carcasses are more likely to sink undetected. In addition, some whales may drown after becoming caught in lines and held underwater where their carcasses would not be found. Such deaths are not included with the confirmed deaths shown on Figure IV-2. When these presumed entanglement deaths are added to confirmed deaths from entanglement, the total is comparable to that of observed deaths attributed to ship strikes. That being the case, entanglement also should be considered a major factor slowing population recovery.

To reduce entanglement deaths, the National Marine Fisheries Service has been adopting and revising regulations since the mid-1990s. Those measures are guided by the 1994 amendments to the Marine Mammal Protection Act. To date, the available evidence indicates that the efforts made have not been effective at reducing the number of entangled whales. In fact, that number may be increasing, although the increase could reflect—at least in part—an increase in the number of right whales. The seven known deaths attributed to entanglement in the past six years (2006 through 2011) exceed the total number of such deaths (six) documented in the 20-year period before 2006 (Figure IV-2). In addition, since 2000 the number of whales newly entangled but still alive also has been increasing. Fewer than five

gravity heavier than water) in place of "floating" line to link two or more traps. Floating groundline can form loops extending tens of feet up into the water column between traps and having the potential to entangle passing whales. Sinking line lies flat along the bottom and therefore is thought to reduce entanglement risks significantly. This measure, however, has been controversial because of concern that sinking line will abrade more rapidly on rocks and rough bottoms, leading to the need for more frequent and costly replacement. That concern appears to be warranted in some areas and further work is being undertaken to develop more abrasion-resistant sinking line.

Perhaps the greatest risk of entanglement comes from vertical lines connecting fishing gear resting on the bottom with surface buoys. In 2009 the Service began a five-year rulemaking process to develop new measures to reduce entanglement risks in vertical lines. As it has for the past decade, the Service relies on an Atlantic Large Whale Take Reduction Team to identify such measures. Composed of representatives from relevant fisheries, environmental groups, the scientific community, and state and federal agencies, including the Marine Mammal Commission, the team is charged with recommending consensus measures to reduce the incidental death or serious injury of large whales, including right whales, in trap/pot and gillnet fisheries. The Marine Mammal Protection Act directs that those measures reduce such entanglements to levels below the right whale population's potential biological removal level (i.e., "the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population") within six months of being implemented. Because of its small population size and low rate of reproduction, the current estimate of the potential biological removal level for North Atlantic right whales is less than one whale per year. To date team members have been unable to identify and agree on effective approaches, leaving it to the Service to choose measures based on differing views among team members.

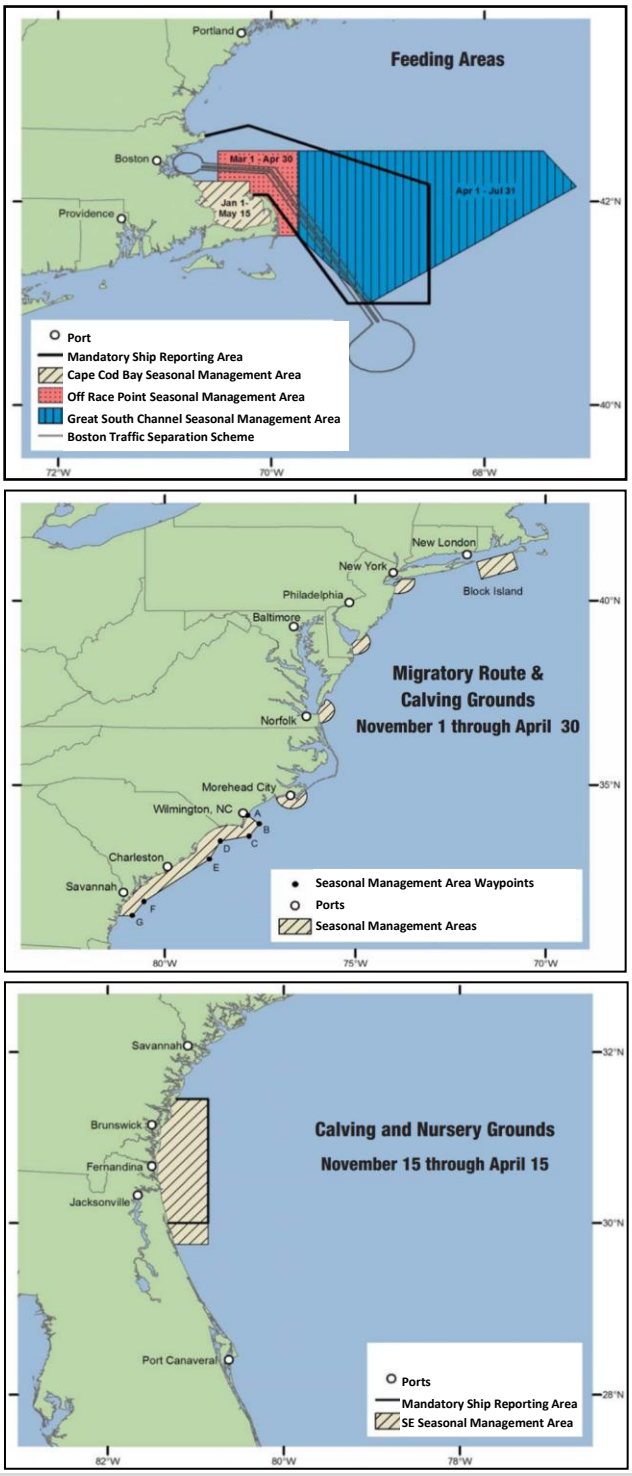

Figure IV-4. Seasonal right whale management areas requiring large vessels (>65 ft) to slow to 10 knots: (a) spring-summer feeding area off Massachusetts, (b) late fall to early spring migratory corridor, and (c) winter calving grounds off southeastern U.S. coast. (Source: National Marine Fisheries Service)

Figure IV-5. This adult female right whale (#2029) was photographed breaching directly beneath an aerial survey plane. It had been seen carrying fishing gear wrapped around its flippers between March 2007 and early 2010 but was able to shed the lines during 2010. Deep indentations and scars from the entanglement are visible at the base of both flippers. (Photo courtesy of Florida Fish and Wildlife Conservation Commission)

To reduce risks of entanglement in vertical lines, the Service has relied largely on a combination of gear modifications thought to reduce the likelihood or severity of entanglements. The result has been a series of rules requiring complex sets of gear modifications such as (1) weak links at various positions on vertical lines and gillnet panels designed to break when whales are entangled, and (2) knotless lines less likely to become caught in whale baleen or on flippers. Given continued and possibly increasing numbers of entangled whales and entanglement-related deaths, those measures appear to have been of limited value. As described in past annual reports, the Commission has questioned their effectiveness and repeatedly recommended a strategy that also includes the removal of gear with hazardous line (i.e., line in the water column and presenting a risk of entanglement) from right whale critical habitat. Except for the recent ban on gillnets in the calving grounds and a seasonal closure for lobster pots in the Great South Channel feeding area off Massachusetts, the Service and fishermen on the Team have rejected any approach that would reduce fishing effort. They also have failed to come up with measures that demonstrably reduce the risk from vertical lines.

In December 2010, the Service reconvened its Atlantic Large Whale Take Reduction Team to continue deliberations on ways to reduce entanglement risks for right whales and other large whales in vertical lines. Instead of focusing primarily on gear modifications, however, the team is now considering ways to reduce the number of vertical lines in the water column. Possible means for doing so include increasing the number of traps per buoy line, establishing caps on the number of buoy lines, and placing seasonal restrictions on vertical lines in high-use right whale habitat. To guide its deliberations and evaluate risk reduction, the team agreed to use a "co-occurrence" model that ranks areas of greatest risk based on the relative density of both whales and fishing gear. In 2010 and early 2011 the team (and a working group consisting of team members) examined the data available for, and the possible use of, such a model. Although the team was unable to agree on specific areas or management measures, several state representatives noted that they would develop measures for consideration at the team's next meeting for areas in which their respective fishermen fish.

On 14 June 2011, the Service announced its intent to prepare an environmental impact statement on new measures under the Atlantic Large Whale Take Reduction Plan to reduce deaths and serious injuries to large whales caused by vertical lines associated with commercial trap, pot, and gillnet fisheries along the U.S. east coast. It requested comments on management options that might be considered and it convened a series of scoping meetings to solicit advice and views from the public and interested agencies and groups on possible management options. On 12 September 2011, the Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, responded to the Service's request. As a general matter, it recommended that the Service give highest priority to mitigation measures for right whales given that their population is far less able to sustain fishery-related deaths and serious injuries than the larger regional populations of humpback whales, fin whales, and other species of concern.

Based on preliminary results of the co-occurrence model, the Commission also noted that 90 percent of the risk of whales encountering vertical lines is in waters off the northeastern United States, principally

in the Gulf of Maine. The Commission therefore recommended that the Service's draft environmental impact statement analyze alternatives for establishing large seasonal management areas off the New England coast including (1) the majority of the southern Gulf of Maine from January through July, (2) the majority of the offshore central Gulf of Maine from October through February, and (3) the small area off northeastern Maine near the edge of U.S. jurisdiction and the Bay of Fundy right whale feeding area from August through September. Within those areas and months, the Commission also recommended that the Service consider a suite of restrictions including closures to any fishing gear with vertical buoy lines, a cap on the number of endlines, a limit of one endline per trap, a minimum number of traps per endline, and a requirement to tend all deployed gillnets with no nets left in the water when vessels return to port.

The Commission also noted that the co-occurrence model calculates entanglement risks for individual ocean blocks (usually 10-minute by 10-minute cells) by multiplying whale sightings per unit of effort and vertical line densities. However, whale sighting effort has been low, and no whales have been sighted during surveys in most areas off the coast of Maine with exceptionally heavy gear density. Thus, model results show a zero entanglement risk for right whales in those areas. Yet, during other times right whales do occur and have been seen, at least occasionally, in those areas and have been entangled in lobster gear set along the Maine coast. Therefore, the Commission recommended that the Service consult with whale biologists on the Atlantic Large Whale Take Reduction Team to (1) find a way to account for those occasional sightings and more accurately estimate rates of occurrence for right, humpback, and fin whales within 20 miles of the Maine coast and (2) use that information in the co-occurrence model to estimate the extent to which vertical lines in those waters contribute to overall entanglement risks for each species.

The Commission also recommended steps to improve information on the source of gear removed from entangled animals and the amount and distribution of vertical lines in use. To improve information on the source of entangling gear, the Commission recommended that the draft environmental impact statement include an analysis of options for new gear marking requirements that would improve the ability of researchers to identify the fisheries, fishing areas, and gear components involved in large whale entanglements. To monitor line reduction goals in managed areas, it also recommended that the draft environmental impact statement identify alternatives to ensure that (1) all trap and gillnet fishermen in state and federal waters record and report in a consistent manner data on the location and number of endlines deployed and the number of traps or nets fished per set and per month, and (2) those data are compiled and analyzed in a timely fashion. Finally, the Commission recommended that the draft statement identify contingency management measures that could be implemented without a new five-year rulemaking process if documented serious injury and mortality levels for right whales or humpback whales exceed potential biological removal levels for two consecutive years.

At the end of 2011, the Service planned to reconvene the Atlantic Large Whale Take Reduction Team to continue deliberations on new ways to reduce the chances of vertical lines entangling right whales and other large whales.

Petition to revise critical habitat for the North Atlantic right whale

In July 2002, the Ocean Conservancy submitted a petition to the National Marine Fisheries Service asking that it revise the boundaries of right whale critical habitat that were initially designated in 1994. The petition was based on new information indicating that the existing critical habitat areas were not sufficient to protect right whales from anthropogenic mortality, and that additional areas were needed to ensure the recovery and survival of the species. In August 2003 the Service published a 12-month determination on the petition (68 Fed. Reg. 51758), finding that the requested revision was not warranted at that time. The Service concluded that, while revising critical habitat boundaries may be a prudent action to take, it was not possible at that time to determine essential biological requirements of the population. It therefore advised that it would continue to analyze the issue based on planned right whale surveys in 2002.

Although the Service conducted various analyses evaluating habitat features critical for right whales, it took no additional action to revise the boundaries, and in September 2009 the Center for Biological Diversity and several other environmental groups submitted a second petition. This petition requested that the Service expand the boundaries of two existing critical habitat areas off Massachusetts and in the southeastern U.S. calving area, and that it also designate as critical habitat waters within 30 nmi of the coast along the species' migratory corridor from South Carolina to Cape Cod, Massachusetts. The Endangered Species Act requires that, within 90 days, the Service determine whether the petition includes information sufficient to warrant a review. If that is the case, then it must determine if the petitioned action is warranted within 12 months. After the Service failed to make its 90-day finding, the petitioners filed a lawsuit on 25 May 2010 alleging that the Service was in violation of requirements for responding to such petitions.

Following a subsequent discussions with the plaintiffs, the Service published a notice on 6 October 2010 (75 Fed. Reg. 61690) announcing a positive 90-day finding. With regard to its 12-month determination on how to proceed with the petition, the agency stated it intended to continue its ongoing rulemaking process with the expectation that a proposed critical habitat rule for the North Atlantic right whale would be submitted to the Federal Register for publication in the second half of 2011. As of the end of 2011, it had not yet done so.

Southern Resident Killer Whale (*Orcinus orca*)

Killer whales inhabit all the world's oceans. At present, they are classified as a single species with no identified subspecies although many scientists consider this monotypic taxonomic structure to be incorrect and in need of revision (Morin et al. 2010 Reeves et al. 2004, Krahn et al. 2004). Killer whales occur in "ecotypes" that can be distinguished genetically and on the basis of color patterns, vocalizations, prey, and foraging behavior. In the northeastern North Pacific Ocean, scientists have identified three ecotypes: a mammal-eating "transient" ecotype that ranges widely in shelf waters along the coasts of Canada and the United States, a fish-eating "offshore" ecotype that occurs principally in pelagic offshore and continental slope waters, and a fish-eating "resident" ecotype that occupies shelf waters and occurs seasonally in specific inshore waters. Although the ranges of different ecotypes overlap, their members rarely, if ever, interbreed, and each typically specializes on exploiting a different segment of the available prey base. Each ecotype may consist of multiple populations with each population composed of one or more pods that form close-knit social groups organized around matrilineal relationships. Scientists have identified at least four populations of the resident ecotype in the northeastern North Pacific Ocean (Krahn et al. 2004). The southern resident killer whale population is one of those and consists of J, K, and L pods. Whales in this population primarily summer in Puget Sound and the adjacent inland waters of Washington state and southern British Columbia where they feed on migrating salmon. From September to May, these whales apparently use coastal waters between British Columbia and central California. Historically, the population is thought to

Figure IV-6. A pod of killer whales is observed by a whale-watching boat in the background (Photo courtesy of Dawn Noren, National Marine Fisheries Service)

have numbered between 140 individuals (based on counts and whales removed from the population) and 200 whales (based on genetic information; 68 Fed. Reg. 31982). Between the late 1960s and early 1970s, about 50 whales were removed for public display and research, and by 1976 the population had declined to about 70 whales. Such removal is no longer permitted in U.S. waters, but the population has not recovered as expected.

Listing Actions

In 2001 the Center for Biological Diversity petitioned the National Marine Fisheries Service to list southern resident killer whales as endangered or threatened under the Endangered Species Act. In 2002 the Service determined that the action was not warranted because the population did not constitute a distinct population segment as defined under the Act. The Service did, however, initiate steps that led to the population's designation as depleted under the Marine Mammal Protection Act in 2003 (68 Fed. Reg. 31980). The Center for Biological Diversity challenged in U.S. District Court the legal basis for not listing the population under the Endangered Species Act, and in 2003 the court instructed the Service to re-evaluate the population's status relative to the Act's definition of a distinct population segment. After doing so, in 2004 the Service proposed that southern resident killer whales be listed as threatened (69 Fed. Reg, 76673), and in 2005, after considering comments on its proposal, adopted a final rule classifying the population as endangered rather than threatened (70 Fed. Reg. 69903). In 2001 Canada's Department of Fisheries and Oceans also designated the southern resident killer whale population as endangered under the Canadian Species at Risk Act (Baird 2001).

Population status in 2011

The Service's 2010 stock assessment report for the southern resident killer whale indicates the population consists of 85 individuals and the draft report for 2011 indicates 86.[3] The major factors that may be impeding recovery of this population are all human-related. Human activities have dramatically reduced the salmon stocks that constitute the prey base for this population. Human activities also have introduced high levels of contaminants into the marine environment (e.g., polychlorinated biphenyls or PCBs and polybrominated diphenyl ethers, a relatively new class of chemicals used in flame retardants), which the whales have accumulated through the food web. Such contaminants may compromise reproductive or immune function. Human disturbance also may be impeding recovery of the southern resident population. The summer range of this population—the inland waters of Washington and British Columbia—is home to a large commercial whale-watching industry as well as high levels of recreational boating and commercial shipping. The presence of these boats and the noise they create may be a significant source of stress for the whales (Ayres et al. 2012). That noise also may mask the whales' communication, resulting in behavioral changes that compromise their ability to forage, reproduce, and survive. The social structure and small population size also put southern resident killer whales at risk from a catastrophic oil spill (e.g., from an oil tanker) that could affect the entire population, particularly in summer months when their pods tend to be in close proximity to each other.

In 2010 the Service announced its intention to conduct a five-year status review of southern resident killer whales (75 Fed. Reg. 17377) and on 17 March 2011 it published the review.[4] The review evaluated progress towards the objective, measurable recovery criteria in the 2008 recovery plan. The review found that the stock was not being over-utilized for commercial, recreational, or educational purposes, but that other recovery factors had not been meet and the stock's status remains inconsistent with that of a healthy,

[3] http://www.nmfs.noaa.gov/pr/sars/species.htm

[4] http://www.nwr.noaa.gov/protected_species/marine_mammals/cetaceans_whales_dolphins_porpoise/toothed_whales/killer_whales/southern_resident_killer_whale/five_year_status_review.html

recovered population. Therefore, the report recommended that the Service retain the population's endangered listing status.

Critical habitat

In November 2006 the National Marine Fisheries Service designated critical habitat for southern resident killer whales, including essentially all of Washington's inland waters with the exception of Hood Canal, 18 military sites, and waters less than 20 feet deep. While this designation covers the primary summer and fall range of the population, no designation was made of critical habitat along the outer coasts of Washington, Oregon or northern and central California, the primary winter and spring range of the population. Those areas were not included because southern resident killer whales are thought to use coastal habitat in the winter but their movements and habitat patterns are poorly known. The Service plans to focus research effort on the investigation of killer whale coastal habitat in the coming years.

Recovery plan development and implementation

In November 2006 the National Marine Fisheries Service circulated a proposed recovery plan for the southern resident killer whale population for public and agency comment (71 Fed. Reg. 69101). On 24 January 2008 the Service finalized the recovery plan (National Marine Fisheries Service 2008) (73 Fed. Reg. 4176), including more specific downlisting and delisting criteria when possible. For example, the Service revised the draft delisting standard pertaining to reproduction to require that each pod include more than two adult males of reproductive age unless available information indicates that one male is sufficient.

In March 2008 Canada's Department of Fisheries and Oceans completed a recovery strategy for the southern resident killer whale population (Fisheries and Oceans Canada 2008). The strategy is complementary to the U.S. recovery plan and focuses on problems relating to prey availability, contaminants, and disturbance.

In 2010 and 2011 the Service initiated, continued, or expanded a range of activities intended to promote recovery of the southern resident killer whale population. Those activities included measures to promote recovery of threatened and endangered runs of salmon that are prey for the whales and various measures to improve ecosystem conditions by reducing contaminants, noise, and disturbance. In February 2011 the Service announced a series of workshops[5] that would be held in collaboration with the Department of Fisheries and Oceans Canada to assess the effects of salmon fisheries on southern resident killer whales. The workshops were designed to engage scientists with a broad range of expertise in a transparent and scientifically rigorous review of all the information available on interactions between Chinook salmon and southern resident killer whales. The first workshop was held 21-23 September 2011, with two more planned for 2012. The Service also developed a killer whale oil spill response plan which is now part of the Northwest Area Contingency Plan that would be used to guide the response to an oil spill in the northwest region.

Vessel interactions

In March 2007 the National Marine Fisheries Service published a request for information regarding regulations or other measures that could be instituted to protect killer whales from significant interactions with vessels (72 Fed. Reg. 13464). During 2008 the Service evaluated the potential impact of such regulations on natural resources (e.g., marine mammals, fish, and the marine ecosystem) and the human environment (e.g., economics, recreation, and transportation). On 29 July 2009 the Service published

[5]http://www.nwr.noaa.gov/protected_species/marine_mammals/cetaceans_whales_dolphins_porpoise/toothed_whales/killer_whales/southern_resident_killer_whale/effects_of_salmon_fisheries_on_southern_resident_killer_whales.html

proposed regulations with a draft environmental assessment. The regulations focused on preventing effects of vessel noise and disturbance on killer whales and reducing the probability of a vessel strike.

In developing its proposed regulations, the Service considered all comments and suggested alternatives from the March 2007 comment request. It then distilled those down to seven possible actions and one proposed action, each of which included 10 common elements. The regulations would—

- apply to all activities in the navigable inland waters of Washington state;
- apply to all killer whales, not just endangered southern residents;
- apply to all vessel operators the harassment or take prohibitions of the Marine Mammal Protection Act and the Endangered Species Act;
- apply to motorized, non-motorized, and self-propelled vessels;
- not apply to federal, state, and local government vessels operating in the course of their official duties;
- not apply to vessels participating in the vessel tracking system;
- not apply to activities, such as scientific research, authorized under permit by the Service;
- not apply to treaty fishing vessels lawfully engaged in actively setting, retrieving, or closely tending fishing gear;
- not apply to any vessel where the operator could prove that a vessel maneuver resulting in a violation was required for safety; and
- not apply to personal use of private vessels in the proposed no-go zone (see below) for access to private property by landowners adjacent to the no-go zone.

The alternative actions considered included the following:

- No-action: The Service would not promulgate any new regulations but would continue the education and outreach program with all of the partners involved in the "Be Whale Wise" education campaign, which includes voluntary guidelines designed to help boaters avoid harassment.
- 100-yard approach regulation: This alternative effectively formalizes "Be Whale Wise" guidelines that advise boaters to stay 100 m (100 yards) away from killer whales.
- 200-yard approach regulation: This alternative would increase the viewing distance suggested in the "Be Whale Wise" guidelines and require boaters to stay 200 yards away from killer whales.
- Protected area: This alternative would establish a proposed protected area equivalent to the current voluntary no-go zone along the west side of San Juan Island. The area would include an 800 m (0.5 mi) wide zone centered on the Lime Kiln lighthouse and a 400 m (0.25 mi) wide zone from Eagle Point to Mitchell Point. The protected area would be enforced 1 May through 30 September.
- An expanded protected area: This alternative would extend the proposed no-go zone 800 m (0.5 mi) offshore from Eagle Point to Mitchell Point and would be enforced 1 May through 30 September.
- Speed limit: This alternative would limit vessel speeds to 7 knots within 400 yards of killer whales.
- Park in the path prohibition: This alternative would require vessels to keep clear of the whales' path, prohibiting vessels from intercepting, placing a vessel in the oncoming path of a killer whale, or positioning a vessel so that wind or currents carry the vessel into the path of the whales.
- Proposed action: This alternative combines three other alternatives, resulting in (1) a 200-yard minimum approach distance, (2) an extended no-go zone on the west side of San Juan Island between 1 May and 30 September, and (3) a prohibition against vessels attempting to intercept whales.

The Service announced an 80-day extension to the public comment period for the proposed rule and draft environmental assessment on 19 October 2009. On 15 January 2010 the Commission commented on the proposed rule and draft environmental assessment. The Commission supported each element of the proposed rule including implementation of a "no-go" zone off the west coast of San Juan Island. The Commission questioned whether the proposed regulations were sufficient to protect the whales from

vessels and recommended several additional measures be considered including (1) establish stand-by zones at some distance beyond the 200-yard approach limit (e.g., beyond 400-600 yards) and limit the number of vessels (e.g., 10) that can be present between that boundary and the 200-yard approach limit at any one time; (2) adopt a regulatory speed limit of either seven knots or, at a minimum, a "slow safe speed" requirement (as defined in 33 U.S.C. § 2006 and the International Regulations for Preventing Collisions at Sea 1972 (see 33 U.S.C. § 1602)) within 400 yards of killer whales; and (3) include the safe operating procedures governing vessel operations in the vicinity of killer whales in the inland waters of Washington state as part of any final rule.

To implement the new regulations the Commission recommended that the Service develop a monitoring plan to assess compliance with and evaluate the effectiveness of the vessel regulations. The Commission also recommended that the Service move quickly to initiate discussions with Canada to develop comparable management strategies for killer whales in the inland waters of British Columbia.

In April of 2011 the Service published a final rule prohibiting vessels from approaching killer whales within 200 yards (182.9 m) and from parking in the path of whales when in inland waters of Washington state (76 Fed. Reg. 20870). The rule exempted vessels actively fishing commercially, cargo vessels travelling in established shipping lanes, and government and research vessels. The final rule does not include a seasonal no-go zone for vessels along the west side of San Juan Island that was in the proposed rule. The Service received extensive comments questioning that measure and decided to continue collecting information and conduct further analysis and public outreach on the concept of a no-go zone for consideration in a future rulemaking. The Service also plans to monitor the effectiveness of the final regulations and consider altering the measures or implementing additional measures if appropriate. The final rule was effective as of 16 May 2011.

Cook Inlet Beluga Whale (*Delphinapterus leucas*)

The Cook Inlet beluga whale stock is one of five beluga stocks that occur in U.S. waters. Its geographical isolation indicates—and mitochondrial DNA analyses confirm—that it is a distinct stock. Unlike other beluga stocks in U.S. waters, the Cook Inlet stock has experienced a significant decline in recent years. Although the stock is believed to have numbered more than 1,300 as recently as the 1970s, it declined rapidly during the 1990s, primarily as a result of overharvesting by Alaska Native subsistence hunters. The current abundance is likely fewer than 400 whales. Because of their proximity to Anchorage, Alaska's largest urban area, beluga whales in Cook Inlet are potentially affected by a variety of human activities. National Marine Fisheries Service analyses of beluga sightings in Cook Inlet over the past 30 years indicate that the stock's summer range has contracted substantially in recent years. Compared with sightings in the 1970s and 1980s, animals are now rarely seen in offshore waters or in the lower reaches of the inlet. In June, when the Service conducts aerial surveys of the stock, beluga whales generally are concentrated in a few groups in the inlet's upper reaches around the Susitna River delta, Knik Arm, Turnagain Arm, and Chickaloon Bay.

Endangered Species Act listing

On 31 May 2000 the National Marine Fisheries Service designated the Cook Inlet beluga whale stock as depleted under the Marine Mammal Protection Act. At that time, the Service declined to list the stock under the Endangered Species Act, primarily because it believed that overharvesting by subsistence hunters was the primary threat to the stock and had been adequately addressed. That being the case, the Service did not consider the stock to be at risk of extinction and expected it to recover. Contrary to the Service's expectations, the stock did not increase after harvest regulations were established in 1999. Instead, it appears to have continued its decline despite the fact that subsistence hunters are reported to have taken only five whales in the past decade. A recent analysis of data from abundance surveys by the

National Marine Fisheries Service (2011) indicates that the stock has declined by an average of 1.1 percent per year since 2000. Figure IV-7 illustrates the stock's trend from 1994, when the Service instituted its monitoring program, to 2011.

In light of the observed stock trend and unanswered questions about the cause or causes of the decline, the Marine Mammal Commission wrote to the National Marine Fisheries Service on 24 April 2006 and recommended that the Service reconsider listing the stock under the Endangered Species Act. The Commission noted that the abundance of Cook Inlet beluga whales is about the same as the abundance of the North Atlantic right whale, which is considered highly endangered. The Commission also pointed to a recent IUCN Red List assessment of the Cook Inlet beluga whale stock, which concluded that it qualified as "critically endangered" under the applicable IUCN criteria (Lowry et al. 2006). In addition, the Commission recommended that the Service expedite publication of a proposed listing determination rather than going through the intermediate step of preparing a new status review. In fact, the Commission recommended that the Service consider using the emergency listing provisions of the Endangered Species Act as an interim measure. The Commission also emphasized the urgent need to fund an expanded research program to investigate the factors affecting the stock and identify and implement appropriate recovery measures.

The Service published a proposed rule to list the Cook Inlet beluga as an endangered species on 20 April 2007 (72 Fed. Reg. 19854). However, it declined to use expedited procedures and, instead, invoked a provision of the Endangered Species Act to extend the decision-making deadline by six months. The Service sought the extra time to (1) consider comments from the state of Alaska questioning the sufficiency of the available data and (2) allow it to evaluate the results of the 2008 abundance survey. The Commission responded by writing to the Secretary of Commerce recommending that the agency withdraw the six-month extension and proceed immediately with listing the Cook Inlet beluga whale stock as endangered. The Commission noted that the purported disagreement over the stock trend was not scientifically credible, and it disputed the notion that the 2008 stock estimate might somehow change the conclusions about the stock trend that supported listing.

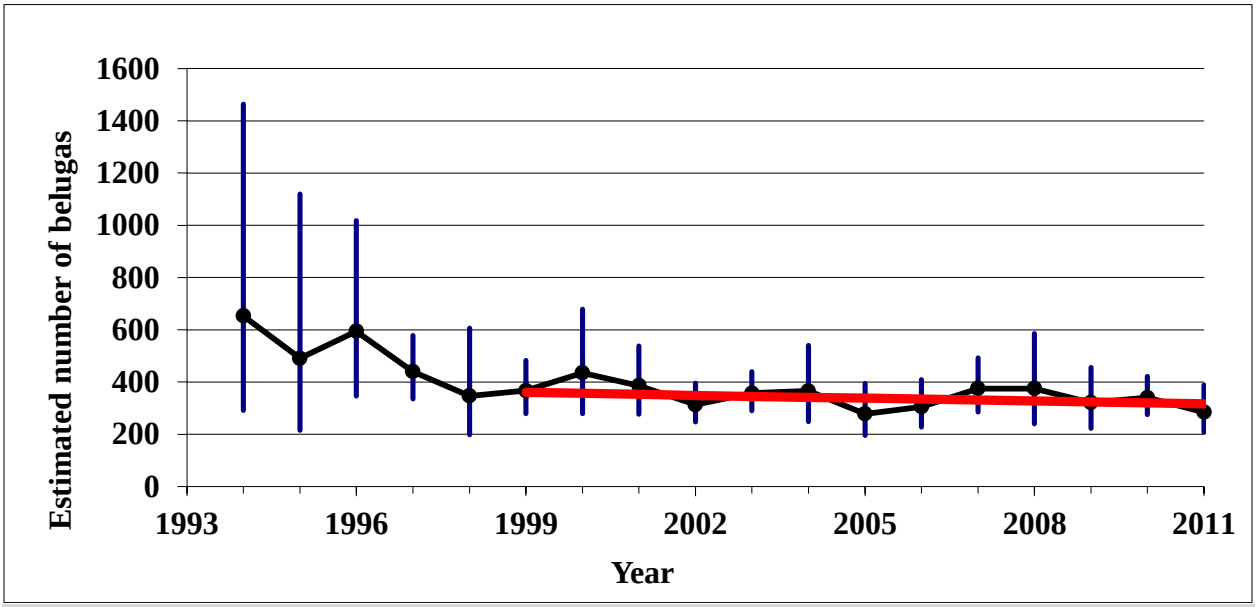

Figure IV-7. Abundance estimates of beluga whales in Cook Inlet, Alaska 1994-2010. Error bars depict 95 percent confidence intervals. Rate of decline from 2000-2010 (red trend line) has been -1.3% per year. (Figure source: R. Hobbs, National Marine Fisheries Service)

As the Commission had expected, the 2008 abundance estimate had little effect on conclusions regarding the population trend. The likelihood that the stock was continuing to decline dropped from 65 to 62 percent. The estimated likelihood that the stock would go extinct within 100 years remained at 26 percent, and, applying the model it considered most realistic, the Service concluded that the probability of extinction within 300 years was 70 percent.

On 22 October 2008 the Service published a final rule listing the Cook Inlet beluga as an endangered species. The final rule indicated that the Service intended to designate critical habitat for the stock in a separate rulemaking because it did not have sufficient information to determine such habitat for the species, as described below.

Litigation

Section 11(g)(2) of the Endangered Species Act requires those seeking to challenge an agency action for an alleged violation of the Act to provide written notice at least 60 days prior to filing a lawsuit. On 12 January 2009 Alaska's attorney general wrote to the Secretary of Commerce and the head of the National Marine Fisheries Service indicating the state's intention to file a suit challenging the listing of the Cook Inlet beluga whale stock. The state cited several alleged violations, including the Service's failure to (1) properly consider conservation practices and protection measures being taken in Alaska, (2) respond adequately to the state's comments on the proposed rule, (3) document sufficiently its basis for determining the Cook Inlet stock of beluga whales to be a distinct population segment of the species eligible for listing, and (4) provide an additional opportunity for public review and comment of documents and data relied on in the final listing rule but not available at the time the proposed rule was published. At the end of 2009 the state of Alaska had yet to file a lawsuit challenging the listing decision but indicated that it still intended to do so.

On 4 June 2010 the state filed its lawsuit in federal court. It asked for declaratory and injunctive relief under the Administrative Procedure Act and the Endangered Species Act, and requested that the court vacate the Service's listing decision (*Alaska* v. *Lubchenco* 2011). The state alleged that the Service failed to consider the relevant statutory factors and did not conform to the requirements for making a listing determination. On 7 September 2010, the court allowed two additional parties, Escopeta Oil Company, LLC, and the Alaska Center for the Environment (including several other nonprofit corporations) to intervene in the case as plaintiff and defendant, respectively. In its deliberation, the court noted that judicial review of agency decisions under the Endangered Species Act is governed by strict limitations within the Administrative Procedure Act—a court may set aside an agency action only if it can be demonstrated "as arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law" 5 U.S.C. 706(2)(A). The court therefore may not substitute its own judgment for the agency, but instead must determine whether the agency considered relevant factors and established a clear rational link between these factors and the decisions made. After reviewing the case, the court issued a final opinion on 21 November 2011. In its opinion, the court found that the Service rationally considered all the relevant listing factors under the Endangered Species Act, based its decision on the best available scientific data, and provided full opportunity for public comment. The judge ruled in favor of the defendants, upholding the Service's listing decision.

Critical habitat

Section 4(b)(6)(C) of the Endangered Species Act requires that critical habitat be designated concurrent with publication of an endangered or threatened listing determination except in certain circumstances. If the agency responsible for the listing finds that critical habitat for the species "is not then determinable," it has one additional year to complete the designation process. In its 22 October 2008 final listing rule, the National Marine Fisheries Service indicated that it did not have sufficient information on the "primary constituent elements" of Cook Inlet beluga whale habitat or on the possible economic consequences of designating certain areas as critical habitat. The Service therefore concluded

that it could not determine critical habitat and indicated its intention to designate critical habitat in a separate rulemaking.

Critical habitat is defined under the Endangered Species Act as specific areas occupied by the species at the time it is listed that include physical or biological features (1) essential to the conservation of the species and (2) that may require special management considerations or protection. Areas outside the current range of the species also qualify for designation as critical habitat if such areas are determined to be essential for conservation of the species. The Service must consider the economic impact of a critical habitat designation and may exclude certain areas if it determines that the benefits of the exclusion outweigh the benefits of including those areas in the designation. The Service published an advance notice of proposed rulemaking on 14 April 2009 (74 Fed. Reg. 17131) seeking information needed to make those determinations. The Marine Mammal Commission provided comments to the Service regarding its advanced notice of proposed rulemaking. The reader can find a summary of those comments in the Commission's 2009 annual report.

The Service prepared a draft economic assessment to evaluate the impact of designating the proposed areas as critical habitat as part of a cost-benefit analysis.[6] The assessment notes that the regulatory impact of a critical habitat designation is confined largely to triggering review under section 7 of the Endangered Species Act, which mandates that federal actions (i.e., those actions authorized, funded, or carried out by a federal agency) not result in the destruction or adverse modification of critical habitat. However, section 7 review also is prompted by virtue of listing a species as endangered or threatened, requiring federal agencies to ensure that federal actions are not likely to jeopardize the continued existence of any listed species. The economic assessment observed that most actions that would adversely modify or destroy critical habitat also would violate the jeopardy prong of section 7. Therefore, the possible economic impact of a critical habitat designation (e.g., by preventing a project from going forward or requiring changes in a proposed action) should be viewed in terms of the incremental impact of the critical habitat review over and above that already required to determine whether an action would jeopardize the species. When viewed in that context, the Service concluded that the potential economic impact of a critical habitat designation was relatively modest. On the other hand, the Service determined that considerable benefits would accrue from designating critical habitat, not only in the context of section 7 but by providing public notice of areas and features important to species conservation. The Service also observed that a critical habitat designation may result in other ancillary benefits such as improving the ecological functioning of the Cook Inlet ecosystem or allowing more opportunities for whale-watching activities. Consistent with its notice of proposed rulemaking, the Service did not propose excluding any areas from the identified critical habitat based on economic considerations. However, the Service proposed to exclude from the designation any manmade structures that exist as of the date that a final designation becomes effective as well as the land on which such structures rest.

The Service also proposed excluding two areas under a separate provision of the Endangered Species Act. Section 4(a)(3)(B)(i) of the Act directs the Service not to designate as critical habitat any lands or other areas owned or controlled by the Department of Defense or designated for the Department's use if those areas are subject to an integrated natural resources management plan prepared under the Sikes Act and that plan provides benefits to the species for which critical habitat is being designated. Under that provision the Service proposed excluding areas within Elmendorf Air Force Base and Fort Richardson's Eagle River Flats live fire range from the critical habitat designation. The Port of Anchorage had sought a similar exclusion based on its designation by the Army as a Strategic Military Seaport, but the Service declined to include such an exclusion in its proposed rule pending receipt of additional information.

On 2 December 2009 the Service published a proposed rule to designate critical habitat for Cook Inlet beluga whales (74 Fed. Reg. 63080). The proposed rule included two adjacent areas within Cook Inlet as critical habitat (see Figure IV-8). The first area includes 1,918 km^2 (741 mi^2) in the northernmost portion of the Inlet—the area northeast of a line from the mouth of Threemile Creek to Point Possession, including the Susitna River delta, Chickaloon Bay, Turnagain Arm, and Knik Arm. This area contains

[6] alaskafisheries.noaa.gov/protectedresources/whales/beluga/chabitat/cib_economicanalysis0810.pdf

shallow tidal flats, river mouths, and estuarine habitat that are particularly important for foraging and as nursery sites. The second area includes all waters south of the first area to 60° 25′ N latitude, nearshore areas south of 60° 25′ N latitude along the west side of the inlet, and Kachemak Bay, near Homer, on the east side of the lower inlet. This area of 5,891 km^2 (2,275 mi^2) is of lesser importance during the spring and summer but provides important feeding and transit areas in the fall and winter. The Service did not include any habitat outside the areas currently inhabited by beluga whales in the proposed designation "because any such areas are presently unknown … and the value of any such habitat in conserving this species cannot be determined." However, it did not address the question of whether the current range of Cook Inlet beluga whales, which has contracted as the stock has declined, would be sufficient to support recovery.

On 3 March 2010 the Commission provided comments on the proposed rule to designate critical habitat for the endangered Cook Inlet beluga whale stock. The Commission noted that it had provided recommendations to the Service concerning critical habitat designation in 2007 and 2009. As reflected in those letters, the Commission reiterated its belief that the designation of critical habitat for Cook Inlet beluga whales is one of the most important actions that can be taken to prevent the extinction of the stock, and encouraged the Service to complete the action as soon as possible. The Commission recommended that the Service adopt its proposal to designate all waters and coastal areas of Cook Inlet used by beluga whales north of 60° 25′ N latitude as critical habitat. In addition, the Commission recommended the Service (1) expand designation farther from shore to include all waters less than 18 meters in depth in the remaining portion of the inlet as critical habitat, including all such waters on the eastern side of the inlet; (2) also include areas in the lower portion of the inlet that must be available for reoccupation if and when the stock increases; (3) adopt a precautionary approach by declining to exercise its discretion to exclude any proposed critical habitat based on economic considerations; and (4) provide Fort Richardson's integrated natural resources management plan to the public and, in the final rule, explain the basis for its conclusion that the plan provides benefits to the Cook Inlet beluga whale stock.

On 11 April 2011 the Service published a final rule designating habitat for the Cook Inlet beluga whale (76 Fed. Reg. 20180). The Service designated the two areas consistent with its earlier proposed critical habitat, with the final designation comprising a total of 7,804 km^2 (3,013mi^2) of marine habitat. In its final decision, the Service ultimately decided to exclude the Port of Anchorage from its critical habitat designation in consideration of national security interests. Although the Department of Defense did not make a request to exempt the Port of Anchorage, the Department has named the port as one of 19 strategic ports in the nation, asserting its strategic importance for military readiness. These factors formed the basis for the Service's final decision, which concluded that the benefits of excluding the port for national security reasons outweighed the conservation benefits of including the port. Additionally, the Service excluded portions of the Eagle River Flats Range on Fort Richardson and military lands of Joint Base Elmendorf-Richardson because it believed that the military was providing sufficient conservation benefits through its integrated natural resource management plan. Figure IV-8 depicts the final critical habitat designation for the Cook Inlet beluga whale stock.

Development of a recovery plan

On 22 October 2008, the same day that the Service published the final rule listing the Cook Inlet beluga whale as an endangered species, it published a notice of availability of the final conservation plan under the Marine Mammal Protection Act.[7] Once a species is listed under the Endangered Species Act, the Service is required to prepare a recovery plan (unless it determines that such a plan will not promote the conservation of the species). The Service indicated in its listing rule that it did, in fact, intend to prepare a recovery plan for the Cook Inlet beluga whale stock. Because conservation and recovery plans

[7] http://www.nmfs.noaa.gov/pr/pdfs/species/belugawhale_conservationplan.pdf

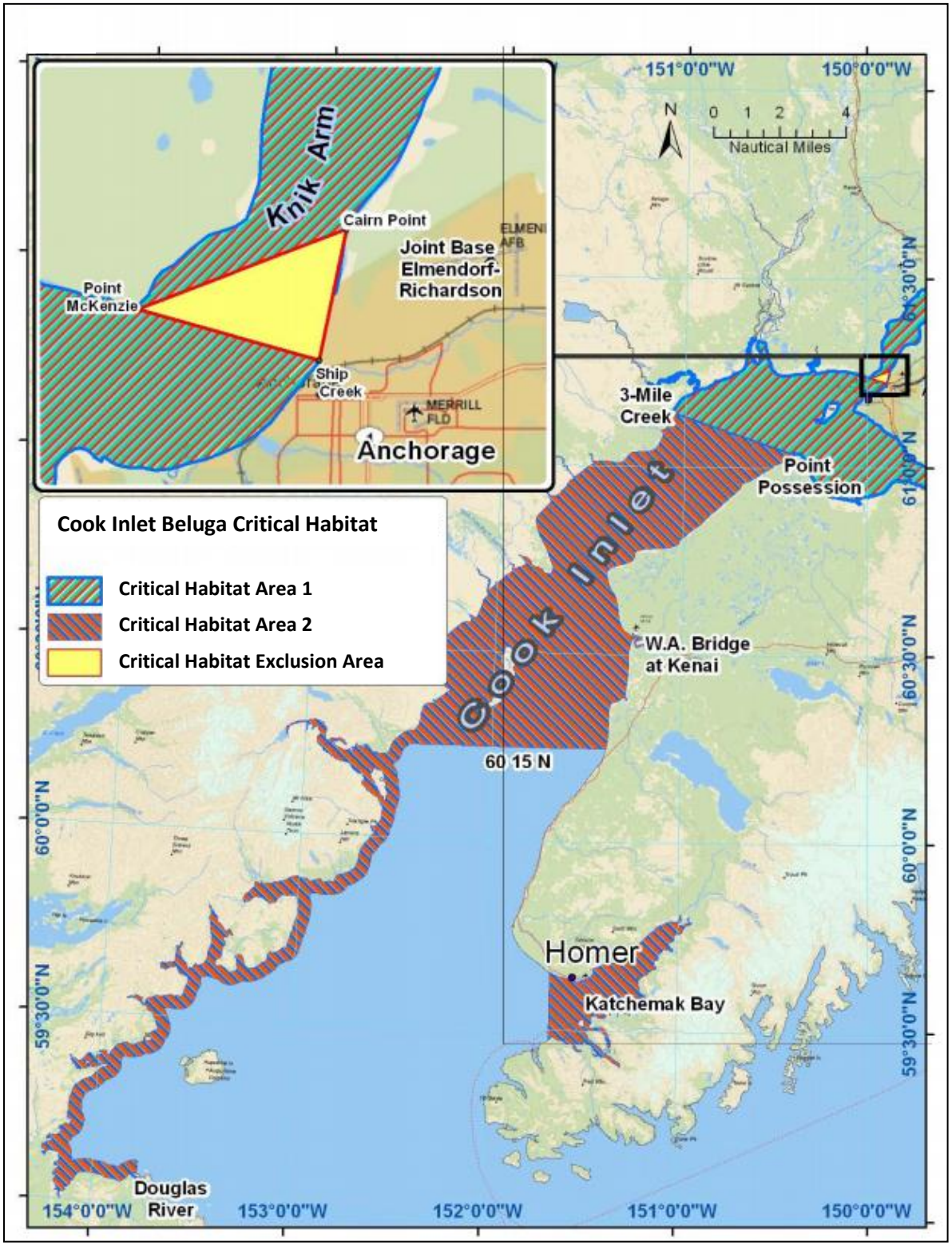

Figure IV-8. The National Marine Fisheries Service has announced a final decision to designate two adjacent areas as beluga whale critical habitat. Area 1 is particularly important for foraging and as nursery sites. Area 2 provides important feeding and transit areas in the fall and winter. An exclusion area was created for the Port of Anchorage for security reasons. (Map source: National Marine Fisheries Service)

are prepared for similar purposes, the conservation plan presumably will provide the starting point for preparation of the recovery plan.

Section 4(f) of the Endangered Species Act governs the development and implementation of recovery plans for the conservation and survival of each listed species. A plan should include (1) a description of site-specific management actions necessary to meet the recovery goal, (2) objective, measurable criteria that, when met, would warrant de-listing, and (3) estimates of the time required and the costs associated with carrying out the measures needed to achieve the plan's recovery goal and intermediate steps toward that goal.

Section 4(f) also authorizes the Service to establish a recovery team consisting of public and private agencies and institutions and other qualified persons to assist in the development of a recovery plan. On 28 January 2010 the Service issued a notice announcing its intent to prepare a recovery plan and soliciting information on Cook Inlet beluga whales and their habitats for the purpose of preparing the plan (75 Fed. Reg. 4528). On 29 March 2010 the Commission responded, noting the plan was needed because of the uncertainty regarding the risk factors that may be impeding recovery of the stock and the measures needed to address those factors. The Commission recommended that the Service use its 2008 conservation plan as a template for developing the recovery plan, and as a guide for the Service's research and management efforts until the recovery plan was completed. The Commission also noted that, over the preceding two decades, the Service had taken no substantial steps to establish a research program, nor had it taken any management actions to address the stock's poor status and need for protection. The Commission offered to help the Service elevate the priority of developing an appropriate research and recovery plan.

On 30 March 2010 the Service convened for the first time the Cook Inlet Beluga Whale Recovery Team. Since then, the team met in September and December 2010; its science panel met in April 2011; and its stakeholder panel met in November 2011. The team's sole focus has been the development of a recovery plan.

On 28 June 2010 the Commission wrote the Service requesting a summary indicating (1) how much funding it allocated for Cook Inlet beluga whale research for fiscal years 2006 through 2010, (2) what research and recovery projects were undertaken in each of those years and the approximate cost of each, (3) how other funds designated for Cook Inlet beluga recovery have been used, and (4) planned research and recovery activities and their anticipated costs for fiscal years 2011 through 2013. The Service responded to the Commission's request with detailed data on research projects and funding for the requested years. The Service noted that research funding has been variable during that period and peaked at just over $2M in 2007.

On 10 May 2010 the Service released a Cook Inlet beluga whale research plan outlining a structured research approach with prioritized actions aimed at understanding and reversing factors causing the decline. On 3 October 2011, the Commission wrote to the Service to recommend that it (1) continue photo-identification work for long-term monitoring and expand that work, as appropriate, to help identify the factors that are impeding stock growth; (2) convene a group of experts in biopsy sampling methods to weigh the risks and benefits of such research and consider how it might best be structured and coordinated; (3) expand its efforts to respond to beluga strandings to assist live-stranded whales and collect comprehensive samples from beach-cast dead animals; and (4) continue to fund aerial surveys on an annual basis. The Service responded on 7 November 2011, agreeing for the most part with the prioritized research activities, including the importance of photo-identification work and convening a group of experts to review research techniques prior to committing to large-scale biopsy sampling. Although the Service agreed with the Commission's recommendations in general, it noted the need to consider practical constraints on such efforts, most notably the costs associated with the recommended activities.

In 2011, the Commission was copied on a letter from the leader of the Cook Inlet Beluga Whale Recovery Team, citing concern over the scientific independence of some of its state representatives. Specifically, the letter highlighted concerns that some state scientists on the team were being required to represent the state's policy positions in the team's deliberations rather than providing their own

independent, scientific perspectives. The Commission wrote to the Service on 21 January and 7 March, 2011, expressing concern over this issue. Discussions between the state and the Service indicated the state was not willing to allow these scientists to participate independently and the Commission recommended the Service dismiss the two state members from the team to maintain its scientific integrity. The Service did so in a manner consistent with national guidance set forth by the White House Office of Science and Technology Policy on the importance of scientific integrity in all federal agency actions (76 Fed. Reg. 36094).

Regulation of subsistence hunting

Section 101(b) of the Marine Mammal Protection Act allows Alaska Natives to take marine mammals for subsistence purposes or for making and selling handicrafts, provided that the taking is not done in a wasteful manner. Other limits may be placed on such taking only through formal rulemaking and only if a stock has been designated as depleted or is considered depleted by virtue of being listed as endangered or threatened under the Endangered Species Act. Estimates derived from a variety of sources indicate that high levels of subsistence hunting of Cook Inlet beluga whales occurred throughout much of the 1990s and were a major cause of the stock's decline. The overharvest and precipitous decline of the stock led to a number of actions to limit hunting, prevent further decline, and promote the stock's recovery. Those actions culminated in the publication of final harvest regulations on 15 October 2008 (73 Fed. Reg. 60976).

The key component of the regulations is a harvest table that sets forth the allowable harvest of Cook Inlet beluga whales according to estimated abundance levels and growth rates, and subject to adjustments based on whether observed mortality from sources other than subsistence hunting exceeds the expected number of deaths for a stock of its size. No harvest is allowed if the average stock estimate over the previous five-year interval is less than 350. Once the average reaches 350, a limited number of strikes would be allowed (e.g., one strike per year under a low or intermediate growth rate). The number of allowed strikes would increase under other scenarios to a maximum of 32 strikes over five years at a stock of 700 or greater if the stock is experiencing a high growth rate. The regulations are codified at 50 C.F.R. § 216.23(f)(2)(v). Because the average abundance estimate over the previous five years was below 350, harvesting is not allowed for the years 2008 through 2012, and none is known to have occurred from 2008 to 2011.

Incidental take and the Knik Arm bridge

The Marine Mammal Protection Act prohibits the unauthorized taking of any marine mammal. Activities other than commercial fishing that incidentally take marine mammals, including Cook Inlet beluga whales, generally require an authorization under section 101(a)(5) of the Act. In addition, now that the Cook Inlet beluga whale is listed as an endangered species, activities that may take these whales are subject to consultation under section 7 of the Endangered Species Act. During 2010 and 2011, as in previous years, the Commission provided recommendations on a number of activities that could take Cook Inlet beluga whales incidentally, including military exercises, underwater seismic activity, and coastal development projects. The Commission's recommendations can be found in Appendix A of this report. The following highlights Commission concerns regarding an ongoing proposal to build a bridge across the Knik Arm in upper Cook Inlet.

The state of Alaska established the Knik Arm Bridge and Toll Authority in 2003 for the purpose of overseeing construction of the proposed bridge, which would connect the municipality of Anchorage with the Mat-Su Borough. In September 2006 the bridge authority, in conjunction with the Federal Highway Administration, published a draft environmental impact statement under the National Environmental Policy Act to consider alternatives for the proposed bridge project and their impacts. The Commission's comments on the impact statement questioned the conclusion that the proposed bridge construction and

operation would not have significant effects on Cook Inlet beluga whales. The statement had identified most of the possible sources of impact, including disturbance from construction activities, increased vessel operations, and increased human use of the Knik Arm area; masking of sounds used by beluga whales for communication, navigation, and predator avoidance; alteration of habitat-use patterns, particularly in transit corridors into and out of Knik Arm; changes in the distribution and abundance of prey; and increased risk of strandings. Nevertheless, the Commission believed that the impact statement had erroneously discounted the significance of these potential effects. The Commission found the statement's assessment of possible cumulative impacts to be especially wanting, particularly in light of the fact that the beluga whale stock seems to be experiencing an ongoing decline for undetermined causes, even in the absence of the additional stressors likely to result from construction and operation of the bridge.

In August 2006 the National Marine Fisheries Service published a notice announcing receipt of an application from the Knik Arm Bridge and Toll Authority seeking an incidental take authorization under the Marine Mammal Protection Act for the proposed bridge construction (71 Fed. Reg. 49433). The Commission commented on 22 September 2006 recommending, among other things, that a rulemaking to issue the requested authorization be deferred until the Service could, with reasonable confidence, support a conclusion that those activities would have no more than a negligible impact on the Cook Inlet beluga whale stock. On 12 March 2009, before the Service had either denied the application or published a proposed rule to authorize incidental taking, the bridge authority wrote to the Service withdrawing its application.

On 8 September 2010 the Service published another notice announcing receipt of a revised incidental take application from the Knik Arm Bridge and Toll Authority in conjunction with the Department of Transportation's Federal Highway Administration (75 Fed. Reg. 54599). The applicants were seeking authorization under section 101(a)(5)(A) of the Marine Mammal Protection Act to take small numbers of beluga whales, harbor seals, and harbor porpoises incidental to construction of the Knik Arm Bridge from spring 2013 through autumn 2017. The Commission commented on 7 October 2010, recommending that the National Marine Fisheries Service require the applicants to—

- clarify how source levels of the impact and vibratory hammers were determined;
- obtain and verify source level and propagation loss data for large-diameter, drilled-shaft construction methods using an oscillator and use that information to estimate the expected number of takes;
- fully describe the process and data used to estimate propagation loss, associated distances to Level A and B harassment thresholds, and the number of takes;
- verify the timing of the proposed in-water construction activities;
- clarify how those takes reflect variations in the activities that would be conducted and the seasonal distribution of marine mammals near the project site;
- provide marine mammal density estimates and estimated takes during those months currently not addressed in the application; and
- explain how activities would be adjusted during the construction period to take into account the observed distribution, movements, and behavior of beluga whales.

The Commission also recommended that, if the Service were to propose regulations for the planned bridge construction activities without better data, it—

- incorporate safety zones with added precautionary buffers for use with
- the impact and vibratory hammers until in-situ measurements have been made and estimated sound pressure levels have been verified;
- apply the same proposed safety zones associated with use of the vibratory hammer to use of the oscillator;

- resolve the uncertainty associated with the qualifiers "when possible and practicable" and "when weather and daylight hours permit" and structure the proposed rule to prohibit in-water activities at times and under conditions when the specified mitigation and monitoring measures are not being implemented or are not expected to be effective;
- require that observations be made before, during, and after all soft-starts of pile-driving and pile-removal activities to gather the data needed to analyze the effectiveness of this technique as a mitigation measure and require the applicants to analyze and report their findings as part of the monitoring and reporting requirements; and
- condition the proposed rule and any letter of authorization issued thereunder to require suspension of the construction activities if a marine mammal is seriously injured or killed and the injury or death could be associated with those activities and, if supplementary measures are unlikely to reduce this risk to a negligible level, require the applicants to suspend their activities until an authorization for such taking has been obtained.

The Service had not issued the proposed rule by the end of 2011. To the Commission's knowledge, it also had not initiated section 7 consultation under the Endangered Species Act.

False Killer Whale (*Pseudorca crassidens*)

False killer whales are found in tropical and subtropical oceans around the world. They are among the larger delphinids and can grow to lengths of five to six meters (16 to 20 ft) and can weigh up to 1,200 kg (2,645 lb). Their outward appearance bears little resemblance to killer whales (*Orcinus orca*); they were given the name *Pseudorca* due to similarities in the skulls and teeth. False killer whales are highly social and occur in relatively discrete, but often overlapping, regional populations of several hundred to well over 1,000 animals. They are upper trophic level predators and thus are naturally rare. They usually hunt for prey in relatively small subgroups and feed primarily on large pelagic fishes, such as tuna, mahimahi, wahoo, and pomfret. Several populations occur at least partially within the U.S. Exclusive Economic Zone around Hawaii and other territories in the central and western Pacific Ocean.

Because they usually occur far from shore, false killer whales are relatively unstudied and poorly known, particularly with regard to their population structure, range, and movements. However, recent genetic, photo-identification, and telemetry studies have identified at least four relatively discrete populations in U.S. waters of the Pacific. These include (1) the Hawaii pelagic population found mostly beyond 140 km offshore (i.e., within and beyond the U.S. Exclusive Economic Zone around the Hawaiian Archipelago), (2) the Hawaii insular population occurring mostly within about 90 km of the Main Hawaiian Islands (MHI), (3) a population around Palmyra Atoll about 1,000 miles southwest of Hawaii (Chivers et al. 2007, 2008, 2010; Baird et al. 2008a, 2010; and Baird 2009), and (4) a fourth population around American Samoa about 1,500 miles farther southwest of Palmyra Atoll. The best estimates of abundance for these populations available through 2011 are 484 whales for that portion of the Hawaii pelagic population within the U.S. Exclusive Economic Zone (Carretta et al. 2010), about 150 whales for the Hawaii insular population (Oleson et al. 2010; Baird unpublished), and 1,329 whales for the Palmyra population (Carretta et al. 2010). Existing information is not sufficient to estimate the abundance of the American Samoa population. Further research is likely to identify additional populations in other U.S. Pacific waters. For example, recent genetic, photo-ID and telemetry data also suggest a separate insular population of false killer whales in the nearshore waters around the Northwestern Hawaiian Islands (Baird et al. 2011; Martien et al. 2011).

Fishery interactions

False killer whales are often attracted to longline fishing vessels and they are the species of cetacean most frequently involved in taking or "depredating" bait and hooked fish, as well as the most frequently recorded caught on hooks or entangled in fishing lines in the Hawaii-based longline fishery. Such interactions are a significant conservation issue for at least the Hawaii pelagic population and are an important management issue for commercial longline fisheries off Hawaii. Rates of bycatch (serious injury and mortality) in the Hawaii-based longline fishery have exceeded the Potential Biological Removal (PBR) levels estimated for false killer whales in Hawaii since data were first available to estimate bycatch rates and PBR. To reduce this bycatch, the National Marine Fisheries Service established a take reduction team in 2010. The team reached consensus on a draft take reduction plan that included both regulatory and non-regulatory elements, and the Service published a proposed take reduction plan in July 2011 (see Chapter VIII**)**.

Listing under the Endangered Species Act

The National Marine Fisheries Service also is considering whether to list the Hawaii insular stock as endangered or threatened under the Endangered Species Act. On 1 October 2009 the Natural Resources Defense Council petitioned the Service to list the population based on its unique position as the species' only known false killer whale population living in close association with an island ecosystem, its small size, evidence that it has declined significantly in abundance over the past 20 years, and threats from longline fisheries, pollution, and random events that have a greater chance of affecting small populations.

On 5 January 2010 the Service published a notice (75 Fed. Reg. 316) that it had received the petition and concluded that the listing action may be warranted. It therefore provided notice that it would review the status of the population and requested comments and information to inform the review. Under a policy adopted by the Service to make Endangered Species Act listing decisions for populations as opposed to entire species,[8] three standards must be met to proceed with listing: the population must be a discrete population unit, it must be ecologically or evolutionarily significant to the species, and it must satisfy at least one of five listing criteria in the Act.

On 5 February 2010 the Marine Mammal Commission wrote to the Service in response to the request for information and transmitted a recently completed contract report reviewing scientific information on false killer whales in Hawaii (Baird 2009). In its letter the Commission noted that it believed the Hawaii insular population met each listing standard under the Endangered Species Act and expressed support for the Service's plan to proceed with the status review. With regard to discreteness, the Commission noted that recent photo-identification studies indicate that false killer whales within about 90 km of shore do not mix with those found farther offshore (Baird 2009). Moreover, genetic studies also indicate that insular false killer whales are demographically isolated (Chivers et al. 2007, 2008, 2010). However, those analyses were based on limited sample sizes and the Commission recommended that the Service (1) ensure that, whenever possible, longline fishery observers collect samples from false killer whales that have been caught incidentally in Hawaiian waters and expedite genetic analyses of those samples and (2) use all available photo-identification records to evaluate associations among individual false killer whales in Hawaii to provide a more powerful assessment of the likelihood of interbreeding between pelagic and insular populations. If those further analyses could not be completed within the timeframe of the status review, the Commission recommended that the Service err on the side of caution by assuming that the insular and pelagic populations are discrete unless it could make a strong case that they are part of a single interbreeding population.

With respect to significance, the Commission noted that the Hawaii insular population appeared to be genetically distinct from other populations and that it was the taxon's only known insular population. It also noted that the insular population was a top predator in an ecosystem that itself is unique. As such, the

[8] http://www.nmfs.noaa.gov/pr/laws/esa/policies.htm

insular population appeared to satisfy several criteria for evaluating significance and the Commission recommended that the Service either find the population to be a significant ecological and genetic component of the species, or provide a rationale for why the only known insular population of false killer whales in U.S. waters should not be considered significant to the species.

Figure IV-9. A false killer whale hooked on a fishing line (Photo courtesy of Eric Forney, National Marine Fisheries Service)

Finally, with regard to conservation factors, the Commission noted that available survey data indicate that the insular population has declined significantly over the past two decades (Baird et al. 2008b; Mobley 2004). Aerial surveys in June of 1989 recorded multiple sightings of individual false killer whale groups in excess of 300 whales (Reeves et al. 2009), each of which was several times greater than the current total population estimate. It also noted that existing information is not yet sufficient to confirm the cause of the apparent population decline, but evidence of interactions with longline fisheries (e.g., photographs of dorsal fins of whales from the insular stock with scars consistent with those known to be caused by longlines) provides a reasonable basis for concluding that such interactions may have caused the injury or death of at least some whales and may have been and may continue to be a factor contributing to the decline (Figure IV-9). To date, the Service has collected little information documenting interactions with longline-type fisheries known to occur within the population's range (e.g., the Hawaii-based shortline and kaka fisheries). Therefore, the Commission also recommended that the Service include the shortline, kaka, and other fisheries likely to take insular false killer whales within the scope of the Hawaiian False Killer Whale Take Reduction Team.

The status review was released in August 2010 (Oleson et al. 2010) and on 17 November 2010 the Service published a notice (75 Fed. Reg. 70169) that it was proposing to list the Hawaiian insular false killer whale as an endangered distinct population segment under the Endangered Species Act. At the time of the proposed listing the Service did not propose designation of Critical Habitat, but did request information relevant to determination of critical habitat. Due to the scarcity of information at that time about the population's behavior and habitat-use patterns, the Commission could not provide the Service with recommendations on particular locations that may be essential for the population. However, the Commission recommended the best way for the Service to assess such areas likely would be through examination of recent false killer whale satellite tracking studies. The Commission also recommended the Service refer to a 2009 Commission-funded study entitled "A Review of False Killer Whales in Hawaiian Waters: Biology, Status and Risk Factors" for relevant information.[9]

Hawaiian Monk Seal (*Monachus schauinslandi*)

The recovery of the Hawaiian monk seal is one of the nation's most critical marine mammal conservation issues. The Hawaiian monk seal is listed as endangered under the Endangered Species Act. It now numbers about 1,200 animals and is declining at a rate of about 4 percent per year. About 80 percent of all

[9] http://www.mmc.gov/reports/workshop/pdf/killerwhale_review_mmc09.pdf

monk seals currently live in the remote Northwestern Hawaiian Islands (Figure IV-10). From the 1950s to the 1970s virtually all seals were found in the NWHI where the principal cause of its decline was human disturbance, particularly from Navy and Coast Guard activities. Such disturbance was reduced in the 1980s and 1990s as the Navy and Coast Guard closed their NWHI stations. New threats, however, are now perpetuating the species' decline. These include starvation due to reductions in prey resulting from changes in the ecosystem brought about by climate variation and disruption and past commercial fishing, entanglement in marine debris, predation by sharks, attacks on pups and females by aggressive adult male seals, and loss of pupping beaches to rising sea levels.

The most encouraging sign for the species' long-term survival has been a recent increase in monk seal numbers in the Main Hawaiian Islands (MHI). Monk seal breeding colonies apparently were eliminated from the MHI soon after the first Polynesians arrived in Hawaii some 1,500 to 2,000 years ago. Over the past few decades monk seal sightings and births have increased steadily in the MHI and scientists estimate that more than 150 seals occupy the MHI at present, with 10 to 15 pups born per year (not including births on Niihau, a private Island and for which complete data are not available). In 2011, 17 pups were born in the MHI, plus 6 to 12 additional pups born on Niihau. If the rates of increase in the MHI and decrease in the NWHI continue at their current rate, the number of seals in the MHI could equal those in NWHI by the year 2023 with about 300 to 350 seals in each area (Baker et al. 2011). The increase in the MHI provides the public an opportunity to see monk seals in the wild, but it also leads to increasing interactions with beach goers and recreational fishermen, as well as exposure of the seals to diseases from domestic and feral animals. Such interactions pose significant new research and management challenges that must be met if the Hawaiian monk seal is to persist.

The National Marine Fisheries Service has lead responsibility for Hawaiian monk seal research and management. It relies heavily on partnerships with other government agencies, especially the Hawaii Department of Land and Natural Resources, the U.S. Fish and Wildlife Service, the U.S. Coast Guard, the

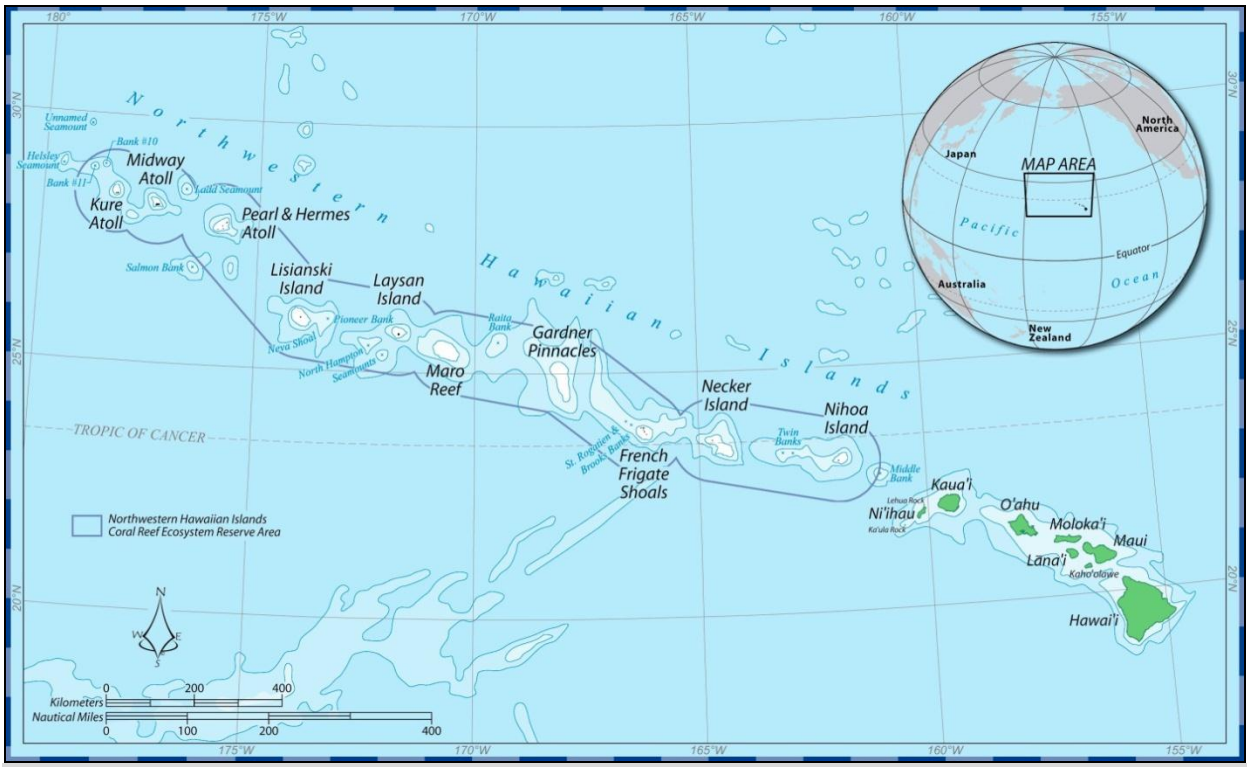

Figure IV-10. Map of the Northwest Hawaiian Islands archipelago (Source: NOAA)

Office of National Marine Sanctuaries in the National Ocean Service, the National Park Service, the U.S. Navy, and the Marine Mammal Commission. Other vital partners include non-governmental groups, such as The Marine Mammal Center, Marine Conservation Institute, Hawaiian Monk Seal Response Team Oahu, Monk Seal Foundation, Waikiki Aquarium, Hawaii Wildlife Fund, and many citizen volunteers in the MHI. To help guide recovery work, the Service has established a Hawaiian Monk Seal Recovery Team composed of recovery program partners and adopted a Hawaiian monk seal recovery plan that was updated in 2007 (National Marine Fisheries Service 2007).

The Marine Mammal Commission has devoted special attention to the Hawaiian monk seal since the mid-1970s when it recommended the species be listed as endangered under the Endangered Species Act. The Commission held its 2009 annual meeting in Hawaii, in large part to review monk seal recovery work by the Service and its key partners. As described below, in 2010 the Commission sent letters to the Service and other involved agencies providing recommendations and comments based on its review.

Funding for Hawaiian monk seal recovery

Inadequate funding has been a longstanding problem for the Hawaiian monk seal recovery program. The logistics and costs of working at the six major breeding sites in the remote NWHI (i.e., French Frigate Shoals, Lisianski Island, Laysan Island, Pearl and Hermes Reef, Midway Atoll, and Kure Atoll – see Figure IV-10) are substantial. Nevertheless, that work has been crucial, as personnel at the field sites collect essential data on the seals such as their abundance, age structure, vital rates; the risk factors impeding their recovery such as entanglement in marine debris, inadequate prey, and predation by sharks; and measures for promoting their recovery. In most years staff are present at major breeding atolls for only about one third of the year, principally during the spring and summer pupping and nursing season. In Fiscal Year (FY) 2008, recovery funding declined to about $2 million, and total field time was about half of the level of previous years.

To address this problem, Congress raised the National Marine Fisheries Service's funding request for the species in FY 2009 to $5.7 million. The increase allowed an expansion of field work in the NWHI and filled many unaddressed research and management needs in the MHI. For FY 2010, the Service was able to maintain funding at nearly the same level—$5.4 million.

On 17 June 2010 the Commission wrote to the Administrator of the National Oceanic and Atmospheric Administration providing a copy of its 10 March 2010 comments and recommendations to the National Marine Fisheries Service. The letter noted that essential recovery actions for the Hawaiian monk seal would require a budget both large enough and consistent enough over time to create a focused, sustained response to current threats. Examples of such actions include a multi-year translocation program to improve juvenile survival rates in the NWHI, seal behavior modification to reduce risks of seal interactions with people in the MHI, reducing risks of infectious disease, and increased field camp efforts in the NWHI. Noting that the Service's recovery plan projected funding needs at nearly $2 million above the levels available in Fiscal Years 2009 and 2010 and that additional funding would be needed before important new recovery projects could be developed, the Commission recommended that the Agency fund the monk seal recovery program at the full $7.2 million level projected in the recovery plan. On 17 August 2010, the Service responded that it would consider requesting additional funding for monk seal conservation in 2011, but that it would need to compete with other high priority needs within NOAA and throughout the federal government.

In FY 2011, funding for the monk seal program declined to $3.3 million (about 40 percent) and the Service's line item request for work on Hawaiian monk seals for FY 2012 was approximately $2.5 million, roughly the same level that had been provided during the decade prior to 2007 when the revised monk seal recovery plan was adopted. In light of this situation, the Marine Mammal Commission again wrote to the Service on 17 November 2011 recommending that the Service restore funding for Hawaiian monk seal recovery efforts for FY 2012 to at least $5.6 million, the average amount allocated in Fiscal Years 2009 and 2010, and include that amount in its annual monk seal line-item requests for the foreseeable future.

At the end of 2011, the Commission understood that the Service was considering increasing the FY 2012 funding level with discretionary funds, but had not made a final decision to do so. The Commission also understood that funding levels for FY 2013 were likely to decrease given anticipated cuts in the federal budget.

Research and management in the NWHI

Population monitoring: Field studies in the NWHI are important not only to monitor population status and carry out research, but also to undertake opportunistic interventions, such as disentangling seals from marine debris, moving pups away from areas subject to shark predation, and administering medical treatment to injured seals. Service records from 1980 through 2011 indicate field teams were involved in interventions that improved the probability of survival for more than 530 seals. Including captive care and other types of activities, around 30 percent of the monk seals alive today are a result of those conservation interventions (NMFS unpublished data). Females benefiting from various interventions have survived to give birth to at least 220 pups, significantly improving pup production in the NWHI and the size of the current population. The benefits of other conservation actions, such as removing entangling debris from beaches, are difficult to describe quantitatively but almost certainly contribute to monk seal conservation.

With the additional funds provided by Congress in 2009 and 2010, the Service was able to (1) lengthen its field camps during the pupping and nursing season at all major pupping sites, (2) establish a year-round field camp at Laysan Island to conduct a deworming trial (Figure IV-11) and assess the effectiveness of year-round management efforts for various conservation threats (e.g., starvation, entanglement, adult male aggression), and (3) increase field research at a smaller breeding site, Nihoa Island. Following its 2009 annual meeting, the Commission recommended to the Service that it maintain field crews at the increased 2009 level in the NWHI, including Nihoa Island, for the foreseeable future. With the increased funding in FY 2010, the Service was able to do so.

Figure IV-11. A scientist with the University of Hawaii Joint Institute for Marine and Atmospheric Research, working with NOAA's Pacific Islands Fisheries Science Center, applies topical deworming medication on a juvenile seal at Laysan Island. (Source: National Marine Fisheries Service)

Population monitoring in 2010 revealed an increase in pup production from 118 to 147 pups born in the NWHI and a slight increase in juvenile survival rates at many of the atolls. In addition, field personnel carried out some two dozen interventions to protect seals in various ways, including moving weaned pups away from areas of high shark predation risks, disentangling seals, and interrupting attacks by sharks and aggressive male seals. In 2011, the Service was able to take advantage of cruise schedules and field camp resources from 2010 to continue field efforts at all six major breeding atolls. It also maintained its winter field camp at Laysan Island although the crew had to be evacuated for a brief time because of the 11 March earthquake off Japan and resulting tsunami. Field results in 2011 indicated a population estimate at the six major breeding colonies of 909 seals with 141 pups, which were comparable to levels found in 2010. Field teams performed more than 50 interventions to protect seals, not including work at Laysan to improve juvenile survival through the administration of a deworming drug.

Improving juvenile survival: Most of the decline of monk seals in the NWHI over the past 30 years has been from poor juvenile survival. Although shark predation and entanglement in marine debris are contributing factors (see below), observations of starving, malnourished, and undersized pups and juveniles indicate that insufficient prey in some areas has been a significant factor. Potential causes include natural ecosystem variability, variability induced by climate disruption, downstream effects of past fishing for lobster, or—perhaps most likely—some combination of those factors. Closure of the lobster fishery and establishment of the Papahānaumokuākea Marine National Monument have eliminated additional impacts from fishing, but nutritional problems persist. Two measures currently under consideration to improve the condition of juveniles include deworming trials and temporary translocation.

Monk seals, like all mammals, carry internal parasites that absorb nutrients from food in stomachs and intestines and cause various ailments (e.g., gastrointestinal ulcers). Administering medications to rid juvenile monk seals of such parasites may improve nutrient uptake and their chances of surviving to breeding age when survival rates improve significantly. In 2009 Service scientists initiated worming trials on a sample of juvenile seals at Laysan Island to determine if such treatments improve their condition. The Commission's May 2010 letter encouraged these trials and the Service's August 2010 response indicated that the trials would continue in 2010. In 2011, the Service completed analyses of its initial trials and concluded that its initial efforts had not been effective in reducing parasite loads (Gobush et al. 2011). It also concluded that it should consider different means of administering such treatment and different dosages. In 2011 the Service tested a new topical drug called Profender, which recently had been used with success on captive California sea lions. Scientists can administer Profender without restraining the animals and often can do so while the animals are asleep on the beach. The new drug was applied to 17 seals in 2011. At the end of 2011, preliminary analyses indicated that the drug caused no adverse effects on the seals and that it had reduced or eliminated parasites in some, but not all seals. The Service was unsure as to whether it would administer the drug in 2012 depending, in part, on the availability of funding.

Scientists and managers also have considered bringing pups and juveniles into captivity to get them into good condition before returning them to the wild. That approach was used in the 1980s and early 1990s, but was expensive and exposed the seals to various additional risks. Ten of a group of 12 seals brought into captivity in the mid 1990s developed an eye ailment that led to blindness, which caused the Service to halt those efforts until it could be assured that such an event would not occur again.

Another measure for improving juvenile survival has been to move weaned pups and juveniles from locations where survival is poor to other atolls or islands in the NWHI where conditions are better. Nihoa is one of the few locations where prey resources in the NWHI appear sufficient to support additional seals. Six seals were moved to Nihoa in both 2008 and 2009 to assess their response and survival. Half were seen in 2010, but funding in 2011 was not sufficient to identify all seals at Nihoa and the survival rate of translocated seals could not be determined reliably.

The survival of juvenile seals appears to be better in the MHI, and another option is to move newly weaned and juvenile seals to waters around the MHI until they reach age three when survival rates in both the NWHI and the MHI approach or exceed 90 percent. At that time, the seals would be returned to the NWHI. Although the Service had begun considering such a two-stage translocation, it noted during the Commission's 2009 annual meeting that it would require considerable advance analyses and preparation. In addition, it noted such a program would be very controversial because some people in the MHI strongly oppose moving seals from the NWHI to the MHI for fear that an increase in seal numbers would result in an increase in interactions with fisheries and a decrease in commercial and recreational fish populations. The Commission recognized the potential for direct fishery interactions but did not believe competition for fish species would be significant because monk seals generally do not forage on the species targeted by commercial and recreational fisheries. Therefore, the Commission recommended that the Service consult with the Hawaiian Monk Seal Recovery Team and key recovery program partners to prepare and analyze a translocation plan.

To assess the potential utility of translocation to and from the MHI, the Commission recommended that the Service move a small group of weaned pups born in the NWHI to the MHI and a comparable

number of seals three years of age or older born in the MHI to the NWHI. This would avoid an increase in the number of seals in the MHI and allow assessment work to begin more quickly. Noting that pup production is declining rapidly in the NWHI, the Commission's 10 March 2010 letter urged the Service to move as quickly as possible with planning, securing necessary permits and funding, and preparing the necessary environmental impact statements. The Service's 5 August 2010 reply noted that it had contracted for the preparation of a programmatic environmental impact statement to evaluate impacts of several enhancement actions, including the two-stage translocation, that it planned to develop a comprehensive public outreach strategy on the issue, and that it would consult with the recovery team, the Commission, and other key partners in developing the translocation plans.

As discussed below, the Service completed a draft programmatic statement in the summer of 2011 and the Commission provided further comments and recommendations in November 2011.

Shark predation: In the mid-1990s shark predation on monk seal pups increased sharply at French Frigate Shoals. Nearly a third of all pups born at the atoll in 1996 were either known or inferred[10] to have been killed by sharks. Such predation removed 207 of the 854 (24 percent) pups born at this atoll between 1997 and 2010. By comparison, pup deaths attributed to sharks at Laysan and Lisianski Islands during that same period amounted to just 2 percent (10 of 540) and 4 percent (13 of 334), respectively, of pups born at those sites. In 2010 nine documented shark attacks resulted in at least six deaths for a loss of 16 percent (6 of the 37 pups born that year). In 2011, 5 of 37 (14 percent) pups born are known or inferred to have been killed by sharks.

Galapagos sharks have been responsible for all observed shark attacks during this period. Recent studies of Galapagos shark movements at French Frigate Shoals indicate that the problem is caused by a small number of individual sharks that have learned to patrol pupping beaches at this atoll in search of pups in the water. To reduce the number of shark-caused deaths, the Service has moved newly weaned pups to other islets at the atoll where shark predation has not been a problem. In 2010, 37 pups were born at the atoll and 17 were moved (after weaning) to areas of lower shark predation risk. In 2011, 15 of the 37 pups born were moved after weaning. Although this approach has been successful in reducing predation on weaned pups, it has not reduced predation on pups before they wean. The Service has considered moving mother and pup pairs prior to weaning but considers that action too great a risk because it may disrupt the mother-pup bond essential for the pup's survival.

Another measure for reducing shark predation involves attempts to identify and kill the Galapagos sharks observed preying on pups. Those efforts have been focused exclusively in areas near pupping sites and have involved gear closely tended or monitored from shore. Such efforts began in 2000, but achieved limited success because the sharks quickly learned to avoid people and boats. Between 2000 and 2007 Service field personnel caught only 12 sharks and shark predation levels have remained higher than those observed at any other atolls. Thus, such predation continues to pose a major obstacle for recovery of the French Frigate Shoals colony.

In 2008 and 2009 the Service halted efforts to catch sharks while it tested various shark deterrents, none of which proved effective. In 2010, the Service tried several new methods, including short drum-lines, five-hook bottomsets, hand lines, and a spring-loaded net set along the beach that could be triggered when sharks came within a few feet of it. The Service proposed catching up to 20 Galapagos sharks in 2010 within 400 meters of the atoll's pupping beaches.

Catching and killing sharks has been controversial. Among other things, Native Hawaiians hold a special reverence for sharks and have opposed killing them unnecessarily. In addition, government agencies have initiated concerted efforts to protect all of the region's marine life through designation of all NWHI waters as part of the Papahānaumokuākea Marine National Monument. However, the Galapagos shark population at the atoll is believed to number several hundred with most individuals staying in deep water around atolls. For that reason the Service considered—and the Commission concurred—that a limited catch of individuals inside the Atoll lagoon near pupping beaches was

[10] Inferred shark-related deaths include sudden disappearances of pre-weaned and newly weaned pups that cannot be explained by other known mortality factors based on observations at the times of the disappearance.

reasonable and not likely to pose a serious risk to either the shark population or the atoll ecosystem. The Service's 5 August 2010 letter to the Commission indicated that a permit application to take 20 sharks from Monument waters had been approved, that the Service had contracted a professional shark fisherman to carry out removals, and a Native Hawaiian cultural practitioner had been involved to ensure that the Native community's spiritual concerns about killing sharks would be consistent with their practices. Unfortunately, only one shark was taken in 2010 and only one more in 2011.

To better assess the hypothesis that predation on pups was caused by a few individual sharks, the Commission encouraged the Office of National Marine Sanctuaries to fund a study of the movements of Galapagos and tiger sharks at French Frigate Shoals using sonic tags implanted in a sample of atoll sharks. The Office did so and in its letter to the National Ocean Service, the Commission commended National Marine Sanctuary Program staff at the Papahānaumokuākea Monument for their support. Final results were not available at the end of 2011, but preliminary findings supported the above hypothesis and revealed that the Galapagos shark population at French Frigate Shoals may number 600 or more.

The Commission recommended that the Sanctuary Office's co-manager for the Monument approve the permit application for removing Galapagos sharks at the atoll. The Commission also sent letters recommending approval of the Service's application to Monument co-managers from the Hawaii Department of Land and Natural Resources and the Fish and Wildlife Service. At the end of 2011 the Service planned to secure the needed permit to continue fishing for sharks in 2012.

Entanglement in marine debris and hookings: Since 1982, Service scientists have documented 311 entangled seals on NWHI and MHI beaches (Figure IV-12). Of those, 209 were disentangled, 86 freed themselves, 8 died, and the fate of 8 others was not determined. The number of seals that have drowned at sea or died of wounds and abrasions or become entangled when biologists were not present to record or disentangle them is unknown. Most entangled seals are juveniles caught in netting and line carried on currents to the NWHI from fishing grounds as far away as southeastern Asia and Alaska. In 2010, a total of 13 seals were found entangled in the NWHI; 9 of those were disentangled and released alive and 4 were able to escape unaided. In 2011 a total of 14 seals were found entangled, 8 in the NWHI and 4 in the MHI. One freed itself and the rest were disentangled and released in good condition.

In addition to disentangling animals, field crews in the NWHI have removed hazardous debris from atoll beaches since the mid 1980s. In the late 1990s work also began to remove net debris from the coral reefs surrounding the atolls. Those efforts have removed several hundred tons of net debris, undoubtedly preventing the death and injury of many monk seals, as well as sea turtles, seabirds, fish, crabs, and corals. The Coast Guard and the National Oceanic and Atmospheric Administration have provided most

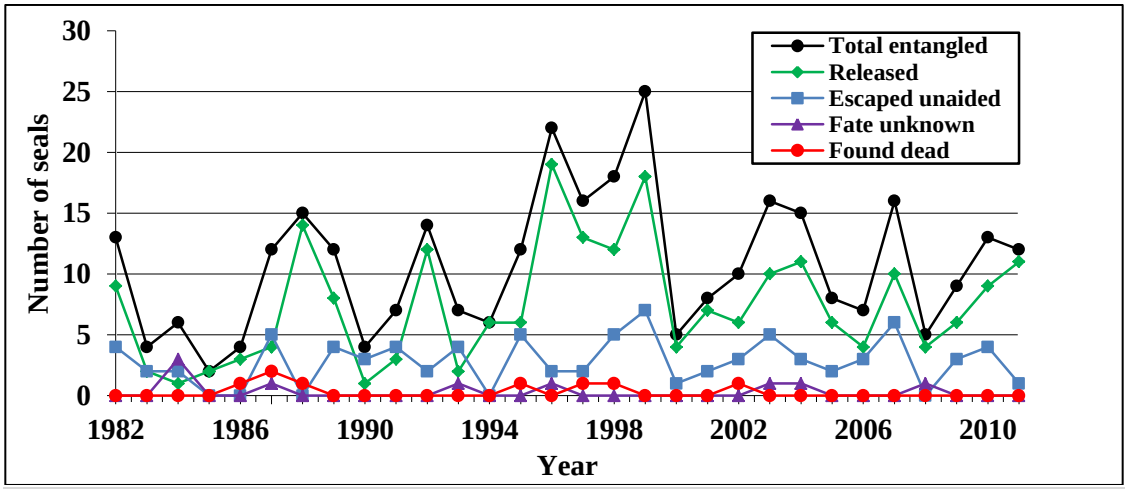

Figure IV-12. Number of entangled Hawaiian monk seals observed from 1992 through 2011. (Data provided by the National Marine Fisheries Service, Pacific Islands Fisheries Science Center)

of the vessel support for these efforts, whereas other agencies, including the Fish and Wildlife Service, the Office of National Marine Sanctuaries, and the state of Hawaii, have provided personnel and/or funding. In 2005 clean-up efforts were reduced to a maintenance level, but accumulation rates since then have proven greater than anticipated. Given the amount of debris in the North Pacific Ocean, the elongated distribution of the NWHI in the southern part of the North Pacific, and the prevailing surface currents, the NWHI effectively act as a sieve or filter, collecting literally tons of debris.

In 2009 NOAA's Coral Reef Ecosystem Division (part of the Service's Pacific Islands Fisheries Science Center) contributed $225,000 and the National Marine Debris Program provided $100,000 to these clean-up efforts. In 2010 the Office of National Marine Sanctuaries, a co-manager for the Papahānaumokuākea Marine National Monument, contributed an additional $225,000. Similar efforts are expected through 2012.

In May 2010 the Commission also wrote to the Assistant Administrator for the National Ocean Service, which includes the Office of National Marine Sanctuaries, and to the Coast Guard commending those agencies for their efforts to remove hazardous debris from atoll reefs. In its letter to the National Ocean Service, the Commission also recommended that the Sanctuary Office work closely with the Service to evaluate debris accumulation rates and give priority to cleaning areas near monk seal pupping beaches. The 25 June 2010 reply from the Ocean Service noted that the Sanctuary Office and its staff at the Papahānaumokuākea Marine National Monument would continue to support monk seal recovery work.

Figure IV-13. Subadult male Hawaiian monk sea found on Oahu with a hook embedded in its mouth from an interaction with recreational fishing gear (Photo courtesy of Tracy Wurth, courtesy of the National Marine Fisheries Service, Pacific Islands Fisheries Science Center).

The Service's Coral Reef Division serves as the lead for coordinating the NWHI debris clean-up efforts and, during 2010, it organized two clean-up trips. One deployment, however, was shortened by a hurricane. Nevertheless, the Division removed a total of 286 derelict nets or net fragments weighing more than 20 metric tons. In 2011 operations were reduced to a single trip because of funding constraints. The trip involved 10 days of clean-up work at Midway and, on its return leg, included stops at Pearl and Hermes Reef, Laysan, Lisianski, and French Frigate Shoals to pick up piles that had been removed from beaches by monk seal field teams during the previous season. In 2011 a total of 15 metric tons were removed, which was substantially less than in previous years when two trips were made per year.

Finally, all known fishery interactions in 2010 and 2011 occurred only in the MHI. In 2010, one seal was found dead after being entangled and drowned in an untended gillnet off Oahu and 11 other seals were seen with hooks thought to be from recreational fishing embedded in their skin (Figure IV-13). Seven of those seals were captured and released after the hooks were removed. The other four were subsequently observed without hooks indicating they were able to shed them. In 2011, no seals are known to have been entangled in gillnets, but nine seals were observed carrying hooks and one seal became entangled in a monofilament line. Of those with hooks, three had the hooks and associated lines removed by responders and the six other seals were resighted without the hooks.

Research and management in the MHI

As noted previously, the MHI population of monk seals now numbers 150 or more and appears to be growing. Their reoccupation of the MHI raises new and difficult research and management challenges.

Assessment and monitoring are difficult because the seals occur throughout the MHI and researchers currently have limited access to Niihau, which appears to have the largest number of seals. Management challenges include interactions between seals and beachgoers, swimmers, divers, recreational fishermen and fishing gear, other wildlife (that may carry diseases), and others who do not wish to have seals in the MHI and are willing to harass or even shoot them.

Prior to 2009 the Service's Pacific Islands Regional Office had no staff designated to work full time on monk seal management issues. In 2009 the Service hired a Hawaiian Monk Seal Recovery Coordinator. The Commission supported this hire but, in its May 2010 letter to the Service, also recommended that the Regional Office hire or contract additional staff to work exclusively on pressing MHI management issues, particularly coordinating volunteers and assisting with public outreach. The Service's 5 August reply advised the Commission that the Regional Office had begun the process of hiring a permanent full-time assistant monk seal coordinator. In addition, it noted three marine mammal response coordinators were being hired on a contract-basis. At of the end of 2010 all those positions had been filled and the Office's budget for monk seal recovery work was $1.7 million.

A second matter of great importance in the MHI is maintaining cooperative involvement of the staff of the Hawaii Department of Land and Natural Resources. To maintain and increase that coordination, the Commission previously urged the Department to seek a grant under Section 6 of the Endangered Species Act to carry out cooperative conservation efforts with the Service on monk seal protection. In 2008 the Department received a one-year grant used in part to fund a monk seal response coordinator on Kauai, as well as various management efforts by other staff. In its May 2010 letters to the Hawaii Department and the Service, the Commission recommended that the two agencies work closely together to complete a multi-year grant for cooperative efforts on endangered species, including the monk seal. The Service's August 2010 response noted that the Department had completed and submitted a three-year grant application and that the proposal had received high marks and was likely to be awarded shortly. Later that year the Service provided the Department with a three-year grant totaling $1.55 million.

Development of a MHI management plan: The 2007 revised Hawaiian Monk Seal Recovery Plan included a provision for developing a MHI monk seal management plan to address critically important issues such as population assessment, interventions with injured or distressed seals, coordination of response efforts, public outreach, disease threats, and other regulatory matters. During its 2009 annual meeting, the Service advised the Commission that the new monk seal coordinator had been assigned the task of completing the plan. In its 10 May letter to the Service, the Commission commended the agency for hiring a new monk seal coordinator and recommended that agency consult with the monk seal recovery team and its partners to complete a comprehensive, long-term MHI management plan as soon as possible.

The Service's 5 August 2010 reply advised that it was preparing a framework to initiate a more formal planning process that would involve substantial coordination with the recovery team, the Commission, and other partner organizations. The Service expected to share an annotated outline of the plan with partner organizations at the end of 2010. However, in 2011 the Service was required to give precedence to the development of a draft programmatic environmental impact statement to analyze options for authorizing several new initiatives to enhance the species recovery (see below). Instead of distributing the outline, the Service held a meeting with staff of the Hawaii Department of Land and Natural Resources to examine threats and the effectiveness of possible management actions. At the end of 2011 the Service hoped to hold additional meetings with its recovery program partners and to complete a draft plan by the end of 2012.

Volunteer monk seal response networks: With technical support from the Service, volunteers on several islands have organized networks to respond to seals on busy beaches, raise money to prepare public outreach materials and public service announcements, provide educational programs for local schools and visitors to the islands, and report sightings of individual seals for population monitoring purposes (Figure IV-14). These networks have grown to include hundreds of committed residents of Hawaii who volunteer thousands of hours to help collect sighting data and carry out routine, but important activities to protect seals that haul out on busy beaches.

Figure IV-14. Three Hawaiian monk seals hauled on Nimitz Beach, Oahu, 9 June 2010 next to recreational fishermen. Note the posted signs cordoning off area of beach. (Photo by Barbara Billand, volunteer monk seal responder, courtesy of the National Marine Fisheries Service, Pacific Islands Fisheries Science Center).

The Commission was impressed by the dedication and efforts of these groups and recommended that the Pacific Islands Regional Office provide an additional staff person to help them develop and organize their conservation activities. The Service's 5 August reply noted that the increased funding available for monk seal work had enabled the Office to fund a contract with a volunteer response coordinator and a contract for additional volunteer coordination on Kauai and Maui. In addition, it noted that it was able to establish a grants program to support a non-profit organization and the University of Hawaii at Hilo to help support volunteer response efforts on Oahu and the Big Island.

In 2010 and 2011, the Service continued to encourage and work closely with various local monk seal volunteer groups offering assistance through various grants and contracts. On Kauai the Service supported a monk seal response coordinator to work with local volunteers. On Oahu it provided a grant to help support activities by a volunteer group called the Hawaiian Monk Seal Response Team Oahu, which also helped coordinate volunteer response efforts on the island of Molokai. On Maui it worked with a local conservation group called Maui Nui, whose response efforts were coordinated by a staff member of the National Ocean Service.

Hawaiian monk seal health care facilities: One of the most urgent needs for monk seal conservation in the MHI is a health care facility to treat injured seals and hold others requiring special attention. Currently no facility is set up specifically to care for injured or distressed animals. SeaLife Park

and the Waikiki Aquarium have generously provided support when they were able, but their abilities to support captive seals are limited. The Kaneohe Marine Corps Air Base has allowed the Service to construct shoreline pens, and its support also has been invaluable. Nonetheless, none of these options can provide all the care needed to respond to the growing number of seals in the MHI.

To meet this need the Pacific Islands Regional Office has been working with The Marine Mammal Center, a non-profit organization that has offered to raise private funds to build a monk seal healthcare facility. The facility is expected to cost about $3 million; however, $1 to $1.5 million would be sufficient to begin construction of a minimally serviceable facility, including holding pools and a small medical building suitable to hold about 12 seals. The facility will be built on lands owned by the National Energy Laboratory Hawaii Authority in Kona on the Island of Hawaii. Construction plans have been prepared and fund raising efforts have begun to cover construction costs. Funds for operating the facility, however, have not been raised. In its May 2010 letter to the Service, the Commission recommended that the Pacific Islands Regional Office continue to work with The Marine Mammal Center to develop the facility and secure the funding needed to cover operating costs. The Service replied that it was doing so and hoped to initiate facility operations by mid 2011. While it had not achieved its goal, at the end of 2011 the Center informed the Commission that it had raised nearly $1 million for the project and now hoped to raise sufficient funds in 2012 to begin construction.

Public outreach: In recent years persons in the MHI have shot several monk seals, presumably because they were opposed to the seals recolonizing those islands. Because seals haul out on public beaches throughout the MHI, extensive efforts are necessary to ensure that visitors and residents are informed regarding conduct necessary to protect both seals and people. Currently, there are many misperceptions regarding these issues. For example, although monk seals remove bait from fishing lines, the available information does not support the idea that monk seals are serious competitors for commercially or recreationally targeted fish species. Instead, the evidence is much stronger that fish stocks in the MHI have been overfished.

Resolving such issues requires dedicated outreach on monk seal biology, ecology, and protection. During the Commission's December 2009 meeting the Service and its partners reviewed many of the actions taken to strengthen public outreach through brochures, web sites, newsletters, public service announcements, presentations to school children and other residents and visitors, and other means. The Service also noted that it planned to use a portion of its increased funding to contract a professional public education firm to survey public perceptions and attitudes towards seals to provide a basis for developing a more effective, targeted public outreach program.

Following its meeting, the Commission recommended that the Service contract a professional firm to (1) develop educational materials and work with agency partners to implement a cooperative, coordinated outreach program focused on segments of the population most likely to interact with seals and (2) ensure delivery of a consistent, well-articulated conservation message. The Service's reply noted that its regional office had started to develop such a contract and that it would ensure outreach work is coordinated among all agencies and organizations involved in promoting monk seal recovery. It also noted that it had hired a contractor to conduct the survey of public attitudes and that the results of that survey would provide a basis for developing the outreach initiative.

In 2011 the public opinion survey was completed (Sustainable Resources Group International, Inc. 2011a) and used as a basis for targeting public education and outreach messages (Sustainable Resources Group International, Inc. 2011b). The survey concluded that, although many people support monk seal conservation, they may engage in activities that could be harmful to the seals because of (1) lack of knowledge that what they are doing is detrimental to seals or (2) concern that the presence of monk seals could interfere with their activities. The results indicated the need for a coordinated, strategic, up-to-date outreach effort to address particular management issues of concern and with messages tailored to residents, fishermen, the military, and tourists. To reach particular audiences, the report recommended the use of signs, guidebooks for visitors, the internet, low cost brochures and fliers, and oral presentations, including formal standardized training for volunteers who regularly interact with the public.

Aversive conditioning for seals in high-risk areas: In recent years several seals have hauled out on popular public beaches and become conditioned to interactions with people. Some seals subsequently adopted behaviors that put them at risk of injury. In a few cases seals also have chased or bitten people in the water and on beaches. To address such problems, the Service has had to capture and move seals, sometimes multiple times and usually with limited success once the seals have adopted such behaviors. At the recommendation of the Hawaiian monk seal recovery team, the Service convened a workshop on aversive conditioning techniques to consider options for discouraging seals from interacting with people.

In its May 2010 letter, the Commission recommended that the Service review the results of its aversive conditioning workshop and then fund studies to develop and test promising techniques to dissuade seals from becoming acclimated to people or frequenting areas that could place them at risk. Such an approach would require clear policies on acceptable hazing methods and circumstances. Once the Service develops those policies, it will need to explain them to the public as part of the outreach program. The Commission also suggested that the Service consider convening a habitat suitability workshop to identify geographic areas in the MHI where seals could be moved with the least risk of interacting with people.

The Service's reply indicated that it was developing a behavioral research program to identify and evaluate techniques to modify the behavior of individual monk seals and reduce the chances of interactions with people in the MHI. It planned to incorporate this program into its MHI research and management plans and ultimately into the Hawaiian monk seal recovery plan. In 2011 Service scientists began to examine historical information in interactions between seals and fisheries, develop forms for recording behavioral responses to human interactions and aversive conditioning experiments, and collect data on various hazing approaches.

Adding monk seals to the Hawaiian Humpback Whale National Marine Sanctuary: The Office of the National Marine Sanctuaries within the National Ocean Service has been an important partner in monk seal recovery efforts. The Office manages two areas that include most of the Hawaiian monk seal's at-sea habitat: the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve, which is part of the Papahānaumokuākea Marine National Monument, and the Hawaiian Islands Humpback Whale National Marine Sanctuary. Among other things, managers of the coral reef reserve have provided funds for removing debris from waters off monk seal pupping beaches and for studying shark ecology and movements at French Frigate Shoals. They also have assisted with logistical support for monk seal field teams in the NWHI. Managers of the Hawaiian Humpback Whale Sanctuary have helped with public outreach in the MHI, reported or participated in efforts to respond to seals on MHI beaches, and funded the salary of the state official responsible for overseeing state involvement in monk seal recovery work.

Because the sanctuary's charter and management plan focus almost exclusively on the protection of humpback whales, its support for monk seal recovery work in the MHI has been limited. As noted in past annual reports, the Commission has urged the sanctuary to amend its charter and management plan to add monk seals to its list of protected species. During the Commission's December 2009 review, the manager of the humpback whale sanctuary noted that the sanctuary's management plan would soon be reviewed and that it may be expanded by the addition of conservation measures for monk seals. The manager noted, however, that certain segments of Hawaii's residential population may be strongly opposed to such additions.

Although some might be opposed, the Commission also believes that others would be strongly supportive. In its 10 May 2010 letter to the National Ocean Service, the Commission commended the sanctuary's staff for its help with monk seal recovery work and recommended that Hawaiian monk seals be added to the humpback whale sanctuary designation document and management plan. It also suggested that the sanctuary clarify that the purpose of doing so would be to assist in carrying out non-regulatory tasks, particularly public education and outreach, coordinating volunteer networks, responding to monk seal rescues and emergency situations, and supporting research and monitoring studies.

The National Ocean Service's 25 June 2010 reply noted that it would continue to assess how it could use its resources for the coral reef reserve and humpback whale sanctuary to support future monk seal recovery work. On 14 July 2010 the sanctuary office announced plans to hold a series of public scoping

meetings throughout the MHI in August 2010 (75 Fed. Reg. 40758). During those meetings sanctuary staff noted that the management plan review process was an opportunity to consider adding protection for various additional resources, such as sea turtles, coral reefs, Hawaiian monk seals, and other marine mammals, to the sanctuary's mission. It also noted that it was interested in comments on whether this might be appropriate and, if so, what resources should be included, what actions might the sanctuary take, and how might sanctuary boundaries be modified in light of such actions. A Commission representative participated in several scoping meetings and noted the Commission's support for adding Hawaiian monk seals to the sanctuary's list of protected species.

On 15 October 2010, the Commission also wrote to the staff of the sanctuary to comment on its management plan review. The Commission reiterated the need for the sanctuary to expand its mission from one focused on conservation of a single species (i.e., humpback whales) to one embracing a broad ecosystem perspective and management activities that would complement those of other management agencies responsible for conserving biological resources from the shoreline out to the 100 fathom contour. The Commission suggested adopting a sanctuary vision and mission statement reading something like the following:

> Vision: To protect, conserve, and, where appropriate and possible, restore the marine life, marine habitat, ecological health, and significant historical relics of the ocean ecosystem that endows the main Hawaiian Islands with a bounty of intrinsic, cultural, economic, recreational, educational, and scientific values.
>
> Mission: To manage the sanctuary in a sustainable manner that respects and balances the needs and rights of all who now enjoy, use, and rely on the sanctuary's benefits; that recognizes and promotes the essential role of partnerships and shared responsibilities of Native Hawaiians, the public, private organizations, and governmental entities with vested interests in their perpetuation; and that preserves undiminished rights and opportunities for all future generations to benefit from and enjoy its blessings.

To reflect this broad scope, the Commission recommended that the name of the sanctuary be changed to something such as the Main Hawaiian Islands National Marine Sanctuary. The Commission also recommended that the management plan include provisions for establishing an interagency coordinating committee chaired by the Sanctuary's co-superintendents and composed of representatives from key management agencies to ensure that its research and management activities complement those of other agencies. The Commission also recommended that, with regard to marine mammals, sanctuary staff consult with the National Marine Fisheries Service to identify sanctuary actions to help (1) protect and promote reoccupation of monk seals in the MHI, (2) reduce risks of entanglement and ship collisions with humpback whales, (3) minimize harassment of spinner dolphins by tour boats, private dolphin-watching vessels, swimmers, and divers, (4) monitor and assist with the recovery of the insular stock of false killer whales, and (5) respond to stranded or distressed marine mammals.

At the end of 2011, the sanctuary's staff was considering comments received during the scoping process. The management plan review process was expected to take at least three more years to complete. Future steps require the preparation of proposed and alternative management actions based on scoping comments, draft and final environmental impact statements analyzing those alternatives, an analysis of economic impacts, and adoption of a final plan and any revisions to the sanctuary designation document.

Expansion of Hawaiian monk seal critical habitat

With certain exceptions, section 4(b)(2) of the Endangered Species Act requires the designation of "critical habitat" for species listed as endangered or threatened. Critical habitat areas include physical or biological features essential to the conservation and recovery of the species and which may require special management considerations. In 1988 the Service designated critical habitat for Hawaiian monk

seals that included all beaches and near shore waters out to the 20-fathom isobath around all of the Northwestern Hawaiian Islands except the Midway Islands. Since that designation new information on the species' ecology and movement patterns has indicated that other areas in the NWHI are essential to the species' survival. In addition, since 1988 monk seals have begun to reoccupy MHI habitat that also is essential for their recovery. In light of those developments, several environmental groups petitioned the Service in July 2008 to include additional areas as critical habitat in both the NWHI and the MHI.

On 14 July 2011, in response to a petition by three conservation groups, the Service proposed rules to expand critical habitat boundaries for the endangered Hawaiian monk seal (76 Fed. Reg. 32026). In the NWHI, it proposed including all beaches and waters in the NWHI within the 500 m isobath with the exception of the protected harbor on Sand Island in the Midway Islands. For the MHI, it proposed including most shoreline areas and waters from a point 5 m above the high tide line (generally identified as reflecting the line of vegetation or debris) out to a depth of 500 m around all islands. In the MHI the proposal excluded developed harbors, shorelines of certain military facilities, and existing shorelines that have been armored with bulkheads or rock rip-rap to prevent erosion. Together the designated areas in the NWHI and MHI would cover more than 28,500 km^2 (11,000 mi^2) and most areas where monk seals are likely to occur.

In support of its proposal, the Service noted that the proposed areas included six types of essential physical and biological features necessary for the species' recovery. They are (1) beaches preferred for pupping and nursing, (2) shoreline areas for haul-out, resting, and molting, (3) coastal areas with low levels of human disturbance, (4) shallow sheltered areas adjacent to pupping and nursing areas, (5) marine areas with adequate prey quality and quantity, and (6) foraging areas from 0 to 500 m deep. The Service also noted that activities within the proposed boundaries that might require special management consideration include, but are not necessarily limited to: (1) in-water and coastal construction, (2) dredging and disposal of dredged material, (3) energy development, (4) activities that generate water pollution, (5) aquaculture, (6) fisheries, (7) vessel groundings and projects posing oil spill risks, and (8) military exercises.

On 5 August 2011, the Commission commented to the Service on the proposed revision of critical habitat noting that the action was an appropriate, proactive step that was in keeping with the species critical status and need to ensure its protection. The Commission therefore recommended that the Service adopt the proposed rule as written. On 7 November 2011 the Service extended the public comment period for an additional 60 days through early January 2012 (76 Fed. Reg. 68710). The Service was expected to make its final decision in 2012.

Expansion of recovery efforts for Hawaiian monk seals

In August 2011 the Service announced the availability of a draft programmatic environmental impact statement analyzing several new initiatives to enhance the monk seal's prospects for recovery. Those activities would supplement ongoing research and management work and, specifically, included the proposed two-stage translocation described above to increase survival rates of juvenile seals in the NWHI. The Service also proposed to (1) monitor for infectious diseases and develop vaccines and vaccination protocols for two vectors of particular concern for monk seals (i.e., West Nile virus and morbillivirus); (2) test and, as warranted, expand deworming treatments to reduce parasite loads in juvenile monk seal digestive tracts; (3) test and, as appropriate, use new methods to modify monk seal behavior patterns that place them at risk from interactions with people and fishing gear in the MHI; and (4) test and, as appropriate, use drugs on male seals to reduce aggressive behavior toward pups, juveniles, and adult females.

On 24 October 2011 the Commission wrote to the Service commenting on the draft statement and proposed plans. Based on its review, the Commission commended the Service for preparing a clear and comprehensive evaluation of new or expanded recovery actions and recommended that the Service (1) move forward with the proposed two-stage translocation program as quickly as possible; (2) consult regularly with outside experts on the development of the translocation program and, after a suitable period

of time, review progress on its implementation; (3) consider including in the final programmatic environmental impact statement a discussion of issues surrounding ecosystem-based management measures to enhance juvenile survival in the NWHI; and (4) give high priority to further testing of a morbillivirus vaccine on captive monk seals to identify possible side effects of the vaccine on seals. At the end of 2011 the Service was incorporating comments into a final programmatic environmental impact statement and was expected to make a final decision on what further actions it would take to modify and expand monk seal recovery activities in 2012.

Florida manatee (*Trichechus manatus latirostris*)

The Florida manatee is a subspecies of the West Indian manatee (*T. manatus*). It occurs in the southeastern United States at the northern limit of the species' range. In summer at least a few Florida manatees range west to Louisiana and Texas and north to the Carolinas. In winter almost all manatees are confined to the southern two-thirds of the Florida Peninsula because they are unable to survive long periods in water colder than 18-20ºC (64-68ºF; Bossart et al. 2002).

To survive winter temperatures all Florida manatees—even those in southernmost Florida—retreat to local warm-water refuges on the coldest days. (Laist and Reynolds 2005a). Currently, 50 or more manatees use about 15 such refuges during all or most winters. These refuges are created by natural springs, power plant outfalls (Figure IV-15), and passive thermal basins. The latter consist of small pockets of warm water heated by solar radiation or microbial degradation of benthic organic material trapped beneath a lens of cold, less dense fresh water at the surface. With no direct warm-water input, passive thermal basins may cool to the extent that they do not support manatees during particularly severe or prolonged cold weather. Because of their strong site fidelity to individual refuges or groups of refuges in winter, Florida manatees have established four relatively discrete subpopulations (also called management units), in (1) northwest Florida, (2) southwest Florida, (3) the upper St. Johns River, and (4) coastal waters along the Atlantic seaboard.

Florida manatees are listed as endangered under the federal Endangered Species Act and under Florida state law. Since 1990 the Florida Fish and Wildlife Research Institute has organized annual statewide surveys to count as many manatees as possible during winter cold fronts that cause most manatees to aggregate at warm-water refuges. The survey counts provide a minimum estimate of population abundance. The counts provide only a general indication of population trends because conditions vary from year to year and a variable but undetermined portion of the total population is counted. Nevertheless, the count results indicate that the population has increased since the 1980s.

The 2010 count tallied a record 5,076 manatees, with 2,780 of these on Florida's east coast and 2,296 on its west coast. The count occurred during one of the coldest periods recorded in Florida and far exceeded the previous record of 3,300 manatees in January 2001. The extent to which the difference reflects an actual increase in manatee numbers is unknown. In 2011, the count was 4,834 manatees, including about 2,400 animals on both coasts.

Despite their apparent increase in numbers between 2001 and 2010-2011, the status and future of Florida manatees remain somewhat uncertain because of high numbers of manatee deaths recorded annually (Table IV-2). In most years at least 25 to 30 percent of all deaths have been attributed to human causes, principally collisions with boats. From the 1970s to early 2000s the Fish and Wildlife Service and state of Florida regulated boat speed limits in many of Florida's waterways to protect manatees. The limits undoubtedly have helped, but have not reduced boat-related deaths to small numbers. Since the mid-1990s large numbers of manatees have died from exposure to brevetoxin—a biotoxin produced naturally by a microscopic dinoflagellate that periodically causes red-tide events in southwestern Florida. Although red tides occur naturally, warming water temperatures and pollution from river discharge and land runoff may be contributing to their increased frequency over the past 15 years.

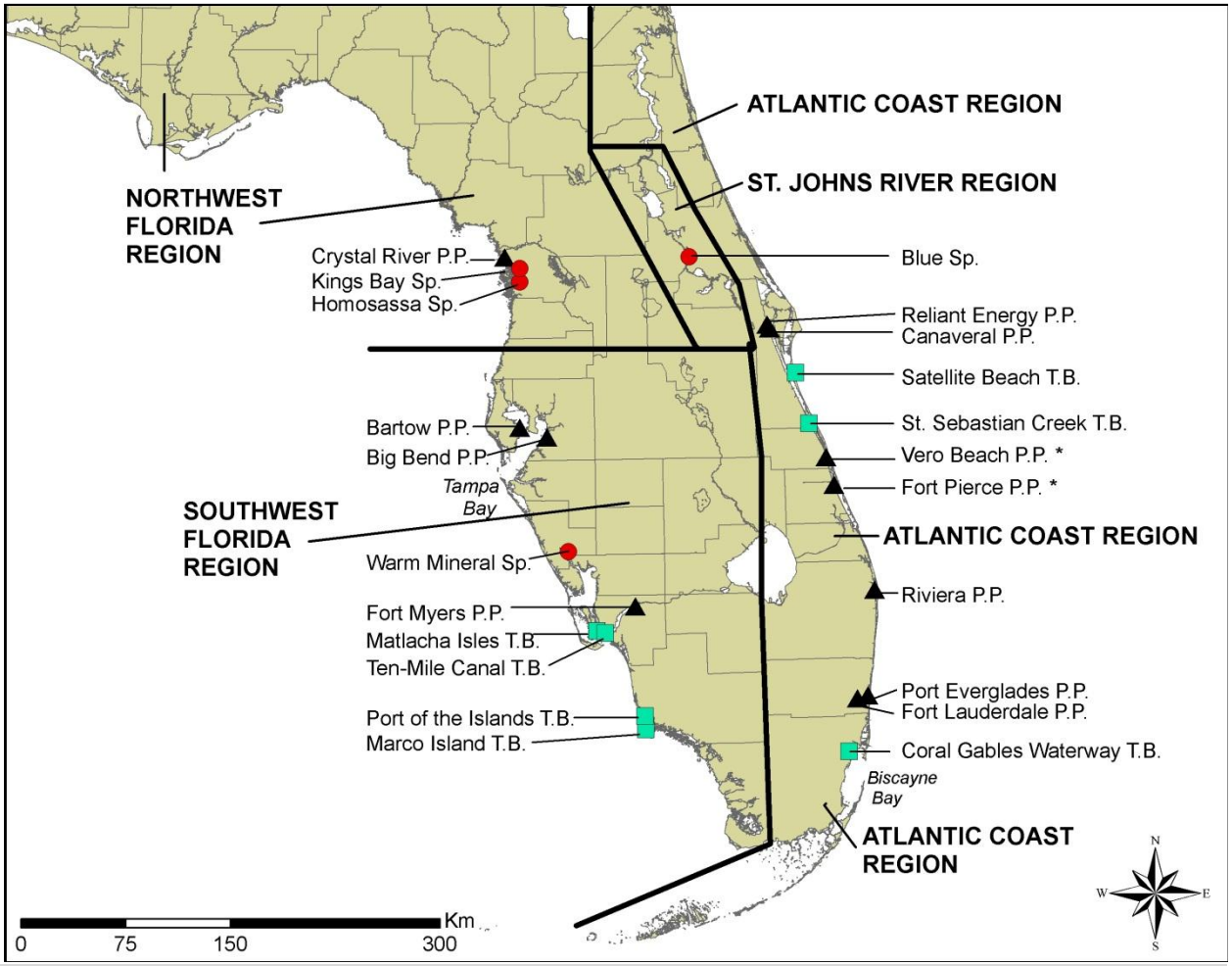

Figure IV-15. Distribution of manatee subpopulations and warm-water refuges. (T.B. = thermal basin, P.P. = power plant). (Source: Fish and Wildlife Service 2001, Laist and Reynolds 2005)

Reported manatee deaths increased from the previous record of 443 in 2009 to 779 in 2010. Many of the 2010 deaths were attributed to a 12-day cold spell, the coldest on record since 1940. In Miami, air temperatures averaged 11.5°C (53°F) for the duration of the cold spell and, at the Tamiami airport in Miami-Dade County, the temperature fell to a low of 3.3ºC (38ºF), the second lowest recorded since 1948 (National Weather Service 2010). At least 288 manatees were thought to have died from cold in 2010 compared to the previous record of 56 in 2009. Many other manatee carcasses were found but either could not be recovered or were too decomposed to determine cause of death. Barlas et al. (2011) estimated that the total number of cold-stress deaths in 2010 may have approached or exceeded 450 manatees. Reported deaths in 2011 also were high (460) due in part to cold stress (112). In total, at least 1,239 Florida manatees are known to have died in this two-year period, about half of which can be attributed to cold temperatures.

The U.S. Fish and Wildlife Service and the Florida Fish and Wildlife Commission lead Florida manatee research and management action, but have been assisted by many other agencies and organizations. Developments to further manatee conservation in 2010 are discussed below.

Table IV-2. Annual number and percentage (in parentheses) of known Florida manatee deaths in the southeastern United States (excluding Puerto Rico): 1978-2011. Data provided by the Florida Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission.

ear	Watercraft	Floodgate and locks	Other Human-Related[1]	Perinatal	Cold Stress	Other[2]	Total
1978	21 (25)	9 (11)	1 (2)	10 (12)	-	43 (51)	84
1979	24 (31)	8 (10)	9 (12)	9 (12)	-	28 (36)	78
1980	16 (24)	8 (12)	2 (3)	13 (19)	-	28 (42)	67
1981	25 (21)	2 (2)	4 (3)	13 (11)	-	75 (63)	119
1982	20 (17)	3 (3)	2 (2)	14 (12)	-	81 (67)[3]	121
1983	15 (19)	7 (9)	5 (6)	18 (22)	-	36 (44)	81
1984	34 (26)	3 (2)	1 (1)	26 (20)	-	67 (51)	131
1985	35 (27)	3 (2)	5 (4)	25 (20)	-	60 (47)	128
1986	33 (26)	3 (2)	1 (1)	27 (22)	12 (10)	49 (39)	125
1987	39 (33)	5 (4)	4 (3)	30 (25)	6 (5)	34 (29)	118
1988	43 (32)	7 (5)	4 (3)	30 (22)	9 (7)	41 (31)	134
1989	51 (29)	3 (2)	5 (3)	39 (22)	15 (8)	63 (36)	176
1990	51 (23)	3 (1)	5 (2)	45 (21)	50 (23)	64 (29)	218
1991	56 (31)	9 (5)	7 (4)	53 (29)	2 (1)	54 (30)	181
1992	38 (23)	5 (3)	7 (4)	48 (29)	1 (1)	69 (41)	168
1993	35 (24)	7 (5)	7 (5)	39 (26)	2 (1)	58 (39)	148
1994	51 (26)	16 (8)	5 (3)	46 (24)	4 (2)	72 (37)	194
1995	43 (21)	8 (4)	5 (2)	56 (28)	0 (0)	91 (45)	203
1996	60 (14)	10 (2)	1 (0)	61 (15)	17 (4)	267 (64)[3]	416
1997	55 (22)	8 (3)	9 (4)	61 (25)	4 (2)	109 (44)	246
1998	67 (27)	9 (4)	6 (2)	53 (22)	12 (5)	97 (40)	244
1999	83 (30)	15 (5)	8 (3)	54 (20)	6 (2)	107 (39)	275
2000	79 (28)	7 (3)	9 (3)	58 (21)	14 (5)	112 (45)	279
2001	82 (24)	1 (0)	7 (2)	63 (19)	32 (10)	151 (45)	336
2002	98 (31)	5 (2)	9 (3)	53 (17)	18 (6)	132 (42)[3]	315
2003	75 (20)	3 (1)	7 (2)	72 (19)	48 (13)	178 (46)[3]	383
2004	69 (24)	3 (1)	4 (1)	72 (26)	52 (18)	82 (29)	282
2005	80 (20)	5 (1)	9 (2)	89 (22)	29 (7)	186 (47)[3]	398
2006	87 (21)	5 (1)	4 (1)	70 (17)	21 (5)	233 (55)[3]	420
2007	75 (23)	2 (1)	5 (2)	59 (18)	19 (18)	162 (50)	322
2008	90 (27)	3 (1)	6 (2)	101 (30)	25 (7)	112 (33)	337
2009	97 (22)	5 (1)	7 (2)	115 (27)	56 (13)	153 (35)	433
2010	83 (11)	1 (0)	6 (1)	98 (13)	288 (37)	303 (39)	779
2011	89 (19)	2 (0)	3 (1)	78 (17)	112 (24)	179 (38)	460

[1] Includes deaths from entrapment in pipes and culverts, complications due to entanglement in ropes, lines, and nets, or ingestion of fishing gear or debris." See FWC http://myfwc.com/research/manatee/rescue-mortality-response/mortality-statistics/categories/

[2] Includes deaths due to other natural and undetermined causes.

[3] Includes a large number of known or suspected red-tide-related deaths in southwestern Florida: 39 in 1982, 151 in 1996, 37 in 2002, 96 in 2003, 92 in 2005, 62 in 2006, and 38 in 2007.

Assuring adequate networks of warm-water refuges

As noted in past annual reports, the Commission believes that the long-term survival of Florida manatees depends on the availability of warm-water refuges to support manatees in each of the four regional management units through cold winter months. Perhaps half of all Florida manatees use power plant outfalls for winter refuges. Power plants and outfalls currently used by manatees have been in existence for at least 35 years (Laist and Reynolds 2005a). Some plants (i.e., Ft. Myers plant, inland Ft. Lauderdale plant, Cape Canaveral plant, Riviera plant, Port Everglades plant, Bartow plant) have been or

are being modernized to burn natural gas instead of oil, thereby extending their operations and the outfalls for another 20 or 30 years. Other plants could soon be decommissioned because of their outdated technology and high operating costs. Decommissioning would significantly reduce the available warm-water refuges now supporting Florida manatees. Limited experience indicates that after plants are closed many manatees accustomed to using their outfalls remain nearby and experience high levels of cold stress unless comparable refuges are close by (Laist and Reynolds 2005b). For that reason, scientists and resource managers have been considering options to minimize risks from plant closures by improving other kinds of warm-water refuges for each manatee subpopulation. Such options include improving manatee access to springs now blocked by dams or other obstructions, creating new passive thermal basins, and tapping warm water aquifers to create small warm-water discharges.

In 1999 the Fish and Wildlife Service convened a Warm-Water Workshop with representatives of electric utilities, government agencies, environmental organizations, and the research community. Following that meeting the Service established a Warm-Water Task Force as a working group of its Florida Manatee Recovery Team. The task force examined opportunities for enhancing manatee access to natural springs, drafted a warm-water refuge plan for enhancing and maintaining networks of warm-water refuges, and developed plans for creating a temporary, artificial refuge should a power company close a power plant. However, progress was limited by insufficient funding.

To address the funding issue, the task force urged the Service and the Florida Commission to add a small surcharge to Florida electric bills. The Marine Mammal Commission also wrote to the Service and the Florida Commission (letter of 8 April 2008) recommending such a surcharge. However, no steps were taken and the Service disbanded its recovery team, including the Warm-Water Task Force.

In 2008 Reliant Energy in Brevard County closed the northernmost plant and outfall on Florida's east coast used by large numbers of manatees. No mitigation measures were taken but, in this case, manatees were able to use the outfall from another plant less than five miles away. Also in 2008, Florida Power & Light Company announced plans to modernize the Riviera Plant in Palm Beach County and the Cape Canaveral Plant in Brevard County (which was the alternative site for manatees previously using the Reliant Energy plant). The Company planned to replace oil-fired generating units with natural gas fired units but in both cases it also planned to continue operating the plants' cooling systems. The refitting should extend the operating life of both plants (and outfalls) for 25 years or more. Had Florida Power & Light Company chosen a course of action similar to Reliant Energy and closed the two plants, perhaps half of the manatees in the Atlantic Coast subpopulation—nearly a quarter of all Florida manatees—would have had no access to warm-water refuges and a winter cold spell could have caused extensive mortality.

On 26 April 2010 the Marine Mammal Commission wrote to the Fish and Wildlife Service noting the need for the agencies and organizations involved in manatee conservation to work together and reinvigorate their efforts to ensure adequate warm-water refuges. The Commission recommended that the Service reconstitute the Warm-Water Task Force to (1) review information on recent cold stress-related deaths, (2) reexamine short- and long-term strategies to ensure that warm-water refuges are adequate to support an optimum sustainable population of Florida manatees, and (3) identify steps to implement those strategies immediately. The Commission also recommended that the Service re-establish a Florida Manatee Recovery Team as soon as possible to strengthen cooperative efforts among key partners. Finally, it emphasized the need to develop and implement solutions, rather than simply monitor threats and trends.

On 20 May 2010 the Service replied that it remained committed to re-establishing a recovery team and associated groups, but it had no immediate plans to reconvene the recovery team because of limited funding and ongoing efforts to respond to a critical habitat petition, conduct a programmatic section 7 consultation on manatee regulatory issues, and publish a rule to protect manatees in Kings Bay. The Service also noted that, if and when it was able to re-establish a team, it would ask it to describe the distribution of a recovered manatee population. The Service also noted that cold related die-offs should be expected from time to time given Florida manatees' occurrence at the northern edge of the species' range and that the Florida Fish and Wildlife Conservation Commission had lead responsibility for responding to

cold stress events. The Service recognized the need to account for such die-offs in recovery planning and to minimize such effects in their overall recovery scheme. With regard to conserving warm-water habitat, the Service aimed to address manatee access to springs and secondary warm-water sites and it welcomed Commission support for those efforts.

The Commission discussed the issue with representatives of the Department of the Interior, which indicated that it would reconsider a fund for improving the availability of warm-water refuges. In September 2010, the Service initiated a structured decision-making process to identify priority actions for developing optimal long-term networks of warm-water refuges for manatees. At the Commission's annual meeting on 10-12 May 2011, the Service indicated that it would focus its efforts on this process rather than reconvening a recovery team.

Structured decision-making process: The purpose of this process is to make management decisions more transparent by clarifying problem statements, the rationale for objectives, alternative actions, consequences of those actions, and trade-offs in selecting a desired set of actions (Gregory and Long 2009). On 12-17 September 2010 the Fish and Wildlife Service and the U.S. Geological Survey jointly convened a first meeting at the Service's National Conservation Training Center in Shepherdstown, West Virginia. The meeting involved convening a panel with representatives of state and federal agencies, including the Marine Mammal Commission, the Florida electric utility industry, and the manatee research community.

This first meeting focused on testing the process to see what kind of results it might produce. Participants found the process constructive and useful for developing strategies to establish long-term networks of warm-water refuges in the absence of power plants. They noted that the fundamental issues were the large proportion of the manatee population now dependent on unreliable sources of warm water (i.e., power plants) and the need to identify and protect reliable warm-water sites not dependent on power plants or technological heat sources to ensure the long-term persistence of manatees both statewide and regionally.

To increase the proportion of manatees using warm-water springs and passive thermal refuges, the group identified alternative actions including: restricting manatee access to power plant outfalls or reducing outfall discharges to encourage manatees to move to other sites; altering freshwater runoff patterns or deepening small areas to create new passive thermal basins; removing barriers blocking manatee access to warm-water springs; maintaining minimum flow rates at natural springs; releasing rehabilitated manatees at natural springs; moving manatees from power plants to natural springs; improving manatee protection at warm-water refuges to encourage greater use; tapping warm water aquifers to create new warm-water refuges; and somehow leading manatees from power plant outfalls to natural springs they would not likely find by themselves.

In February 2011 the Fish and Wildlife Service convened a second meeting of key recovery program partners to discuss results of the September workshop and to determine interest and ways of using the structured decision-making process to identify short- and long-term actions to improve warm-water refuge networks. The participants agreed that the process would be useful and recommended that the Service hold a series of structured decision-making workshops focusing on each of the four regional manatee subpopulations.

At the Marine Mammal Commission's 10-12 May 2011 annual meeting in New Orleans, Louisiana, a Service representative indicated that the Service was planning to contract a facilitator familiar with the structured decision-making process and also was planning a contract for the development of an interactive model to project the likely effects of proposed actions on regional manatee subpopulations. The Commission wrote to the Service on 21 September 2011 expressing support for the Service's plans and recommended that the Service plan its future workshops to ensure ample meeting time for participants to identify, discuss, and agree on specific regional research and management actions. The Commission also recommended that, before holding the planned workshops, the Service assess each of the four subpopulations with regard to (1) the current number of manatees, (2) the current number that rely on power plant outfalls versus other types of warm water refuges, and (3) the additional warm-water refuge capacity needed to meet long-term conservation objectives.

At the end of 2011 the Service had contracted for the development of an interactive model to assess the effects of alternative management actions on regional manatee subpopulations.

Plans to modernize power plants: Florida Power & Light Company has been an outstanding industry partner in manatee conservation efforts. As noted above, the company announced plans to modernize the Cape Canaveral and Riviera power plants, both used extensively by manatees along the Atlantic coast. With closure of the Reliant Energy power plant in Brevard County, the two plants are now the northernmost warm-water refuges used by large numbers of manatees on the east coast and thus are located where manatees would be most exposed to cold stress if the plant outfalls were eliminated. Provisions under the 1972 Clean Water Act prevent the creation of new outfalls that discharge water at temperatures substantially higher than ambient levels. However, plants with outfalls in place at the time the Act was passed may continue operating as long as the outfalls are not substantially modified.

To maintain the outfalls at the two plants being modernized, Florida Power & Light Company is retaining the existing cooling system even though it is replacing all other power plant components. Replacing the two plants is expected to cost roughly $1 billion each and involves tearing down both plants to construct new ones. The Canaveral and Riviera plants are expected to be closed until 2013 and 2014, respectively. To ensure that manatees are not affected while the plants are closed, Florida Power & Light also installed large electric water heaters to discharge warm water during the winter at both plants solely for the purpose of maintaining habitat for manatees. It evaluated the temperature and volume of water needed to heat an area adequate to support manatees in outfalls at both the plants and consulted with the Florida Fish and Wildlife Commission to identify specific requirements for operating the replacement water heaters pending the completion of the new plants. The heating units cost about $5 million per plant; one was installed at the Riviera Plant in 2009 and the other at the Cape Canaveral plant in 2010 (Figure IV-16). They operate whenever ambient water temperatures fall below 65ºF (18ºC) and maintain the refuges at or above 68ºF (20ºC) until such time as ambient water temperatures outside the outfall again rise above 65ºF. The company also monitored manatee use of the refuge, made preparations to rescue cold-stressed manatees in the event of equipment failure, and planned to develop a long-term

Figure IV-16. Manatees at a warm-water refuge created by temporary electric water heaters installed by the Florida Power & Light Company during reconstruction of its Cape Canaveral power plant in Brevard County, Florida. (Photo courtesy of Florida Power & Light Company)

strategy to reduce adverse effects from eventual plant closures. The heating units operated effectively during the cold winters of 2009-2010 and 2010-2011. The state's 2010 count revealed 368 and nearly 1,000 manatees at the Riviera and Canaveral plants, respectively.

Enhancing manatee protection and access at natural springs: During 2010 and 2011 several actions were taken or scheduled to improve manatee protection and access at natural warm-water springs. In late July 2010, a group of agencies and organizations purchased 57.1 acres of undeveloped land, including the spring bottoms, surrounding Three Sisters Spring. Manatees use the spring, which empties into a canal adjoining Kings Bay at the head of the Crystal River. The purchase had been negotiated for more than 20 years and cost $10.5 million. The funds came from the Federal Land and Water Conservation Fund, state of Florida, the Felbum Foundation, The Nature Conservancy, Save the Manatee Club, Friends of Chassahowitzka National Wildlife Refuge Complex, several other non-governmental fund-raising groups, and several local government entities, including the City of Crystal River. Title to the land, which includes a conservation easement, was transferred to City of Crystal River and the state's Southwest Florida Water Management District. The Fish and Wildlife Service will have responsibility for managing the property as part of the Crystal River National Wildlife Refuge.

The Commission had long supported the purchase because as many as 300 manatees use the spring on cold winter days. Surrounded by residential housing, its purchase and protection from development is a major step towards securing long-term protection of the region's network of warm-water refuges. The property also will be used to educate visitors about manatees and the local ecosystem. One of the first management actions taken after its purchase was to remove several large boulders that have impeded manatee access to the main spring. The Water Management District also plans to capture and treat urban runoff now entering directly into the adjoining canal system.

Also during 2010, the Florida Fish and Wildlife Commission announced plans to deepen the spring run at Fanning Springs State Park. This spring is about 40 miles north of Crystal River on the Suwannee River. Like the springs in Kings Bay, it discharges water at 22-23ºC (72-73ºF) temperature. However, years of erosion and siltation from surrounding land use have blocked access to the spring during low water conditions in winter months. By having the spring run restored to its natural depth, the Commission hoped to give manatees and other species, including endangered sturgeons, greater access to the main spring. The project began in the fall of 2011 with funding ($130,000) from the Florida Fish and Wildlife Commission and The Nature Conservancy. It opened new winter habitat for manatees along the Suwannee River, which also includes several other warm springs. Increased manatee use of natural warm-water refuges that are now little used will be essential for maintaining manatee abundance as power plants are retired.

Funding for the enhancement of warm water refuges: At its 10-12 May 2011 annual meeting the Marine Mammal Commission reviewed efforts to ensure the availability of long-term warm-water habitat. Inadequate funding has been and likely will continue to be a problem given declining agency budgets. In its 21 September 2011 letter to the Service, the Commission expressed its view that Florida power companies bear considerable responsibility for supporting the research and management efforts needed to ameliorate the effects of power plant closures on manatees. To date, manatees, utility companies, and electricity consumers have all benefitted from the availability and use of the plant outfalls. The manatees have benefited from the warm-water habitat. Electric utilities have saved tens of millions of dollars by avoiding requirements to install new cooling systems that otherwise would have been required by the National Pollution Discharge Elimination System. Floridians have benefited by not having to pay the increased costs (that would likely be passed on to the consumer through increased utilities rates) that would have been required to install those new cooling systems.

To date some companies, most notably the Florida Power & Light, have been outstanding partners in manatee conservation, but they have contributed relatively little financially to efforts to address the long-term risks associated with plant closures. The Commission's 21 September letter recommended that the Fish and Wildlife Service consult with the state of Florida and the Environmental Protection Agency to consider remedies to this situation. It further recommended that, as a condition for maintaining exemptions from thermal discharge requirements, Florida power companies contribute annually to a

revolving fund to support the research and management activities needed to improve and maintain long-term regional networks of warm-water refuges capable of supporting optimum sustainable subpopulations of Florida manatees as power plants are closed. Such activities might include, but not be limited to, dredging streams or "runs" emerging from springs so that manatees have access to them, testing the feasibility of opening wells to create or enhance warm-water refuges, assessing the key features of passive thermal basins for supporting manatees through the winter, purchasing land around key warm-water refuges to assure long-term protection, testing the feasibility of translocating animals to warm-water springs now not used or little used by manatees, and assessing and monitoring manatee use of key warm-water refuges.

At the end of 2011, the Service had not yet replied to the Commission's letter.

Designation of the Kings Bay Manatee Refuge

Kings Bay is a roughly circular water body a mile wide at the head of Crystal River. It is formed by a complex of natural springs that discharge water at 22ºC (72ºF) and is used by more manatees than any other natural spring in Florida. The number of manatees using the Bay in winter has increased steadily and in January 2010 a record 565 manatees were counted in its waters and adjoining canals. Because of its clear warm water and the presence of manatees, Kings Bay has become a major attraction drawing tens of thousands of snorkelers and divers annually to swim with wild manatees. However, some divers chase the manatees in hopes of touching them, and on occasion stand on, kick, or otherwise harass them. Despite enforcement efforts such incidents have increased in frequency as the numbers of divers and manatees have increased.

The Fish and Wildlife Service purchased most of the islands in Kings Bay and some adjoining submerged lands to protect manatees and their habitat. In 1982 those areas were designated as the Crystal River National Wildlife Refuge. Refuge staff members provide advice on proper conduct when diving with manatees and enforce rules prohibiting manatee harassment. The Service also designated 7 small areas of the Bay covering a total of about 45 acres as "manatee sanctuaries" and prohibited all human access (e.g., boats, swimmers, and divers) within them. In addition, the state of Florida established regulations covering most of the bay and requiring that boats use slow or idle speeds between 15 November and 15 March.

The Commission believes that the problem of continuing harassment stems from the Fish and Wildlife Service policy of allowing divers to touch wild manatees. In the Commission's view, this practice and the promotional videos showing divers coming in contact with animals foster an expectation of some divers that they will be able to touch wild manatees. As a result, some divers chase animals, many of which shy away from divers. As noted in past annual reports, the Commission therefore recommended that the Service adopt rules that prohibit touching manatees or approaching them closer than 10 feet. The Service has declined to actively oppose touching manatees in a way that does not cause harassment believing it is harmless to allow divers to touch manatees that approach them, which some animals do. Nonetheless, the Fish and Wildlife Service and Florida Fish and Wildlife Conservation Commission are working to increase enforcement in an effort to decrease harassment incidents.

On 9 November 2010 the Service announced an emergency rule designating Kings Bay as a manatee refuge (75 Fed. Reg. 68719) to reduce manatee deaths caused by boat collisions and harassment. The Service noted that it would propose a corresponding permanent rule in 2011. The emergency rule remained in place from 15 November 2010 to 15 March 2011 (winter manatee season) in all waters in the Bay and adjacent canals. It imposed a slow speed limit for boats throughout the refuge and provided refuge staff authority to alter boundaries of the seven manatee sanctuaries or establish new sanctuaries on an *ad hoc* basis as needed to protect concentrations of manatees in the Bay. It also identified and prohibited those activities causing harassment of manatees in the refuge, including (1) chasing or pursuing manatees, (2) diving on, disturbing, or touching them when they are resting or feeding, (3) cornering or surrounding them, (4) riding, holding, grabbing, or pinching them, (5) standing on or attempting to stand on them, (6) poking, prodding, or stabbing them with anything, including hands and

feet, and (7) separating mothers and calves or groups. It also prohibited scuba diving and casting nets or fishing lines within an area called Three Sisters Springs.

On 22 June 2011 the Service proposed a permanent rule that closely followed the emergency rule (76 Fed. Reg. 36493). However, the proposed permanent rule also added an additional restriction to reduce boat speeds. An increasing number of manatees have been using the Bay year-round and several manatees have been killed by boats during the summer when a high-speed water sports area has been allowed in central portions of the bay. The proposed rule called for all boats to travel at slow speed throughout the refuge year-round (except in areas where idle speed already is required). In effect, the proposed permanent rule would eliminate the summer high-speed water sports area in the Bay.

The Marine Mammal Commission commented on the Service's proposed rule on 22 August 2011. The Commission supported the designation of the bay as a permanent manatee refuge and the establishment of year-round slow speed requirements throughout the bay. It also commended the Service for clarifying most activities constituting manatee harassment. It noted, however, that the rules would still allow divers to touch manatees that were not feeding or resting and to approach all animals within inches, including those that were feeding or resting. Believing this would continue to encourage divers to chase animals, the Commission again recommended that the Service promulgate a rule to prohibit divers from petting, rubbing, or touching any manatees or approaching them closer than 10 feet. The Commission also pointed out that allowing such activity was inconsistent with marine mammal viewing guidelines adopted by Watchable Wildlife, Inc., which the Fish and Wildlife Service and other wildlife management agencies had endorsed formally. Those guidelines strongly advise marine mammal watchers to follow "hands off" and "keep your distance" standards. Finally, the Commission noted that allowing people to "pet" manatees effectively conditions them and encourages them to approach people. Each year many manatees, including some in Kings Bay, are deliberately harmed by people who consider manatees pests or feel animosity towards them because of boat speed regulations. Accordingly, the Commission emphasized the importance of discouraging manatee behaviors that involve approaching people.

Although the Service was to adopt the final rule in time for the winter manatee season beginning in mid-November 2011, it had not done so by the end of 2011.

State endangered and threatened species rules

In 2003, the Florida Fish and Wildlife Commission received a petition asking it to reconsider the endangered status of Florida manatees under state law. The petition generated considerable controversy and in 2005 the Florida Commission adopted new criteria for classifying imperiled species. The new criteria were based on those used by the International Union for Conservation of Nature (IUCN). However, the state of Florida equated its endangered and threatened categories with the IUCN's highly endangered and endangered categories, respectively. That is, a species that would be considered endangered by the IUCN would be considered threatened by the state of Florida. The state's approach led to concern that many species facing significant conservation threats—including Florida manatees—would be deprived of adequate protection because they would not meet the strict criteria required for IUCN "highly endangered" status.

In late 2007, the Florida Commission was completing its review of manatees under the new criteria and was about to reclassify them. However, the Florida governor wrote to the chairman of the Florida Commission expressing concern about the need for a better method of estimating manatee abundance, the high number of manatee deaths during the previous year, and the need for more time to evaluate the situation. Shortly thereafter, the governor also asked the Florida Commission to reassess the criteria and procedures for listing and managing species under the state's endangered species law. In response, the Florida Commission established a working group of interested parties to develop new state rules for conserving species in need of added protection in Florida.

The Marine Mammal Commission participated as a member of the working group and in early January 2010 received a copy of proposed changes with a request for comments. The new rule stated that any species native to Florida may be designated as threatened or endangered if it is already designated as

endangered or threatened under the federal Endangered Species Act. The rule also stated that a species could be designated as threatened if it met state listing criteria, which would be based on those used by the IUCN to classify species as vulnerable. Vulnerable is the category immediately below endangered on the Red List and is roughly equivalent to the threatened listing category under the Endangered Species Act. Under this rule, the state would have only one listing category (i.e., threatened) for species not already listed under the federal Endangered Species Act.

On 14 January 2010, the Commission sent comments on the new rule noting that it represented a significant improvement over the previous rule and that the Commission supported its adoption subject to certain modifications. The proposed rule defined taking as killing, hunting, harming and harassing listed species. However, it defined the term "harass" more narrowly than the federal laws. It included intentional or negligent acts likely to cause injury to wildlife, but did not include activities that could significantly disrupt reproduction and recovery without causing injury to animals (e.g., installing lights on sea turtle nesting beaches thereby prevent nesting but causing no injury). Therefore, the Commission recommended that the term be defined more broadly to include disruptions of normal behaviors that could have population-level effects.

The Commission also noted some confusion regarding state actions to be taken when species were to be delisted under federal law. The Commission recommended that the language be revised to clarify the steps that would trigger removal of a species from the state list when it was being removed from the federal list and whether those actions would include conducting biological reviews described in the section. To ensure that listing and delisting decisions are not an open-ended process, the Commission recommended that the proposed rule specify the amount of time to be allowed for making determinations as to whether a listing or delisting was warranted and for completing related biological reviews.

In late 2010 the Florida Fish and Wildlife Commission adopted "Rules Relating to Endangered and Threatened Species" (Chapter 68A-27 of the Florida Code). The final rule deleted reference to species scheduled for removal from the federal list. It did not address other Commission recommendations but, nevertheless, the Commission considers it a significant improvement in the state's approach to listing and conserving native Florida wildlife at risk of extinction.

Gray Whale (*Eschrichtius robustus*)

From the mid 1800s to the early 1900s commercial whaling severely depleted the eastern and western North Pacific populations of gray whale. The gray whale was listed as endangered under the Endangered Species Conservation Act of 1969 and that listing was retained under the Endangered Species Act of 1973. The eastern and western populations were listed separately under the Act as distinct population units. The eastern North Pacific population of gray whales was considered recovered and removed from the Endangered Species list in 1994, as described below.

Recovery of the eastern gray whale population

The eastern gray whale population increased to more than 20,000 individuals by the 1990s under protections conferred by the Endangered Species Act and the International Whaling Commission's 1986 moratorium on commercial whaling. At that point many considered it to be near its environmental carrying capacity (i.e., the maximum number of individuals supportable by the environment over a long period of time)—although that position has been challenged by Alter et al. (2007). In 1994 the National Marine Fisheries Service removed the population from the U.S. list of endangered and threatened species, making it the first marine mammal population to be delisted.

The Endangered Species Act requires a five-year status review of delisted species and the Service conducted such a review in 1999. The review again concluded that the eastern population of gray whales was near its carrying capacity and was neither endangered nor threatened as defined by the Endangered

Species Act (Rugh et al. 1999). The review noted, however, that continued population monitoring could provide important insights into a number of biological and management issues related to marine mammal populations thought to be near carrying capacity. For example, it might provide scientists with information about how a whale population adapts as it approaches the limits of its environment, and what factors are important in regulating the population. Many of these kinds of questions pertain to a population's growth patterns and trends, and the factors that cause a population to stabilize after a period of growth.

Population estimates and trends

The Service's determination to delist the eastern population of North Pacific gray whales was based largely on abundance estimates and the resulting trend, as derived from winter counts of gray whales migrating south along the coast of California to their calving grounds. National Marine Fisheries Service scientists have made 23 such counts since 1967. A recent reanalysis of all the estimates (Laake et al. 2009) resulted in an abundance estimate of 19,126 gray whales in the winter of 2006–2007.

This estimate is below the estimated abundance in the late 1990s because the population declined sharply due to an unusual mortality event in 1999 and 2000 (Figure IV-17). During that event, large numbers of emaciated adult gray whales stranded along the entire migratory path from Mexico to Alaska (Figure IV-18). Punt and Wade (2010) estimated that about 15 percent of the non-calf population died in each of 1999 and 2000, compared to about 2 percent mortality in a normal year.

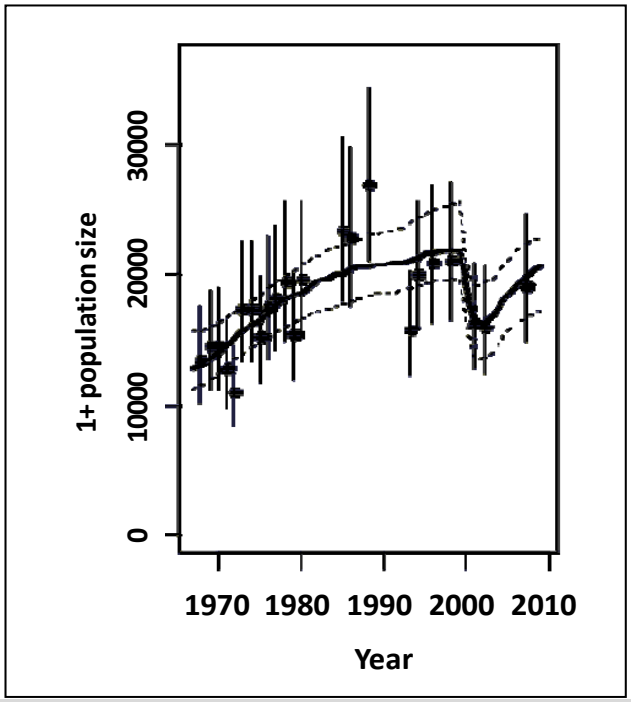

Figure IV-17. Estimated abundance of Eastern North Pacific gray whales from National Marine Fisheries Service counts of migrating whales past Granite Canyon, California. Error bars indicate 90% probability intervals. The solid line represents the estimated trend of the population with 90% intervals as dashed lines. (Punt and Wade 2010)

The poor condition of many of the stranded whales in 1999 and 2000 supports the idea that starvation was a contributing factor to the mortality event. In fact, the availability of food likely is one of the key factors that determine a population's carrying capacity. In support of this idea, Perryman et al. (2002) found a significant positive correlation between the area of feeding habitat available in the Bering Sea (i.e., shallow areas free of ice) and estimates of calf production the following spring. They suggest that longer periods of open water provide greater feeding opportunities, resulting in whales that are in better condition and better able to sustain pregnancy and nurse a calf. Whether the correlation holds in future years remains to be seen, but if it does hold, then gray whales may benefit from a reduction in sea ice caused by climate disruption (Moore 2008). Preliminary results from surveys in some of the breeding lagoons of Baja California indicate that calf production may have been particularly high in 2011 (International Whaling Commission 2011).

A petition to designate the eastern population as depleted: The number of gray whales stranded in 1999 and 2000 provided evidence that the population had been subjected to a strong limiting factor of some kind, leading to a substantial decrease in abundance. On 21 October 2010 the National Marine

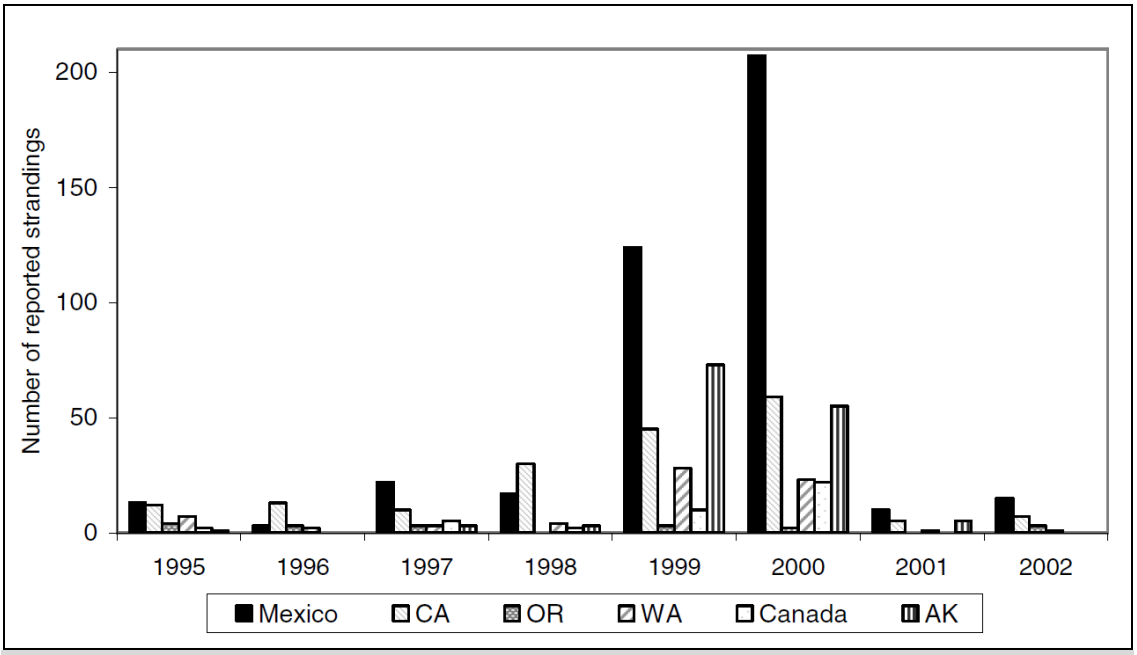

Figure IV-18. Annual trends in reports of gray whale strandings by region, 1995-2002. (Gulland et al. 2005)

Fisheries Service received a petition to designate the eastern North Pacific gray whale population as a depleted stock under the Marine Mammal Protection Act (75 Fed. Reg. 68756). The petitioners requested a status review of this population of gray whales and asserted that it was "…in decline sufficient to classify the stock as depleted, as defined in the Marine Mammal Protection Act, thereby requiring the preparation of a conservation plan to restore the stock to its optimum [sustainable] population."

The Marine Mammal Protection Act and implementing regulations specify that a population stock is to be designated as depleted when its abundance is less than its optimum sustainable population. The optimum sustainable population is defined as a range, the lower limit of which is the population's maximum net productivity level. Thus, the question to be addressed was whether the petition presented sufficient information to conclude that the eastern North Pacific gray whale population had declined to the extent that it might be below its maximum net productivity level and, therefore, warrants a status review. In support of their assertion, the petitioners relied primarily on the Alter et al. (2007) estimates of historical abundance, which are significantly higher than current population estimates. In the petitioners' view, the higher estimates cast considerable doubt on the Service's position that the abundance of the eastern North Pacific gray whale population was above the maximum net productivity level. The petitioners also suggested several factors that may be impeding recovery of the population.

After considerable review of the petition, the Marine Mammal Commission wrote to the Service on 8 December 2010[11] indicating that it did not believe a status review was warranted or would be a good use of limited resources. The Commission stated that resources available to the Service for gray whale studies would be better directed toward careful monitoring and investigation of the factors that may affect their conservation. Continued monitoring of this population during its feeding and reproductive seasons, and during its migration, should yield better insights into population status and the manner in which climate-related changes in the marine environment are or may be affecting the environmental carrying capacity and maximum net productivity level. With those information needs in mind, the Marine Mammal Commission recommended that the National Marine Fisheries Service—

[11] Available at http://www.mmc.gov/letters/letters_10.shtml

- defer any status review until the scientific evidence provides a stronger basis for concluding that the population may be below its maximum net productivity level;
- focus its research and management efforts related to the eastern North Pacific gray whale population on continued monitoring and expanded study of the whales' natural history and factors that may affect conservation of the population, including the whales' responses to changes in their environment;
- establish and fund a program to continue monitoring gray whale abundance and reproduction, and initiate efforts to understand how climate disruption in the Arctic affects gray whale feeding, nutritional status, and carrying capacity; and
- take advantage of opportunities (e.g., at meetings of the Alaska Scientific Review Group, Marine Mammal Society biennial meetings) to convene groups of gray whale researchers from Mexico, Canada, the Service, state research and management agencies, non-governmental organizations, academic institutions, and Native American groups to discuss ways of coordinating research aimed at the issues that are most relevant to conservation of the eastern North Pacific gray whale population.

On 27 December 2010 the Service published a 60-day finding for the petition (75 Fed. Reg. 81225), concluding that the petition did not present substantial information indicating that a status review may be warranted. The analyses of Punt and Wade (2010) using the revised abundance estimates from Laake et al. (2009) provided the basis for the Service's conclusion. Punt and Wade (2010) estimated the population to be at 91 percent of its carrying capacity and 1.29 times larger than its maximum net productivity level. They also estimated an 88 percent probability that the population was above the maximum net productivity level and therefore within the optimum sustainable population range.

New thinking about population structure

Scientists and managers have long subscribed to the hypothesis that there are separate eastern and western North Pacific populations of gray whales, with the currently much larger eastern population migrating along the coast of North America and the small, critically endangered western population migrating along the coast of Asia. In 2010 and 2011 satellite telemetry, photo-identification, and genetic studies provided new information on movements by gray whales between the western and eastern North Pacific. In addition, Scheinin et al. (2011) reported a gray whale in the Mediterranean Sea, again demonstrating that this species is capable of moving across large ocean basins.

The full scientific and management implications of this interchange are uncertain, the new information obtained in 2010 and 2011 has forced the scientific and management communities to re-examine previous assumptions and consider alternative hypotheses. The implications may be most significant with regard to the western population of North Pacific gray whales, which numbers about 130 individuals, and it also may be important for a collection of gray whales referred to as the Pacific Coast Feeding Aggregation. Both of those populations may be at risk from various human activities and the manner in which those activities are managed may have important conservation effects. Those implications are discussed in more detail in Chapter V of this report in the sections on the western population of gray whales and the International Whaling Commission.

Northern Sea Otter (*Enhydra lutris kenyoni*) Southwest Alaska Stock

Northern sea otters (*Enhydra lutris kenyoni)* in Alaska are managed as three separate stocks: southeast, southcentral, and southwest. As with all sea otters, the southwest Alaska stock was nearly exterminated by commercial fur hunters in the 1700s and 1800s. The International Fur Seal Treaty was signed in 1911

and banned the hunting of sea otters, but by that time only 13 isolated populations remained throughout the species' range—a range that once extended around the rim of the North Pacific Ocean from Mexico to Japan. Several of the surviving colonies were in southwest Alaska, and by the 1960s, sea otters had reoccupied their former habitat in that region (Kenyon 1969). Southwest Alaska sea otters now inhabit nearshore waters from Kodiak Island and the western side of Cook Inlet to the western tip of the Aleutian Islands, a distance of about 2,500 km.

The U.S. Fish and Wildlife Service has lead responsibility for the recovery of sea otters. Other agencies and groups, particularly the U.S. Geological Survey and Alaska Native organizations, assist with research and management activities. Because of limited funding and the extensive range of the southwest Alaska sea otter population, the Service has monitored trends in the population's abundance by surveying segments of their range. For that reason, the Service has divided the population's range into five management units: the western Aleutian Islands, the eastern Aleutian Islands, Bristol Bay along the north side of the Alaska Peninsula, the eastern end of the south side of the Alaska Peninsula, and Kodiak–Kamishak Bay–Alaska Peninsula (Figure IV-19).

Like all sea otters, southwest Alaska sea otters rarely occur in waters deeper than about 100 m, although they occasionally cross deepwater channels between island groups. Adult males may move 400 km or more, although movements of 100 to 200 km are more typical (Jameson 1989). Adult females are more sedentary and rarely move more than about 20 km (Ralls et al. 1996). Otters inhabit areas with substrates ranging from fine mud or sand to rock and feed on an assortment of benthic invertebrates (e.g., clams, sea urchins, snails, crabs, and worms) and fish.

A 1976 survey produced an abundance estimate of 94,050 to 128,650 otters in southwestern Alaska, and biologists thought the population may have approached or equaled its pre-exploitation abundance. The stock then plummeted and surveys between 2000 and 2008 indicate the current abundance of sea otters is 43 to 58 percent below the 1976 level. In some areas, the declines have exceeded 90 percent (Burn and Doroff 2005, Estes et al. 2005, U.S. Fish and Wildlife Service 2008). The greatest declines have been in the western Aleutian Islands and along the southern part of the Alaska Peninsula. At some small islands in the central Aleutians, sea otters may have disappeared entirely.

The cause or causes of the decline are uncertain. Despite some inter-annual variability in pup production, the evidence does not indicate a problem with reproduction. Instead, the more likely cause is increased mortality from one or more sources. The suspected sources include predation by killer whales, starvation, disease, oil spills, incidental take in commercial fisheries, subsistence harvests, poaching, and intraspecific aggression. The leading hypothesis is an increase in predation by killer whales (Estes et al. 1998), although what may have caused this increase is uncertain and subject to various theories about how the Bering Sea ecosystem and its food webs may have changed as a result of natural and human-caused factors.

Listing under the Endangered Species Act and development of a Southwest Alaska Sea Otter Recovery Plan

In 2005 the Fish and Wildlife Service designated the southwest Alaska sea otter stock as threatened under the Endangered Species Act. In 2006 the Service convened a Southwest Alaska Sea Otter Recovery Team to assist it in drafting a recovery plan. The team—composed of representatives from federal and state agencies, Alaska Native organizations, and the academic community—met six times between 2006 and 2008 to discuss potential recovery strategies and goals, specific recovery actions, research activities, and criteria for removing the stock from the list of endangered and threatened wildlife. In 2009 the team focused on drafting the recovery plan.

On 12 October 2010 the Fish and Wildlife Service announced that its Draft Recovery Plan for the Southwest Alaska Distinct Population Segment of the Northern Sea Otter was ready for public review (75 Fed. Reg. 62562). The draft plan outlined three main objectives: (1) achieve and maintain a self-sustaining population of sea otters in each designated management unit, (2) maintain enough sea otters to

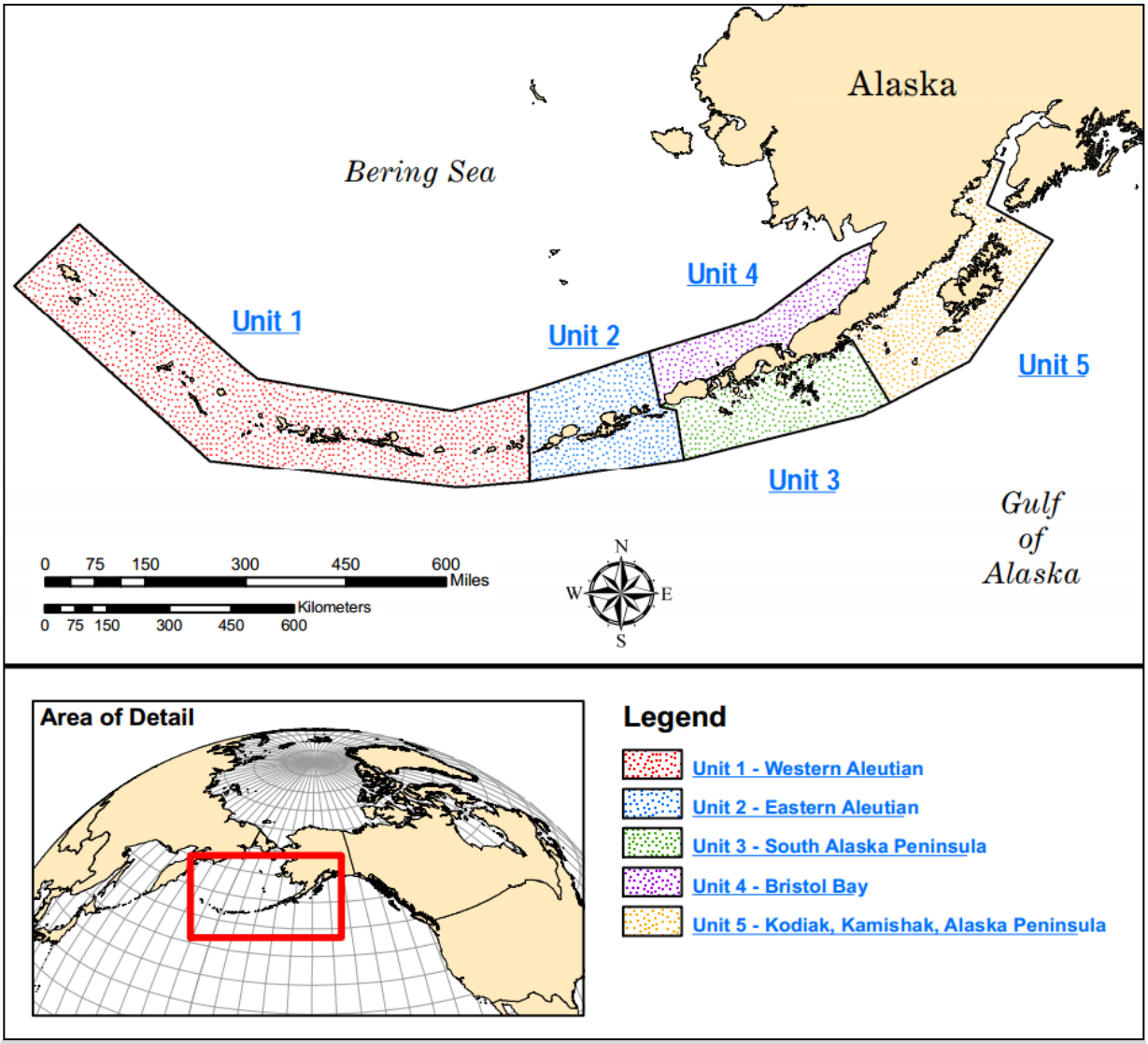

Figure IV-19. The five management units for the southwest Alaska distinct population segment of the northern sea otter, as depicted on a map of sea otter critical habitat designated by the U.S. Fish and Wildlife Service in October 2009. (Source: U.S. Fish and Wildlife Service, Alaska Region)

ensure that they are playing a functional role in their nearshore ecosystem, and (3) mitigate threats sufficiently to ensure persistence of sea otters. Each of these objectives is linked to explicit "delisting" criteria to determine if the overall recovery goals have been met; i.e., that the threats to the southwest Alaska sea otter population have been mitigated or controlled, and the population has recovered to the point where it no longer requires protection under the Endangered Species Act. The draft plan specified criteria for uplisting the stock to endangered and for delisting the stock based on the overall status of the five management units (75 Fed. Reg. 62563). The draft plan also emphasized the importance of monitoring and modeling the population and its kelp forest habitat, particularly for the western and eastern Aleutian management units. The draft plan also called for greater efforts to identify key characteristics of sea otter habitat and measures to ensure adequate oil spill response capability in southwest Alaska. Finally, the draft plan called for additional research on the impact of killer whale

predation on sea otters, which the recovery team considered the most important threat to the population and greatest impediment to its recovery.

On 8 February 2011, the Commission commented on the draft recovery plan, recommending that the Service adopt it after making several changes. First, the Commission recommended that the Service revise the draft plan by including an estimate of the total time and cost required to recover the population to the point that it can be delisted, and that it reconsider and revise its proposed approach for determining when the listing status of the southwest Alaska sea otter should be changed to endangered. The Commission also recommended that the Service revise the plan to specify the frequency for conducting population monitoring surveys of each management unit.

The Commission further recommended that the Service delete the statement concluding that the potential impact on sea otters from oil development in southern portions of the Bering Sea will be negligible and replace it with a statement that potential impacts on sea otters could range from negligible to high depending on the nature and extent of any spills that occur, and that it should update the tables in the plan's threats analysis section accordingly. The Commission also suggested that the Service expand its list of actions under Task 2.3, concerning development of an oil spill response plan, to describe (a) areas most in need of protection, (b) personnel and equipment needed to protect those areas from oil and to respond to oiled otters, (c) logistical requirements for deploying those resources and response efforts, and (d) the costs of purchasing and establishing equipment caches to meet specific sea otter response needs.

Regarding predation and disease—the other two major threats to recovery—the Commission suggested that the Service restructure its planned actions to investigate the role and significance of disease, and work with the National Marine Fisheries Service to modify Task 5.1 on predation impacts by (a) dividing the task into two subtasks, one for studies focused on sea otters and the other for studies focused on killer whales and other predators, (b) expanding the discussion under each to identify the studies that the Services believe to be of highest priority, and (c) providing cost estimates for those studies.

At the end of 2011 the Service had not issued its final recovery plan.

Proposed legislation to expand definitions of native subsistence hunting and trade

Sections 101 through 103 of the Marine Mammal Protection Act prohibit the taking and importation of marine mammals and marine mammal products, but allow certain exemptions. They include the taking of a marine mammal by any Indian, Aleut, or Eskimo who resides in Alaska and dwells on the coast of the North Pacific Ocean or the Arctic Ocean, so long as the taking is for subsistence purposes or for the purpose of creating and selling authentic native articles of handicrafts and clothing and is not done in a wasteful manner. The term "authentic native articles of handicrafts and clothing" means "items composed wholly or in some significant respect of natural materials, and which are produced, decorated, or fashioned in the exercise of traditional native handicrafts without the use of pantographs, multiple carvers, or other mass copying devices. Traditional native handicrafts include, but are not limited to: weaving, carving, stitching, sewing, lacing, beading, drawing, and painting." Existing legislation and statutory provisions under the Act are designed to draw a clear distinction between subsistence harvesting and maintenance of cottage industries based on creating and selling traditional handicrafts on the one hand, and commercial use of marine mammals on the other hand.

The stock assessment report for the southcentral Alaska sea otter population indicates that it is stable, whereas the report for the southeast population indicates it has grown substantially since it was re-introduced to this area in the 1960s and now numbers between 10,000 and 20,000 individuals.[12] Recently, the re-establishment of sea otters in southeast Alaska has sparked controversy because of the potential conflicts between sea otters and commercial and subsistence fisheries. Dive fishermen claim to have lost a total of more than $20 million to sea otter predation since the mid-1990s (McDowell Group 2011).

[12] Both reports can be found at http://alaska.fws.gov/fisheries/mmm/seaotters/reports.htm

This controversy prompted Senator Lisa Murkowski of Alaska on 29 July 2011 to introduce S. 1453, entitled "A bill to amend the Marine Mammal Protection Act of 1972 to allow the transport, purchase, and sale of pelts of, and handicrafts, garments, and art produced from, southcentral and southeast Alaska northern sea otters that are taken for subsistence purposes." As evident from its title, the bill would amend Section 102 of the Marine Mammal Protection Act to allow the transport, purchase, sale, or offer to purchase or sell, any otter pelt of the southcentral or southeast Alaska stock of sea otters taken in accordance with Section 101(b)(1). However, the primary impetus for the bill was the desire to allow increased taking of sea otters to reduce fishery-sea otter conflicts. The Bill also would allow the transport, purchase, sale, export, or offer to do any of the preceding, of any handicraft, garment, or art produced from a pelt taken from the southcentral or southeast Alaska stocks of sea otters, regardless of whether the product (a) is traditional or contemporary, or (b) is or is not altered significantly. On 30 July 2011 Representative Don Young of Alaska introduced an identical bill, H.R. 2714, in the House of Representatives. The House bill was referred first to the House Committee on Natural Resources and then to that Committee's Subcommittee on Fisheries, Wildlife, Oceans, and Insular Affairs. On 25 October 2011, the Subcommittee held a legislative hearing to discuss the merits of the bill. During the hearing, the Marine Mammal Commission provided testimony to the Subcommittee.

In its testimony, the Commission noted that H.R. 2714 would, in effect, open the door to the commercial harvesting of sea otters by allowing the sale of unaltered pelts and the export of non-traditional handicrafts, garments, and art objects. Although the initial taking would be done by Alaska Natives, nothing in the bill would prevent the sales to or subsequent creation of handicrafts, garments, or other art objects by non-Natives. The Commission also noted that H.R. 2714 would confound enforcement of the MMPA in two ways. First, enforcement officers would have no readily available basis for distinguishing between sea otters from the threatened southwest Alaska population and sea otters from the southcentral and southeast populations. Second, the bill would create two classes of handicrafts—those taken initially for subsistence purposes under Section 101 (b)(1) of the Act, and those taken specifically for the purpose of creating handicrafts under Section 101 (b)(2) of the Act. The latter group would remain subject to limitations on what items could be made and sold. The potential confusion over distinguishing between these two groups, coupled with underlying economic incentives, could result in potentially negative impacts on the affected stock.

The Commission also pointed out in its testimony that the sale of unaltered sea otter pelts within and outside the United States, coupled with the opportunity for non-Natives to obtain pelts and fashion and sell them on the open market, could undermine Alaskan Native cottage industries that currently produce and sell authentic native articles of handicrafts and clothing. Finally, the Commission testified that Section 101(a)(3)(A) of the Marine Mammal Protection Act allows the Secretary of the Interior to waive the moratorium on taking of marine mammals, provided that the taking is in accord with sound principles of resource protection and conservation and the Secretary has given due regard to the distribution, abundance, breeding habits, and times and lines of migratory movements of such marine mammals, to determine when, to what extent, if at all, and by what means, such taking may be waived. Given that the Act already contains a provision for waiving the prohibition on taking, the Commission stated its belief that the waiver process provides a better mechanism for reviewing and resolving the factors that led to the introduction of H.R. 2714.

At the end of 2011, no further actions had been taken on either the Senate or House versions of the bill.

Southern Sea Otter (*Enhydra lutris nereis*)

In North American waters south of Alaska, the only sea otters surviving the era of commercial hunting were a few tens of animals living along the remote Big Sur coast of central California. These were the remnants of a separate subspecies called the southern sea otter. In the decades following adoption of an international ban on hunting sea otters in 1911, this small colony slowly increased in abundance and

range (Figure IV-20). In 1977 the U.S. Fish and Wildlife Service listed the southern sea otter population as threatened under the Endangered Species Act to promote its recovery.

Each spring the U.S. Geological Survey (Survey) counts sea otters along their mainland range in California with the help of the California Department of Fish and Game, the U.S. Fish and Wildlife Service, and the Monterey Bay Aquarium and its volunteers. To reduce the influence of anomalously high or low counts during any single year (from variations in viewing conditions, observer experience, animal distribution and movement, etc.) the Survey uses three-year running averages of spring survey results as a more reliable way to measure changes in sea otter population abundance (Hatfield and Tinker 2012). The 2009 running average was 2,813 and the 2010 average was 2,711. The difference appeared to stem from a decrease in the number of pups (267) counted in 2010, the lowest since 2003 (Hatfield and Tinker 2012). The unusually low number of pups followed a relatively severe winter with associated periods of high surf, and the sea otter stranding network in California recovered the highest number of pups and immature otters in the 2010 spring season than during any other time within the past five years. Overall, growth of the population appears to have leveled off in the past four or five years for reasons not yet determined (Figure IV-21).

Although sea otter populations in Washington and parts of Alaska have increased at rates approaching 20 percent per year, the California population has grown at a much slower rate even in the best years, generally 5 percent or less (Estes 1990, U.S. Fish and Wildlife Service 2003). The reasons for its slower growth rate are uncertain, but possible causes include mortality from exposure to human-related contaminants and pathogens (e.g., toxoplasmosis; Miller et al. 2007) and food limitation (Tinker et al. 2008), whether from intra-specific competition, competition with other species (including humans), or loss of foraging habitat. The Survey was unable to count sea otters in the spring of 2011 because of severe weather and strong currents along the Pacific coast. Survey efforts were expected to resume in 2012.

The San Nicolas Island translocation project

In the late 1980s the Fish and Wildlife Service moved 140 sea otters from the population's mainland range to San Nicolas Island. The purpose of the move, authorized under Public Law 99-625, was to establish a separate colony that could be used to help restore the mainland colony should it be severely affected by a catastrophic event (i.e., an oil spill). San Nicolas Island lies 65 nmi offshore and is the most remote of the Southern California Channel Islands.

The translocation of the otters sparked controversy because of concern that otters from the new colony would expand rapidly and colonize other offshore islands and the mainland coast south of the existing range. Because the diet of sea otters includes shellfish important for commercial and recreational fisheries, such potential expansion raised fears that those resources would be depleted by an increase in the number of otters. To address that concern, Public Law 99-625 also required the establishment of a no-otter management zone. The zone, as designated by the Service, extended along the California coast from Point Conception southward. Otters in the management zone were to be captured and moved back to San Nicolas Island or to the area occupied by the mainland population.

In 1993 the Service suspended capture efforts in the management zone after several otters died during attempts to capture and move them. In addition, the San Nicolas colony failed to increase as expected and, in the late 1990s, it numbered fewer than 25 otters. By that time the mainland population had begun to show signs of a declining trend. In addition, a considerable number of otters were observed zone. In July 2000 the Service conducted a section 7 consultation under the Endangered Species Act on the containment component of the translocation program. The resulting biological opinion concluded that continuing containment efforts would jeopardize the population's recovery, in part by artificially restricting its range and increasing its vulnerability to the effects of oil spills, disease, and stochastic events. In January 2001 the Service therefore published a notice that it would continue its suspension of efforts to catch sea otters in the no-otter zone pending re-evaluation of the translocation program (66 Fed. Reg. 6649). In 2003 the Service adopted a Revised Southern Sea Otter Recovery Plan (U.S. Fish and Wildlife Service 2003), which advised allowing natural range expansion.

intermittently in the management

In 2005 the Service took further steps to end the translocation program when it published a draft supplemental environmental impact statement on the future of the translocation project. The preferred alternative was to declare the project a failure, terminate regulations for the sea otter management zone, allow the mainland population to expand southward naturally, and leave in place the few otters that had become established at San Nicolas Island. At the end of 2009 the count of otters at San Nicolas Island included 33 independent animals and 6 pups, slightly below the 2008 count of 37 independent otters and 5 pups. By the end of 2011, the numbers of independent sea otters counted at San Nicolas Island (i.e., non-pups) had increased to 48. The Commission has supported the Service's proposed action and, as noted in previous annual reports, recommended that steps be taken to finalize the draft statement and file a record of decision on the matter.

Figure IV-20. Current range of the southern sea otter population. The red line represents the current extent of the population's mainland range. The red dots at the northern and southern ends of the range represent observations of a single otter at that location. (Modified from Hatfield and Tinker 2012)

In 2009 the Service took no action to announce a final decision. The Navy raised concern about possible legal constraints on its exercises and activities at San Nicolas Island and perhaps elsewhere if the translocation program were ended and the sea otter colony at San Nicolas Island left in place. Because of the Service's delay in reaching a final decision, the Environmental Defense Center and the Otter Project sued the Fish and Wildlife Service on 30 September 2009 over its alleged failure to protect sea otters in the no-otter management zone. During this time, the Service continued to suspend any efforts to catch and relocate otters found in the management zone. On 23 November 2011, the parties to the litigation reached a settlement agreement. The agreement required the Fish and Wildlife Service to prepare a draft environmental impact statement on the translocation program, including a draft determination as to whether the program had failed. If the draft evaluation determined that the program had failed, the Service was to submit to the *Federal Register* no later than 1 September 2011, the text of a proposed rule to terminate the translocation program. Following a public comment period, the Service would then be required to complete a final environmental impact statement and make a final failure determination no later than 7 December 2012.

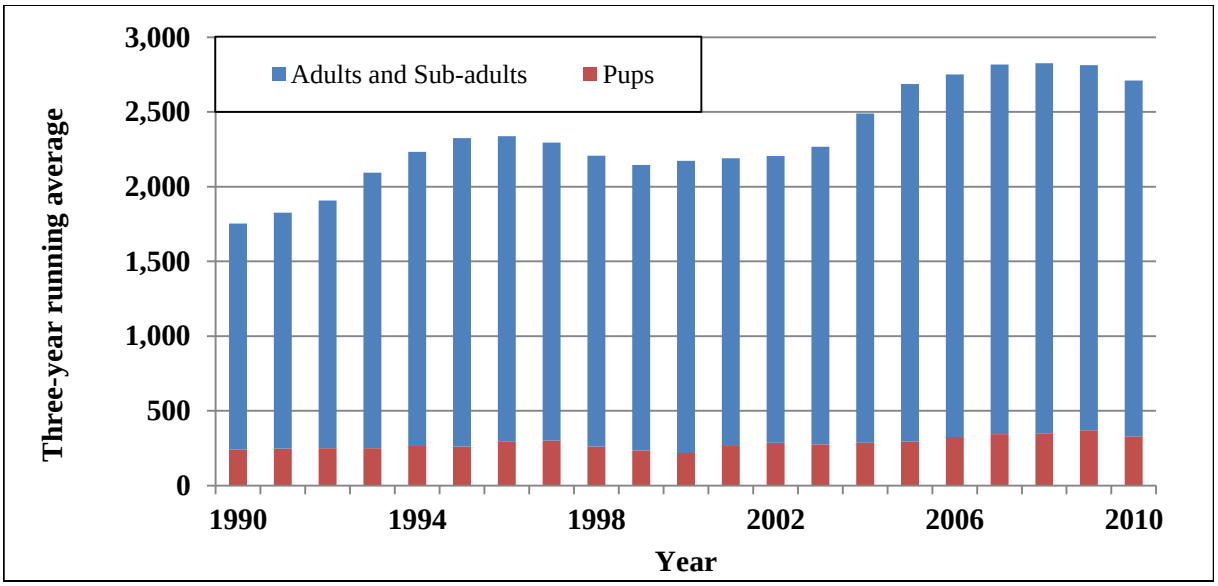

Figure IV-21. Population trends for southern sea otters based on a three-year running average of spring counts from 1990 through 2010. The three-year average is calculated using data from the current year and the two preceding years. Data are not available for 2011 because the survey was disrupted by bad weather and poor ocean conditions. (Source: Hatfield and Tinker 2012)

On 10 August 2011, the Commission provided written comments to the Service's Draft Evaluation of the Southern Sea Otter Translocation Program. The Commission recommended that, as part of a proposed rulemaking to terminate the program, the Service include proposed amendments to 50 C.F.R. §17.84(d)(8)(vi) to eliminate the requirement that sea otters at San Nicolas Island be returned to the parent population and complete that part of the rulemaking prior to making a final failure determination. The Commission had stated this same position in a 2003 letter to the Service, finding that the recovery and management goals for the species would be best served by leaving the existing San Nicolas Island population intact and on site even if the translocation were determined to have failed. Although the population may never achieve the numbers predicted at the outset of the translocation program, the population could still continue to grow to a point where it could cushion the effects of a potential catastrophic event such as an oil spill. The Commission also noted that both the recovery team and the Service's biological opinion recognized that capture and removal would pose an unnecessary risk to the San Nicolas Island otters and the population as a whole, and the applicable regulations should be amended to allow the Service to retain the existing otter population at San Nicolas Island and give it an opportunity to become fully established.

In accordance with the settlement agreement for the suit brought by the Environmental Defense Center and the Otter Project, the Fish and Wildlife Service published a notice in the *Federal Register* on 26 August 2011 (76 Fed. Reg. 53381). The notice announced the Service's finding that the translocation program had failed and that the agency was therefore proposing a rule to terminate the program. The Service's notice did not incorporate the Commission's recommendation. The agency stated that it assumed that by terminating the sea otter translocation program and revoking the regulations governing it, the regulatory requirement to return the sea otters at San Nicolas Island to their parent population also would be eliminated. On 24 October 2011, the Commission responded to the Service's notice by reiterating its recommendation that the Service amend 50 C.F.R. § 17.84(d)(8)(vi). At the end of 2011 the Service had not made its final decision on this matter.

Pending legislation

On 15 January 2009 Representative Sam Farr of California and co-sponsors introduced H.R. 556, the Southern Sea Otter Recovery and Research Act, in the U.S. House of Representatives to promote the protection and recovery of southern sea otters. The bill was referred to the House Committee on Natural Resources, which held a public hearing on its provisions in the spring of 2009. Based on results of the hearing, the bill was revised, approved by the full House of Representatives, and forwarded to the Senate for its consideration.

If enacted, the bill would have directed the U.S. Fish and Wildlife Service and the U.S. Geological Survey to implement a southern sea otter research and recovery program, including activities to monitor and analyze population ecology and health of southern sea otters, and to undertake measures that would mitigate or eliminate potential human or environmental factors affecting the population. The proposed act would authorize appropriations of up to $5 million per year between 2010 and 2015 to the Secretary of the Interior to carry out these research and management activities. It also would direct the Secretary to establish a peer review panel to provide advice on research and management priorities, reappoint a Southern Sea Otter Recovery Implementation Team, and prepare periodic reports on the status of sea otter recovery.

On 29 July 2009 the bill was referred to the Senate Subcommittee on Science, Commerce, and Transportation and considered as S. 1748, a companion bill to H.R. 556 that was introduced by Senator Boxer on 1 October 2009. On 12 December 2010, the bill was amended and reported favorably out of the Senate Subcommittee on Science, Commerce, and Transportation and placed on the Senate Legislative Calendar under General Orders. However, the Senate took no further action on the bill during the 111th session of Congress.

Steller Sea Lion (*Eumetopias jubatus*)

Beginning in the 1970s the Alaska population of Steller sea lions (*Eumetopias jubatus*) declined by over 80 percent throughout much of its range. In 1990 the National Marine Fisheries Service listed the entire species as threatened under the Endangered Species Act (55 Fed. Reg. 49204). In 1997 the Service recognized separate western and eastern distinct population segments based on geographic, demographic, and genetic information. Accordingly, it changed the listing status of the western population to endangered based on its continued decline. It did not change the status of the newly recognized eastern population (62 Fed. Reg. 24345). That population occurs from California through southeast Alaska, has increased by 2 to 3 percent annually over the past three decades, and is recovering from high levels of human-caused mortality in the years prior to the passage of the Marine Mammal Protection Act.

Causes of the western population's decline

The causes of the western population's decline have been the subject of considerable debate. Bycatch in commercial fisheries, illegal shooting by fishermen and others, the intentional killing of 45,000 pups for their fur between the mid-1960s and the early 1970s, and subsistence harvests by Alaska Natives all have contributed to the decline, but explain only a portion of it. The debate over other possible causes has been extensive and intense. The leading hypotheses include the effects of large-scale commercial fishing (e.g., prey depletion), large-scale oceanographic changes and regime shifts, and predation by killer whales (*Orcinus orca*). Because of the potential involvement of commercial fisheries, research on the decline of the Steller sea lion received extensive funding in the early 2000s, increasing from about $3 million in 1998 to as much as $56 million in 2002 and 2003 (Weber and Laist 2007), although funding has been sharply reduced in recent years. Despite the research supported by those funds, the controversy persists over the relative roles of fishing, regime shifts, and predation in the western population's decline.

The revised recovery plan

The National Marine Fisheries Service completed the first recovery plan for Steller sea lions in 1992, but that plan became outdated over the next decade as the Service gathered more information and recognized separate western and eastern populations. In 2001 it convened a recovery team to revise the recovery plan and it released a draft for public review in 2006. Appropriately, the draft dealt with the two populations separately. With regard to the western population, it identified competition with fisheries, oceanographic changes, and predation by killer whales as major threats; contaminants and incidental mortality in fisheries as moderate threats; and subsistence hunting, illegal shooting, entanglement in debris, disease, and disturbance from vessel traffic and scientific research activities as minor threats. It outlined 78 different recovery actions to assess the status of the western population, investigate remaining threats, and implement corresponding conservation measures.

The draft also highlighted three major conservation strategies for the western population: (1) maintaining current fishery management measures, (2) conducting an adaptive management approach to investigate the effects of fisheries on the ecosystem, and (3) continuing to monitor sea lion status and investigate threats. On 31 August 2006 the Commission wrote to the Service, commending the recovery team for its work and concurring with the major focus and recommendations of the plan. The Commission also recommended that the Service reconsider certain recovery criteria to address uncertainty regarding the causes of the population decline, implement a rigorous adaptive management approach for investigating the role of fisheries in the decline, and convene an implementation team to better coordinate the various ongoing and future research efforts. In 2008 the Service released its final version of the revised recovery plan.

Critical habitat

On 27 August 1993, the Service also designated critical habitat for the Steller sea lion. Critical habitat in Alaska included terrestrial rookery and haul-out areas, an air zone extending vertically 3,000 feet from the surface of rookeries and haul-out areas, an aquatic area that extended 3,000 feet seaward in federal and state waters from the baseline of all terrestrial areas, and an aquatic area extending 20 nautical miles (nm) seaward from the baseline of all major rookeries and haul-out areas west of 144 W longitude. It also included three special foraging areas located in the Shelikof Strait, Bogoslof, and Seguam Pass areas. Critical habitat in California and Oregon was designated only for the overhead air zones and aquatic areas extending 3,000 feet out to sea around rookeries (58 Fed. Reg. 45269).

A variety of the Steller sea lion protective measures implemented since the late 1990s (64 Fed. Reg. 3437) have been intended to address the effects of concentrated fishing in critical habitat. For the most part, those measures have been aimed at minimizing disturbance around rookeries and haulout sites and, especially, minimizing the potential for competition between the fisheries and sea lions for important prey species such as Atka mackerel, Pacific cod, and pollock. To avoid competition, management measures have sought to distribute fishing over space and time and thereby avoid fishery-induced localized depletions of prey, particularly in key sea lion foraging areas and particularly in winter months when sea lions—especially young sea lions learning to forage independently—may be more vulnerable to reduced availability of prey. (77 Fed. Reg. 22750).

Proposed changes to protective measures

The history of this Steller sea lion/fishery conflict has been described in detail in the Commission's reports in 2001, 2002, and 2005 through 2007. The description here focuses only on elements of that conflict in the past few years.

Of the three main hypotheses posed to explain the western population's decline, two (oceanic regime shifts and killer whale predation) are essentially beyond management control. The third hypothesis—the

effects of fishing—is not. As a result, much of the controversy surrounding sea lion recovery efforts involves protective measures aimed at avoiding or minimizing the effects of fishing.

In April 2006, the Sustainable Fisheries Division of the Service's Alaska Region reinitiated a section 7 consultation with its counterpart, the Protected Resources Division, on the potential effects of Alaska groundfish fisheries on species listed under the Endangered Species Act and their designated critical habitat in the Bering Sea and Aleutian Islands management area. The re-initiation was based on new scientific information and changes to the fisheries since 2003 (National Marine Fisheries Service 2010). The Service did not release a draft biological opinion summarizing the consultation until August 2010. The draft opinion found that protective measures implemented in the Bering Sea–Aleutian Islands region were not sufficient to prevent fishing activity from jeopardizing the continued existence of Steller sea lions or to avoid destroying or adversely modifying their critical habitat. As a result, it proposed a reasonable and prudent alternative consisting of more stringent fishery measures in areas where Steller sea lion population declines are worst—in the western Aleutian Island region in fishery areas 541, 542, and 543 (Figure IV-22). The protection measures were designed to minimize local competition between Steller sea lions and the Atka mackerel and Pacific cod fisheries in those areas, improving prey availability and foraging success, ultimately leading to increased sea lion survival and reproductive rates and, thus, population growth.

On 3 September 2010, the Commission wrote to the National Marine Fisheries Service commenting on the draft biological opinion. The Commission recommended that the Service revise the opinion to describe (1) the full extent of biomass reduction in each of the fisheries over time as projected by the proposed management strategy, (2) how these projected reductions in biomass could affect the foraging efficiency of Steller sea lions, and (3) how the reductions would still allow for recovery of the western Steller sea lion population despite the fact that no changes were required for the region's overall harvest strategy to mitigate jeopardy effects on the western population and its critical habitat. The Commission further recommended that the Service (4) analyze the shifts in the age/size distribution of prey stocks and explain how this shift could affect foraging efficiency of Steller sea lions, (5) describe changes in the distribution of prey stocks under both fished and unfished conditions, and (6) develop an adaptive, experimental approach to Alaska groundfish fisheries management. Finally, the Commission recommended that the Service (7) correct and clarify the use of the terms "recovery" and "carrying capacity" and ensure that references to recovery in the biological opinion are consistent with recovery criteria set forth in the Service's revised Steller sea lion recovery plan, and that the Service (8) analyze all of the reasonable and prudent alternatives and explain how they facilitate Steller sea lion recovery rather than just maintaining the status quo.

On 17 October 2011 the Subcommittee on Fisheries, Wildlife, Oceans and Insular Affairs, House Natural Resources Committee, held an oversight field hearing in Seattle, Washington, on NOAA's Steller sea lion fishery management restrictions and the science behind the agency's decisions. During the hearing, the Commission provided testimony in which it highlighted several long-standing concerns over the need to maintain the integrity of the Section 7 consultation process as described under the Endangered Species Act. These concerns centered around three areas: the need for transparency in information management; the need for analyses of effects to recognize cumulative effects as well as potential sources of error, and the need for a fair and open decision-making process. The Commission also noted the importance of the North Pacific Fishery Management Council during the consultation process, pointing out that the Council can serve as a conduit through which industry can provide input, and could serve as a forum for developing reasonable and prudent alternatives (RPAs) as well as research to address important uncertainties. Finally, the Commission testified on the need for the National Marine Fisheries Service to assess the ecological effects of fishing based on the maximum sustainable yield from a single target fish stock. A long-term, well-conceived, and well-planned adaptive management approach should be used to investigate the ecological effects of fishing. This issue is at the heart of ecosystem-based fishery management and the agency has yet to address it in a systematic and comprehensive manner.

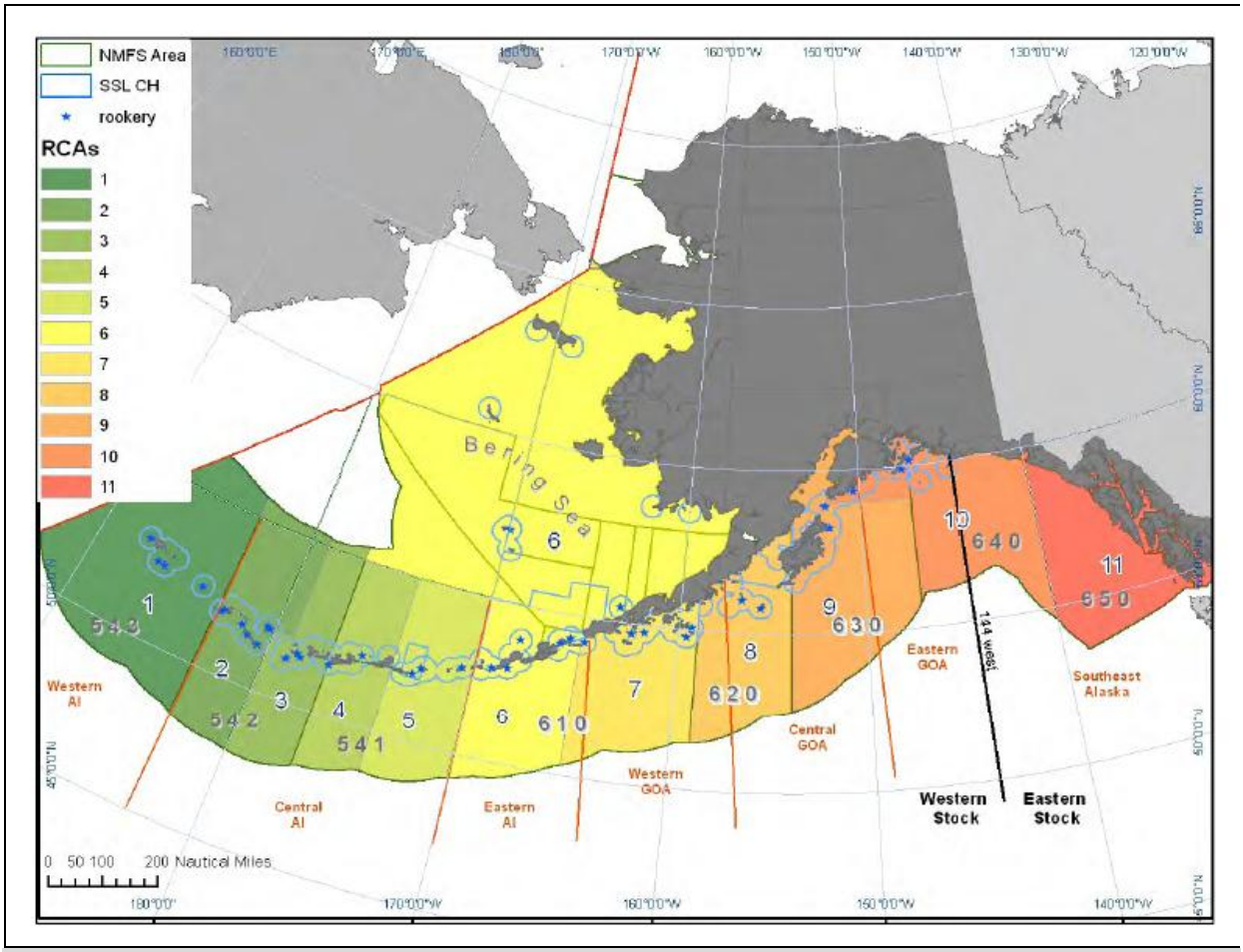

Figure IV-22. Locations of important Steller sea lion rookeries and haul-out areas and their spatial relationships to fishery management areas used by the National Marine Fisheries Service. Steller sea lion rookeries found within statistical areas 541, 542, and 543 (western Aleutian Islands) are experiencing the worst population declines. (National Marine Fisheries Service 2010)

During the public comment period on the Service's biological opinion, the Fisheries Service received over 10,000 comments, including extensive scientific reviews of the document and scientific underpinnings of the report's conclusions. The Service also requested an internal agency review of the scientific information provided in the biological opinion by scientists familiar with Steller sea lions, North Pacific Ocean ecosystems, and Alaska regional groundfish fisheries. The Service considered these comments and the internal review and made several revisions before releasing a final version of the biological opinion in November 2010. To fulfill its requirements under the National Environmental Policy Act (NEPA), the Service conducted an environmental assessment to provide evidence and analysis necessary to determine whether the proposed protection measures for the Bering Sea–Aleutian Islands management area would require the agency to prepare an environmental impact statement. On 26 November 2010, the Service reached a "Finding of No Significant Impact" determining that although the proposed actions would have an impact on people that participate in BSAI fisheries, the actions overall will not significantly impact the quality of the human environment.

In December 2010 the Service released an interim final rule (75 Fed. Reg. 77535) to implement Steller sea lion protection measures in Bering Sea–Aleutian Islands groundfish fisheries to ensure the fisheries do not jeopardize the western sea lion population or adversely modify their critical habitat. The intended measures disperse fishing effort over time and space to protect Steller sea lions from prey

competition around important rookeries and haulout areas. On 4 February 2011, the Commission issued public comments, recommending the Service implement its interim final rule and then begin the process of reexamining and modifying the specified protective measures with the goal of facilitating recovery rather than just preventing further decline. The Commission further recommended that the Service expand its section 7 consultations regarding the Alaska groundfish fisheries by analyzing the theory underlying its fishing strategy and its full ecological effects. In its letter, the Commission noted the dynamic nature of prey stocks throughout the Bering Sea–Aleutian Islands region, as well as the tendency for the Service to treat prey stocks as if they are more or less fixed in time and space. Without a fuller accounting of the ecological effects of overall fishing strategy in the Bering Sea–Aleutian Islands region, future biological opinions will remain inadequate and incomplete for their intended purposes.

Following the December 2010 announcement of the proposed interim final rule, the state of Alaska and various fishing industry entities filed legal actions against the Service in U.S. District Court, District of Alaska, seeking injunctive relief against the proposed protective measures and petitioning the court to review the Service's decision. The state of Alaska and fishing industry groups also challenged the Service's final biological opinion and its reasonable and prudent alternative under the Endangered Species Act, the finding of no significance under the National Environmental Policy Act, and the interim rule restricting fishery activity. The plaintiffs moved for summary judgment, arguing the Service's actions were substantively and procedurally flawed under the Administrative Procedure Act, Magnuson-Stevens Fishery Conservation and Management Act, Endangered Species Act, and National Environmental Policy Act (*State of Alaska* v. *Lubchenco* 2011). On 2 February 2011, two environmental non-governmental organizations, Oceana, Inc. and Greenpeace, Inc., filed a motion with the court to intervene in the case as defendants, which the court granted. The court denied a motion to intervene by two other groups, but allowed them to participate as amici curiae (volunteering to assist the court with information as needed for the case) supporting the plaintiffs' position. The court consolidated the three actions to expedite the hearing, and the case proceeded in 2011 as the interim rule and protective measures were implemented by the Service. At the end of 2011, the court was considering the plaintiffs' motion for a summary judgment and was hearing oral arguments from both sides. A final court decision was not expected until 2012.

Delisting the eastern population of Steller sea lions

On 30 August 2010 the states of Oregon and Washington submitted a petition to delist the eastern population of Steller sea lions under the Endangered Species Act. The state of Alaska submitted a second petition on 1 September 2010. On13 December 2010 the Service (1) announced its 90-day finding that the petitions presented substantial scientific or commercial information indicating the petitioned action might be warranted and (2) requested comments (75 Fed. Reg. 77602). Endangered Species Act regulations provide rules for revising the Lists of Endangered and Threatened Wildlife and Plants (50 Fed. Reg. 424). The rules state that a species, subspecies, or distinct population segment may be delisted for one or more of the following reasons: the species is extinct or has been extirpated from its previous range; the species has recovered and is no longer endangered or threatened; or investigations show the best scientific or commercial data available when the species was listed, or the interpretation of such data, was in error. The 2008 Steller Sea Lion Revised Recovery Plan[13] also called for a status review of the eastern population, noting that it (1) appears to have recovered from the predator control programs of the 20th century, (2) faces no known substantial threat, and (3) continues to increase at an average growth rate of 3 percent per year.

On 17 February 2011, the Commission submitted written comments to the Service, recommending that it proceed with delisting, but also recommending a number of steps to better investigate the status of Steller sea lions in California waters, where the southern extent of the population's range had retracted northward. The reasons for the retractions are not known, but the Service posited that they could be due to ecological changes from climate disruption, increased competition with fisheries, or growing populations

[13] http://alaskafisheries.noaa.gov/protectedresources/stellers/recovery/sslrpfinalrev030408.pdf

of California sea lions and harbor seals. The steps that the Commission recommended to the Service included—

- examining the genetic and other related information to determine if the southern portion of the eastern population is discrete and warrants management as a separate unit;
- developing or designing a strategy to track the status of the population in California waters;
- identifying possible causes of the southern range contraction and the evidence needed to prove or disprove each;
- developing a research plan to investigate the gaps in information regarding the potential causes of the contraction; and
- estimating the costs for carrying out such a plan.

Following the 90-day public comment period, the Service initiated a 12-month review to consider whether to delist the eastern population of Steller sea lions. At the end of 2011, the Commission did not expect the Service to release its proposed decision until 2012.

Incidental take authorizations for fishing activity

In November 2010 the National Marine Fisheries Service proposed to authorize the incidental take of six marine mammal stocks listed under the Endangered Species Act by groundfish fisheries in the Bering Sea and Gulf of Alaska (75 Fed. Reg. 68767). In accordance with the Marine Mammal Protection Act, the Service made a preliminary determination that incidental taking from commercial fisheries would have a negligible impact on the endangered central North Pacific stock of humpback whales, western North Pacific stock of humpback whales, northeast Pacific stock of fin whales, North Pacific stock of sperm whales, and western stock of Steller Sea lions; and the threatened eastern stock of Steller sea lions. The Service invited the public to comment on its preliminary determination of negligible impact and the Commission wrote the Service on 24 November 2010, recommending that it issue the authorization. The Commission also recommended that the Service: (1) emphasize research and monitoring programs to address uncertainties related to reproduction and survival of the far-western subpopulations of the western U.S. stock of Steller sea lions and re-evaluate the negligible impact determination as new information becomes available; (2) work with state and tribal fishery managers and participants to expand observer coverage in fisheries that may take marine mammals and, as observers provide better data, re-evaluate the negligible impact determination; and (3) identify the information gaps related to endangered and threatened species that may be affected by the issuance of the proposed authorization and elevate the priority given to addressing those gaps. The Service issued the authorization on 21 December 2010.

Polar Bear
(*Ursus maritimus*)

The polar bear, perhaps the quintessential symbol of the Arctic, is the largest species of bear (genus *Ursus*). Polar bears are distributed throughout the circumpolar Arctic in 19 populations totaling 20,000 to 25,000 bears (Aars et al. 2006, Obbard et al. 2010). The species evolved to exploit the Arctic sea ice niche and, in recent years, climate disruption has led to a rapid decrease in sea ice habitat. The projected effects of climate disruption, coupled with other threats, have raised serious concerns about the fate of the polar bear, dependent as it is on sea ice habitat and healthy populations of ice seals for prey. The risk to polar bear populations has been recognized for more than a decade and prompted the Polar Bear Specialist Group of the International Union for Conservation of Nature (IUCN) to adopt a resolution in 2001 calling for increased research into the effects of global warming (Lunn et al. 2002). In 2005 the Polar Bear Specialist Group recommended that the species' status be changed from "lower risk" to "vulnerable" based on the likelihood of an overall decline of more than 30 percent in the size of the total population

within the next 35 to 50 years (Aars et al. 2006). This threat also prompted the Fish and Wildlife Service in 2008 to list the polar bear as a threatened species throughout its range.

The Polar Bear Specialist Group periodically reviews the status of polar bear populations. Information from the most recent (2010) summary is presented in Table IV-3. Reliable abundance estimates are not available for three of the populations and the estimates for seven other populations are more than 10 years old. Of the 19 populations, the best available data indicates one is increasing, four are stable, and seven are decreasing. The best available information is not sufficient to determine the trend of the other seven populations.

Two populations of polar bears occur within the jurisdiction of the United States (Figure IV-23). The southern Beaufort Sea population numbers about 1,500 animals and ranges into Canada (Regehr et al. 2006). Although this population appeared to remain stable through the 1980s and 1990s at about 1,800 animals, it apparently declined by 20 percent to about 1,500 animals by the mid 2000s. The available information is not sufficient to confirm this statistically because of overlapping confidence intervals among the relevant studies. However, several independent observations support the hypothesis that the population is under nutritional stress due to earlier and more extensive retreat of ice in summer and later formation of ice in fall and winter. Those observations include reduced cub survival, smaller body size, poorer body condition than in the adjacent northern Beaufort Sea population, earlier emergence from dens, reduced survival of adult females in years with an extended open-water season and with sea ice farther from shore, and several occurrences of cannibalism, starvation, and incidents in which bears clawed their way through thick ice attempting to capture seals (Regehr et al. 2006, 2010; Amstrup et al. 2006; Stirling et al. 2008).

The United States shares jurisdiction of the Chukchi/Bering Seas stock with Russia (Lunn et al. 2002). The best estimate of abundance is about 2,000 bears, but this is a best-guess approximation only, unsupported by comprehensive surveys or rigorous science. Otherwise, little information is available on

Table IV-3. Abundance, trend, and relative status of the 19 polar bear populations (Source: IUCN 2010)

Subpopulation	Abundance estimate (year of estimate)	Trend	Status
Arctic Basin	Unknown	Data deficient	Data deficient
Baffin Bay	1,546 (2004)	Decline[1]	Data deficient
Barents Sea	2,650 (2004)	Data deficient	Data deficient
Chukchi Sea	Unknown	Decline	Reduced
Davis Strait	2,158 (2007)	Stable[2]	Not reduced
East Greenland	Unknown	Data deficient	Data deficient
Foxe Basin	2,578 (2010)[3]	Data deficient	Not reduced
Gulf of Boothia	1,592 (2000)	Stable	Not reduced
Kane Basin	164 (1998)	Decline	Data deficient
Kara Sea	Unknown	Data deficient	Data deficient
Lancaster Sound	2,541 (1998)	Decline	Data deficient
Laptev Sea	800–1,200 (1993)	Data deficient	Data deficient
M'Clintock Channel	284 (2000)	Increase	Reduced
Northern Beaufort Sea	1,202 (2006)	Stable	Not reduced
Norwegian Bay	190 (1998)	Decline	Data deficient
Southern Beaufort Sea	1,526 (2006)	Decline	Reduced
Southern Hudson Bay	900–1,000 (2005)	Stable	Not reduced
Viscount Melville	161 (1992)	Data deficient	Data deficient
Western Hudson Bay	935 (2004)	Decline	Reduced

[1] On-going study to validate status assessment
[2] Elizabeth Peacock (pers. comm., as cited in Vongraven and Richardson 2011)
[3] Seth Stapleton (pers. comm., as cited in Vongraven and Richardson 2011)

the trend or status of the Chukchi/Bering Seas stock. The Polar Bear Specialist Group's 2010 summary indicates that the Chukchi Sea population is "reduced" and "declining." Illegal taking in Russia may have contributed to such a decline,[14] despite the fact that hunting has been prohibited in Russia since 1956. As with the Beaufort Sea stock, this stock also has experienced a reduction in sea ice habitat in recent years (Durner et al. 2009).

Stock assessments

Section 117 of the Marine Mammal Protection Act requires the Fish and Wildlife Service to prepare stock assessments for the marine mammal stocks that it manages and that occur in U.S. waters, including the southern Beaufort Sea and Chukchi/Bering Seas stocks of polar bears. Because the polar bear is listed as a threatened species under the Endangered Species Act, these stocks are considered "strategic" and stock assessment reports are to be reviewed at least annually.

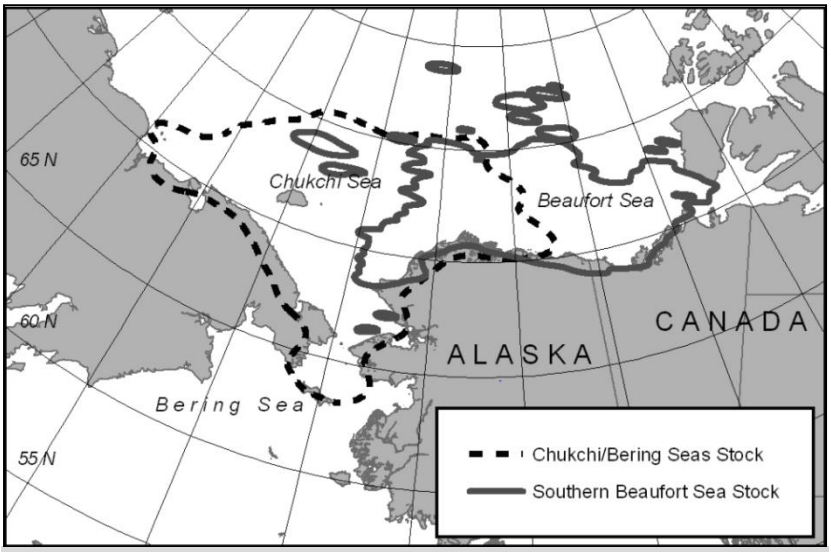

Figure IV-23. Map of the Southern Beaufort Sea and the Chukchi/Bering Seas polar bear stocks. (Source: Fish and Wildlife Service)

The Service published a notice of availability of the stock assessment reports on 30 December 2009 (74 Fed. Reg. 69139). Those reports are available on the Service's website.[15] The Service determined in 2010 and 2011 that the status of those stocks had not changed and could not be more accurately determined and, therefore, it did not update either report in 2010 or 2011.

Listing polar bears under the Endangered Species Act

In 2005 the Center for Biological Diversity petitioned the Fish and Wildlife Service to list the polar bear as a threatened species throughout its range under the Endangered Species Act. That petition contended that the polar bear "faces likely global extinction in the wild by the end of this century as a result of global warming." In analyzing the petition, the Service considered the U.S. Geological Survey analysis, which divided the range of polar bears into four ecoregions: (1) the seasonal ice ecoregion, which occurs mainly at the southern extreme of the polar bear range and includes Hudson Bay, (2) the archipelagic ecoregion consisting of the Canadian Arctic, (3) the polar basin divergent ice ecoregion, where ice is formed and then retreats from nearshore areas, especially during the summer minimum ice season, and (4) the polar basin convergent ice ecoregion, where sea ice formed elsewhere collects against the shore. Based on current conditions, projected sea ice trends, and the expected effects on polar bears, the U.S. Geological Survey, which prepared supplemental analyses, predicted population declines in western Hudson Bay (in the seasonal ice ecoregion) and southern Beaufort Sea (in the divergent ice

[14] See the 2010 stock assessment report at http://www.nmfs.noaa.gov/pr/sars/species.htm
[15] http://www.nmfs.noaa.gov/pr/sars/species.htm#fws

ecoregion) because of reduced availability of sea ice. Agency scientists predicted that polar bears could be extirpated from the polar basin divergent ice ecoregion and the seasonal ice ecoregion within the next 45 years. The results indicated that polar bears likely would be extirpated in the polar basin convergent ice ecoregion within the next 75 years. The results also predicted that polar bears in the archipelagic ecoregion likely would persist through the end of this century, but in reduced numbers.

The Marine Mammal Commission initially supported listing the species as threatened, noting that polar bears currently have a relatively large total population size and a broad distribution and that, on the whole, the species is not in immediate danger of extinction. However, the Survey's analyses convinced the Commission that declining sea ice habitat poses a significant risk of extinction to the populations in the divergent ice ecoregion and the seasonal ice ecoregion. Some populations already are in danger of extinction unless the declining trends in sea ice coverage are reversed. Therefore, the Commission recommended that the Fish and Wildlife Service list the populations in those regions (the southern Beaufort Sea, Chukchi Sea, Laptev Sea, Kara Sea, Barents Sea, western Hudson Bay, and southern Hudson Bay) as endangered. The Commission also reiterated its earlier recommendation that the Service list the polar bear populations in the other two ecoregions as threatened.

The Fish and Wildlife Service published a final rule on 15 May 2008 (73 Fed. Reg. 28212), listing the polar bear throughout its range as a threatened species. The listing rule presented detailed information on the population trends and demography of polar bears worldwide and addressed the five listing factors to be considered under section 4(a)(1) of the Endangered Species Act. The Service's analyses focused on the factor pertaining to the present or threatened destruction, modification, or curtailment of the species' habitat or range, concluding that listing was warranted based on the ongoing and projected decline of sea ice habitat and the effect that this will have on polar bear populations worldwide.

The listing decision prompted several legal challenges. The state of Alaska, hunters, and various trade associations filed lawsuits contending that polar bears did not meet the listing criteria under the Endangered Species Act. The Center for Biological Diversity and other conservation organizations sued the Service contending that a listing as endangered was warranted. Rulings in these cases are discussed later in this section.

Special rule for polar bears

If a species is listed as endangered under the Endangered Species Act, all of the prohibitions set forth in section 9 of the Act automatically apply. For species listed as threatened, however, this is not the case. Rather, section 4(d) of the Act directs the Fish and Wildlife Service to adopt such regulations as are "necessary and advisable" for the conservation of the species. The Service has the option of adopting the full suite of prohibitions applicable to endangered species or choosing a different combination tailored to the threats faced by the particular species. In the case of polar bears, the Service published an interim final rule under section 4(d) concurrent with its listing decision. Both were published on 15 May 2008 (73 Fed. Reg. 28212 and 73 Fed. Reg. 28306).

For the most part, the Service's interim rule relied on the provisions already applicable under the Marine Mammal Protection Act and the Convention on International Trade in Endangered Species of Fauna and Flora (CITES). If an activity is allowed under a permit or authorization issued under the Marine Mammal Protection Act or is subject to one of the Act's exceptions or exemptions, no additional authorization under the Endangered Species Act would be needed. This would include, for example, subsistence hunting and trade in handicrafts, cultural exchanges among circumpolar Natives, taking in defense of life or property or for the welfare of the animal, scientific research and enhancement activities, and authorized incidental taking. Similarly, no additional Endangered Species Act authorization would be needed for the import or export of a polar bear or its parts if it is authorized under a CITES permit or is allowed under one of the Convention's exceptions (e.g., for personal or household effects). If, however, one of the Marine Mammal Protection Act or CITES exceptions is not applicable, an authorization under the Endangered Species Act provisions would be required. The interim final rule also clarified that, as a consequence of the listing, certain activities that previously were permissible could no longer be

authorized, such as the taking or importation of polar bears for purposes of public display or the importation of polar bear trophies from Canada.

The interim final rule also specified that none of the prohibitions that otherwise would be applicable under its Endangered Species Act regulations will apply to the taking of a polar bear when that taking "is incidental to, but not for the purpose of, carrying out an otherwise lawful activity within any area subject to the jurisdiction of the United States, except Alaska."

Federal actions, including those carried out, funded, or authorized by federal agencies, that may affect a listed species or its critical habitat are subject to consultation under section 7 of the Endangered Species Act to ensure that they are not likely to jeopardize the continued existence of the species or destroy or adversely modify critical habitat. Although an action may affect species or habitats that occur outside the area where the action will take place (e.g., through indirect effects), the Service stated that, to meet the applicable regulatory standards, such effects must (1) be caused by the action subject to consultation and (2) be reasonably certain to occur. The Service explained that "effects are only appropriately considered in a section 7 analysis if there is a causal connection between the proposed action and a discernible effect to the species or critical habitat that is reasonably certain to occur." The Service recognized that every agency action that contributes greenhouse gases to the atmosphere arguably could trigger a consultation for polar bears or other species that are affected by climate disruption. Nevertheless, the Service thought that there was an insufficient basis for drawing a causal connection between emissions from a specific federal action and impacts on the species or its critical habitat. As such, the Service indicated that it does not intend to consult on federal actions that occur outside the polar bear's range but that could affect the species or its habitat through the release of greenhouse gases.

As discussed in previous annual reports, the Marine Mammal Commission submitted comments on the interim rule. In summary, the Commission noted that the regulations relied almost exclusively on the provisions of the Marine Mammal Protection Act and CITES to provide for the conservation of polar bears. The Commission also pointed out that those same provisions had not been sufficient to keep the species from reaching the point where it warrants listing as a threatened species. Therefore, the Commission did not see how relying on those provisions without any supplementation would satisfy the mandate of the Endangered Species Act to bring the species to the point where the Act's protective measures are no longer needed. Most notably, the interim final rule did not include any provisions specifically designed to address the primary threat faced by polar bears: the ongoing and projected loss of sea ice habitat.

The Fish and Wildlife Service published a final special rule for polar bears under section 4(d) of the Endangered Species Act on 16 December 2008 (73 Fed. Reg.76249). In most respects, the final rule tracked the provisions of the interim final rule. Minor clarifying changes were made to the provision concerning deference to authorizations under the Marine Mammal Protection Act and CITES. The one substantive change concerned the provision applicable to incidental takes. The Service adopted a recommendation made by the Commission that the exemption for such takings be revised to be applicable to all areas within the current range of the polar bear that are subject to U.S. jurisdiction, not just within Alaska.

As discussed later in this section, a federal district court invalidated the final rule on 17 October 2011 due to the Service's failure to comply with the requirements of the National Environmental Policy Act. Because of this, the 15 May 2008 interim rule regained effect. At the end of 2011, the Service was preparing a notice for publication early in 2012 announcing the reinstatement of the interim rule. Also, the Commission expected the Service to initiate a rulemaking early in 2012 to propose a new special rule for polar bears under section 4(d) of the Endangered Species Act to replace the interim rule.

Critical habitat

Section 4(b)(6)(C) of the Endangered Species Act requires that critical habitat be designated concurrent with publication of an endangered or threatened listing determination except in certain

circumstances. One of the exceptions is when the agency responsible for the listing finds that critical habitat for the species "is not then determinable," in which case it has one additional year to complete the designation process. In its final listing rule, the Service invoked this exception to extend the deadline for designating critical habitat, or determining that such a designation is not prudent, until 15 May 2009. However, under a settlement agreement reached with conservation groups, the Service extended that deadline until 30 June 2010.

The Fish and Wildlife Service published a proposed rule to designate critical habitat for the polar bear on 29 October 2009 (74 Fed. Reg. 56058). Although the polar bear is a circumpolar species and essential habitat occurs outside the United States, regulations implementing the critical habitat requirements of the Endangered Species Act (50 C.F.R. § 424.12(h)) specify that critical habitat designations are limited to areas under the jurisdiction of the United States. In accordance with this limitation, the Service proposed to designate approximately 519,403 km^2 (200,541 mi^2) in Alaska and adjacent territorial waters and waters within the U.S. Exclusive Economic Zone as critical habitat for the polar bear.

As part of its review to identify those areas containing physical and biological features essential to the conservation of polar bears, the Service identified three "primary constituent elements" meeting those criteria: (1) sea ice habitat used for feeding, breeding, denning, and movements, (2) terrestrial denning habitat, and (3) barrier islands that are used for denning and movements along the coast and that provide refuge from human disturbance. The Service determined that those areas faced potential threats from climate disruption; oil and gas exploration, development, and production; human disturbance; and commercial shipping, and therefore merited special management considerations or protection, and that each habitat type warranted inclusion in the proposed critical habitat designation. In proposing to include sea ice habitat in the proposed designation, the Service recognized that such habitat varies seasonally and from year to year and that polar bear use of such habitat is not uniform. Thus, the Service proposed to limit the inclusion of sea ice habitat to those areas over the continental shelf in waters 300 m or less in depth. The southern boundary of the proposed designation was set to correspond to the range of the Chukchi/Bering Seas population, as established by telemetry data. By far, sea ice habitat constitutes the largest area included in the proposed designation, accounting for 96 percent of the area proposed.

Two provisions of the Endangered Species Act allow the Service to exclude certain areas from a critical habitat designation. Section 4(b)(2) of the Act directs the Service to consider the economic and other relevant impacts of specifying particular areas as critical habitat and allows it to exclude such areas if it determines that the benefits of doing so outweigh the benefits of designation. Section 4(a)(3)(B)(i) of the Act directs the Service not to designate as critical habitat any lands or other areas owned or controlled by the Department of Defense or designated for the Department's use if those areas are subject to an integrated natural resources plan prepared under the Sikes Act and that plan provides benefits to the species for which critical habitat is being designated. At the time that the proposed rule to designate critical habitat was published, the Service had yet to complete its economic analysis of the impact of the proposed designation. As such, the Service did not propose excluding any areas on the basis of economic considerations. The Service indicated that it was preparing such an analysis that would be made available for public review and comment and considered in its final determination. The Service identified 11 areas operated by the Department of Defense (primarily radar installations) within the proposed critical habitat area that potentially qualified for exclusion under the second exception. The Service indicated that it would review the applicable integrated natural resources plans for these facilities to see if those plans provide benefits to polar bears.

The Marine Mammal Commission submitted comments regarding the proposed critical habitat designation on 28 December 2009. The Commission noted that, although the area proposed by the Service is large, because of considerable inter-annual variation in the distribution of different sea ice habitat types and the large ranges of individual polar bears, the entire area proposed for designation constitutes important habitat that, for one reason or another, is essential to the conservation of the species. Consequently, the Commission supported adoption of the proposed rule. The Commission agreed with the Service's determination that there currently was no need to designate critical habitat in areas outside the

existing range of polar bears. The Commission cautioned, however, that as sea ice is lost in the future, polar bears will have little choice but to move into marginal habitats. As such, less-productive areas that currently are not essential for conserving the species may become so in the future. This being the case, the Commission recommended that, once an initial designation has been finalized, the Service establish a schedule for periodic reviews to consider changes in habitat-use patterns and the need to supplement the original designation.

The Commission also reiterated a point that it had made in commenting on the proposed regulations to list the polar bear under the Endangered Species Act. The Commission took exception to the Service's view that addressing the underlying reason that the species is at risk of extinction and essential habitat is being lost (i.e., global climate disruption) was beyond the scope of the Act. In the Commission's view, failing to address this central issue is contrary to the very purpose of the Act. The fact that this is a complex, global problem does not exclude it from the Act's mandates to conserve listed species, including the polar bear, and the ecosystems on which those species depend. The Commission therefore recommended that the Service work with other key agencies, including the Environmental Protection Agency, the Department of Energy, and the Department of Transportation, to develop a coordinated strategy to identify how best to use their authorities to address climate disruption, thereby promoting the conservation of polar bears and protecting the species' essential habitat.

The Commission's comments also considered possible exclusions of certain areas from a critical habitat designation. The Commission agreed that the Service should consider exclusions of military sites based on their integrated natural resources plans but noted that, for polar bears in particular, there was a need to ensure that such plans provided adequate long-term protection for the species and its habitat. In light of the projected changes in available polar bear habitat in the foreseeable future and likely shifts in distribution, the Commission advised that any exclusion would need to be reviewed periodically to ensure that the applicable plans remain adequate to protect polar bears and to identify revisions that may be necessary to address changing and emerging threats. The Commission deferred commenting on other possible exclusions pending completion of the Service's economic analysis. It noted, however, that, just as the National Marine Fisheries Service had done in its proposed designation of critical habitat for the Cook Inlet beluga whale, the analysis of possible economic impacts from a critical habitat designation should focus on whether there are any new impediments to economic activities beyond those already caused by the requirement that federal activities not jeopardize the continued existence of listed species.

On 5 May 2010 the Fish and Wildlife Service published a notice announcing the availability of a draft economic analysis of the proposed critical habitat designation and reopening the public comment period (75 Fed. Reg. 24545). The Commission determined that there was no need to revise or supplement its previous comments based on the new information.

On 7 December 2010 the Service published a final rule designating critical habitat for the polar bear within areas under U.S. jurisdiction (75 Fed. Reg. 76086). To a large extent, the final designation tracked the Service's original proposal. It included three components—sea ice habitat, terrestrial denning habitat, and barrier islands (Figure IV-24)—but was somewhat smaller (484,734 km^2) than originally proposed. Table IV-4 summarizes the area included in the designation for each of these components. Further information and detailed maps illustrating the area designated as critical habitat can be found on the Service's website.[16]

In accordance with section 4(a)(3) of the Endangered Species Act, the Service excluded five radar sites operated by the U.S. Air Force because they are subject to integrated natural resource management plans that include measures to protect polar bears within or adjacent to those facilities. The designation also excluded certain areas in accordance with section 4(b)(2) of the Act, which allows the Service to balance whether the benefits of the exclusion outweigh the benefits of designating an area as critical habitat. Areas excluded from the designation under this provision include the Alaska Native communities of Barrow and Kaktovik and all existing manmade structures.

[16] http://alaska.fws.gov/fisheries/mmm/polarbear/esa.htm

On 1 March 2011 the Alaska Oil and Gas Association filed a lawsuit challenging the critical habitat designation. The state of Alaska and several Alaska Native corporations subsequently filed similar lawsuits. The plaintiffs contended that the scope of the area designated as critical habitat was unprecedented and included areas that are not essential to the conservation of the species, as required under the Endangered Species Act. They also asserted that the Service failed to assess the full economic impacts of the designation when weighing the costs and benefits of the designation. As such, the plaintiffs believed that the Service's analysis was faulty and that the designation would have "significant adverse ramifications for the people who live and work on the North Slope, for Alaska's oil and gas industry, and for the state of Alaska." The plaintiffs also contended that the Service improperly included areas in the designation that were not occupied by polar bears at the time of listing. The state of Alaska and Alaska Native groups also took issue with the adequacy of consultation by the Service prior to designating critical habitat. Finally, the state alleged that the Service failed to provide it with an adequate written justification for issuing a critical habitat rule that conflicted with its comments on the proposal. These lawsuits were pending at the end of 2011.

Table IV-4. Area of final designated polar bear critical habitat units (Source: Fish and Wildlife Service, 75 Fed. Reg. 76121)

Critical Habitat Unit	Estimated Size of Area in km^2 (mi^2)
Sea-ice Habitat	464,924 (179,508)
Terrestrial Denning Habitat	14,652 (5,657)
Barrier Island Habitat	10,576 (4,083)
Total Area[1]	**484,734 (187,157)**

[1] The total area is less than the sum of the three units, because the barrier islands habitat slightly overlaps the sea-ice and terrestrial denning habitat areas.

Deterrence Regulations

Polar bears frequently are found in the vicinity of villages in northern Alaska and other areas where human activities occur (e.g., around oil and gas operations). For some time, the Fish and Wildlife Service has worked with Alaska Natives to develop and implement measures for safely deterring polar bears to reduce the risks of injuries to humans and to minimize the chances that encounters will escalate to the point where bears are killed. The Service believed that it would be useful to supplement these efforts through the publication of generally applicable guidance for deterring polar bears.

Section 101(a)(4) of the Marine Mammal Protection Act authorizes individuals to take marine mammals in certain circumstances to protect property and personal safety, provided that the measures used do not result in the death or serious injury of the animal. That provision directs the Service to publish in the *Federal Register* guidelines for safely deterring marine mammals. For marine mammals listed as endangered or threatened under the Endangered Species Act, such as the polar bear, the Service is to recommend specific measures that may be used to deter animals non-lethally. The Service decided to provide this guidance through the adoption of regulations and published a proposed rule on 26 April 2010 (75 Fed. Reg. 21571).

The Commission provided comments on the proposed rule on 26 May 2010. The Commission questioned the need to provide this guidance by regulation and recommended that the Service consider less formal alternatives that would be easier to update or revise should the need arise. It also recommended that the Service consider expanding the proposed deterrence measures for bears that pose a threat to personal safety. Specifically, the Commission suggested that the Service use a stepped approach that would allow the use of crackershells and projectiles, if other measures proved ineffective, as preferred alternatives to lethal taking. The Commission also believed that there was no basis for limiting deterrence measures to U.S. citizens as the Service had proposed and recommended that this proposed requirement be deleted. Lastly, the Commission believed that the Service needed to provide additional

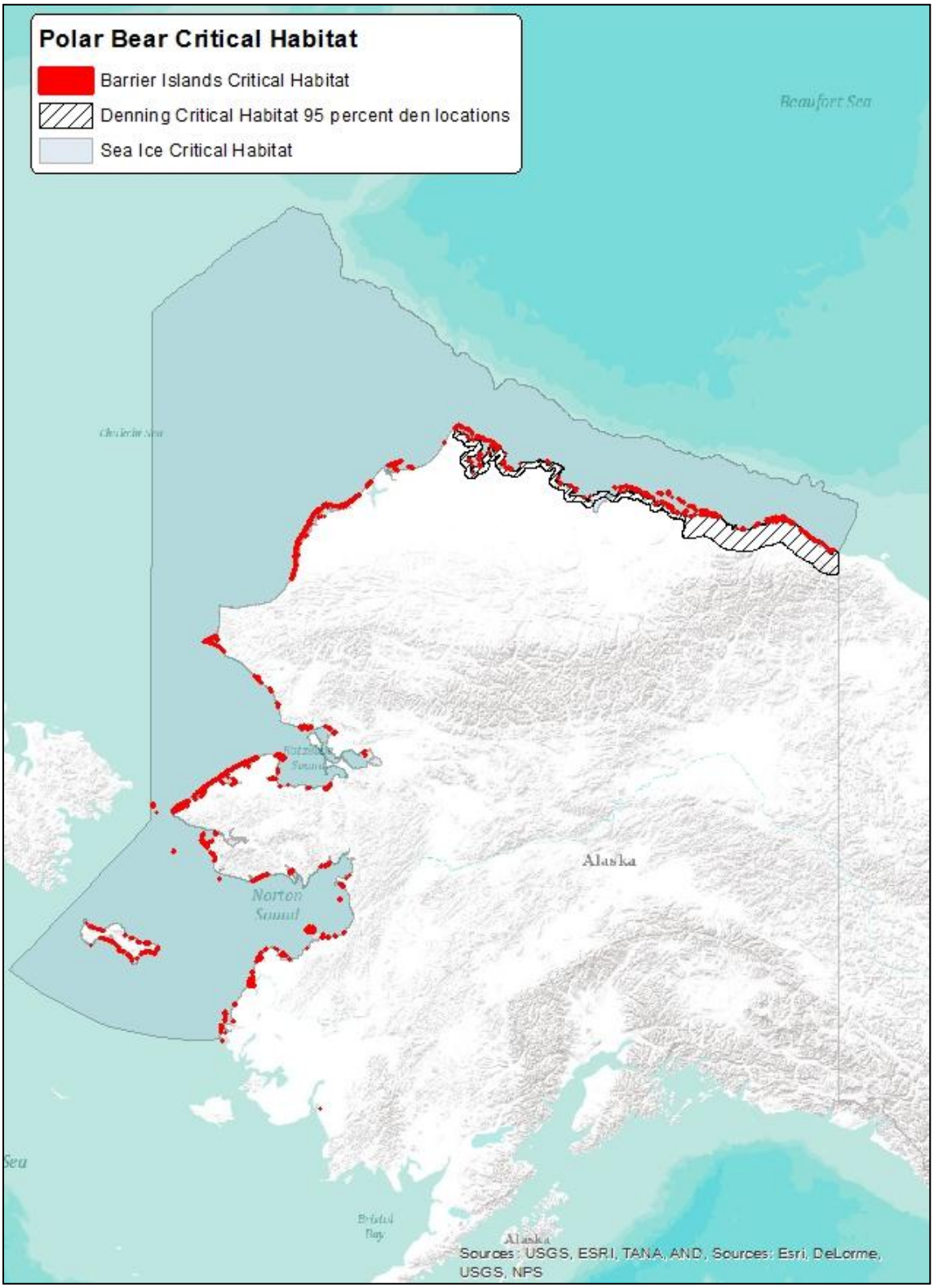

Figure IV-24. Map of polar bear critical habitat (sea ice, terrestrial denning, and barrier islands areas) designated by the U.S. Fish and Wildlife Service. (Data source: Fish and Wildlife Service)

justification for the 150 dB sound threshold that it was proposing as not being harmful to polar bears.

The Service published the deterrence guidelines for polar bears as a final rule on 6 October 2010 (75 Fed. Reg. 61631). The Service decided that regulations were appropriate because the guidelines "establish a binding norm that has the effect of law" with respect to those employing deterrence measures. The Service declined to adopt the stepped approach recommended by the Commission, noting that these guidelines were intended to apply to everyone, regardless of their level of skill, training, or ability. Although it recognized that more aggressive deterrence measures would be appropriate in some instances, the Service thought that greater familiarity with polar bears, their behavior, and likely responses was needed by those using such measures. It noted, for example, that public officials with the required training and experience already were authorized to use such measures under section 109(h) of the Act when needed to protect the welfare of the animal, protect public health and welfare, or remove nuisance bears non-lethally. The Service agreed that the guidelines should not be limited to U.S. citizens and revised the regulations accordingly. The Service also provided additional information concerning the hearing capabilities of polar bears and the sound pressure levels expected to be effective in deterring bears. Based on this information, the Service revised downward the allowable sound level to 140 dB and limited continuous use of such sources to no more than 30 seconds.

The regulations, codified at 50 C.F.R. § 18.34, authorize the use of passive deterrence measures, including rigid fencing, bear exclusion cages, and bear resistant garbage containers. The Service also authorized the use of "preventative" deterrence measures, such as acoustic devices or the use of vehicles or boats to patrol areas and block the approach of bears. The Service stressed that vehicles and boats could be used only to deter bears from entering villages, encampments, or other compounds, but not to chase bears.

Recovery plan

The Endangered Species Act requires that a recovery plan be developed and implemented for each listed species unless the Service determines that such a plan will not promote the conservation of the species. Each plan is required to include (1) a description of site-specific management actions that may be necessary to achieve the plan's goals for the conservation and survival of the species, (2) objective, measurable criteria which, when met, would prompt an action to delist the species, and (3) estimates of the time required and cost to carry out the measures to meet the plan's goal, and for achieving intermediate steps towards that goal. Efforts to develop such a plan are expected to draw on the existing polar bear conservation plan developed under the Marine Mammal Protection Act. However, the conservation plan was finalized in 1994 and will need considerable updating. For example, the conservation plan does not address impacts associated with climate disruption, which is now recognized as the primary threat to the species.

In commenting on the proposed listing of polar bears as threatened, the Commission supported the development of a recovery plan, noting that such plans generally promote the conservation of listed species. Although the Commission recognized that constituting a recovery team may be premature, it recommended that the Service make a concerted effort to identify and begin addressing management and research needs so that efforts to conserve polar bears are as timely and well informed as possible. The Commission advised the Service to consider the direct effects of climate disruption and to anticipate secondary effects, such as increased shipping in the Arctic and expanded opportunities for commercial fishing, oil and gas development, tourism, and coastal development. The Commission stressed the importance of identifying essential polar bear habitats and collecting baseline information on use of those habitats before secondary threats associated with climate disruption occur and become irreversible.

To develop a polar bear recovery plan, the Fish and Wildlife Service convened four meetings with stakeholders in 2010 and 2011. The first meeting provided an introduction to the recovery planning process and solicited general input for identifying and assessing threats to polar bears that should be addressed in the plan. The second meeting focused on actions that could be taken to mitigate potential impacts of climate disruption. The third meeting focused on actions that could be taken to mitigate

potential impacts of human-caused removals. The final meeting sought suggestions concerning the recovery criteria that would be incorporated into the plan. More detailed information about these meetings, including minutes of each meeting, is available on the Service's web site.[17] Representatives of the Marine Mammal Commission were able to participate in the first two meetings.

At the end of 2011 the Service was working on a draft plan that it expected to make available for public review and comment late in 2012 or early in 2013.

Trophy imports

The 1994 amendments to the Marine Mammal Protection Act allow the Secretary of the Interior to issue permits authorizing the importation of polar bear trophies from sport hunts conducted in Canada, provided that certain findings are made. Among other things, the applicable provision (section 104(c)(5)) requires the Secretary to find that Canada has a monitored and enforced sport hunting program that is consistent with the purposes of the Agreement on the Conservation of Polar Bears[18] and the Marine Mammal Protection Act and based on scientifically sound quotas that will ensure the maintenance of the affected population stock at a sustainable level. Imports of trophies had been approved from 6 of 13 management units identified by Canada. Imports from a seventh management unit (M'Clintock Channel) also had been approved but only for bears that were legally harvested prior to 1 April 2000 when the sustainability finding was revoked. Imports from the other management units never were authorized except under a grandfather provision that allowed the importation of any polar bear trophy legally taken in Canada before 18 February 1997, the date on which the Fish and Wildlife Service published regulations implementing the polar bear import provision.

All of this changed, however, when the Fish and Wildlife Service listed the polar bear as a threatened species. Under the statutory definition of "depletion," any species or population of marine mammal listed as endangered or threatened under the Endangered Species Act is automatically considered to be depleted under the Marine Mammal Protection Act. In accordance with section 102(b)(3), depleted marine mammals may be imported into the United States only for purposes of scientific research or for enhancing the survival or recovery of the species or stock. In an opinion issued by the Department of the Interior's Solicitor on 23 May 2008,[19] the agency determined that this general import prohibition took priority over the specific permit provision applicable to polar bear trophies. The opinion concluded that "Congress did not intend to allow the importation of sport-hunted polar bear trophies from Canada under section 104(c)(5) of the MMPA if polar bears were listed as a threatened species or endangered species under the ESA." The Solicitor noted, however, that the Service can still authorize the importation of polar bear parts under scientific research or enhancement permits, provided that all of the applicable statutory and regulatory requirements have been satisfied. Consistent with the Solicitor's determination, the Service suspended its review of pending applications for trophy import permits and informed those who had been issued import permits but had yet to import their trophies that those permits were no longer valid. Some of the hunters whose import permit applications were pending at the time of the listing, as well as hunting organizations, filed lawsuits challenging the Service's determination. As discussed in the next section, the district court ruled that the Service's determination was correct—the listing of the polar bear as threatened precluded further imports of sport-hunted trophies under the Marine Mammal Protection Act.

Litigation

The Service's listing of polar bears and issuance of the special rule almost immediately spawned a variety of legal challenges. Conservation groups contended that the species should have been listed as

[17] http://alaska.fws.gov/fisheries/mmm/polarbear/esa.htm#recovery_plan
[18] A 1973 agreement to prohibit unregulated sport hunting of polar bears, signed by Canada, Denmark, Greenland, Norway, the U.S.S.R., and the United States
[19] http://www.doi.gov/solicitor/opinions.html (see section M-37015)

endangered rather than threatened. The state of Alaska and others claimed that listing polar bears as threatened was unwarranted. Hunters who had applied for or had been issued trophy import permits challenged the Service's interpretation that such imports could no longer be authorized. Litigants also challenged the special rule, some contending that it should have incorporated all of the protections afforded species listed as endangered and others that it had been too inclusive of those prohibitions. All of the cases, which originally had been filed in multiple judicial districts, were consolidated into a single case to be considered by Judge Emmet Sullivan in the U.S. District Court for the District of Columbia.

Judge Sullivan issued his first ruling on 30 June 2011 (*In re Polar Bear Endangered Species Act Listing and § 4(d) Rule Litigation*), upholding the listing of polar bears as threatened. Applying the deferential standard of judicial review applicable to listing decisions, the court found that the Service had applied a permissible interpretation of the term "in danger of extinction" as applied to polar bears. In assessing the claims of conservation groups that some or all of the populations of polar bears should have been listed as endangered, the judge noted that "[a]lthough the evidence emphasized by [those groups (which included the Commission's recommendation that some populations be listed as endangered)] is troubling, the Court finds that the agency acted well within its discretion…in reaching its conclusion…." The judge continued that, while those groups "would have weighed the facts differently, the Court is persuaded that [the Service] carefully considered all of the available scientific information before it, and its reasoned judgment is entitled to deference."

The judge also found that the Service had acted reasonably when it used three generation cycles (45 years) to define what constitutes the "foreseeable future" in assessing whether the polar bear should be listed as threatened (i.e., "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range"). Similarly, the court ruled that the Service had not acted irrationally when it declined to consider any populations or bears within any ecoregion as sufficiently discrete to qualify as a "distinct population segment," which would merit separate consideration for listing. This is an issue raised by parties on both sides to bolster claims that at least some populations should have been considered for listing as endangered, or conversely, should not have been listed at all.

Judge Sullivan issued two separate opinions on 17 October 2011 addressing the remaining issues in the case. The first of these considered both substantive and procedural challenges to the special rule for polar bears issued under section 4(d) of the Endangered Species Act. Conservation groups contended that the rule violated the Act because it failed to provide for the conservation of the polar bear. Specifically, the plaintiffs claimed that the rule was wanting in that it did not address the issue of greenhouse gas emissions, which had been identified by the Service as the cause of increasing temperatures in the Arctic and the predicted loss of the polar bear's sea ice habitat. Conversely, the Service determined that regulations under section 4(d) would not be a useful or appropriate tool to alleviate that particular threat. Although sympathetic to arguments that a strong mechanism to combat the effects of global climate disruption is needed, the court nevertheless believed that the Service's conclusion that the rule provides for the conservation of polar bears even without reversing the trend of sea ice loss was not arbitrary, capricious, or contrary to law.

Conservation groups also challenged the 4(d) rule based on alleged violations of the National Environmental Policy Act (NEPA), arguing that the Service should have prepared an environmental impact statement on the rulemaking. The Service believed that the issuance of special rules for threatened species is exempt from NEPA and contended that, even if those requirements apply, issuance of the polar bear rule did not qualify as a "major federal action significantly affecting the quality of the human environment." The court disagreed with the Service's position and determined that there is no broad NEPA exemption for such rules. Moreover, the judge ruled that, at a minimum, the Service was required to conduct an initial assessment of the rule to determine whether preparation of a full environmental impact statement is needed. Because it had not done so, the court vacated the rule pending completion of a new rulemaking and preparation of a NEPA analysis. The court determined that the interim final rule adopted at the time of listing, which had not been challenged by the plaintiffs, would be reinstated pending completion of a new rulemaking.

The second opinion issued by the district court on 17 October 2011 addressed the complaints filed by Safari Club International, Conservation Force, and individual hunters challenging the Service's determination that listing the polar bear as threatened precluded the importation of sport-hunted trophies from Canada. These plaintiffs argued that the more specific provision of the Marine Mammal Protection Act concerning trophy imports (section 104(c)(5)) took precedence over the more general prohibitions concerning the importation of depleted species. Furthermore, they contended that the Service had not properly designated the polar bear as a depleted species under the Act. The court was not persuaded by these arguments. It ruled that under the Act's definition of a depleted species, a species listed under the Endangered Species Act automatically is considered depleted. No further action or notice is required. Further, the judge concluded that the Service was correct in its finding that, because the species is depleted, sport-hunted polar bear trophies no longer are eligible for import. Sport-hunting is not among the narrow, specific exceptions to the Act's ban on taking and importing depleted marine mammals.

Native subsistence hunting

The Marine Mammal Protection Act authorizes Alaska Natives to take marine mammals for subsistence uses and for purposes of making and selling authentic Native articles of handicrafts and clothing. Subsistence hunters take polar bears from both stocks that occur in Alaska (Table IV-5). The Fish and Wildlife Service's marking and tagging program has provided data on the number of polar bears taken since 1988, the year that program was instituted. Under the program, Alaska Native hunters are required to report, within 30 days, on each polar bear taken and to present the animal's skin and skull for tagging. The Service has established a network of "taggers" located in each of the hunting villages who tag the bear parts and measure the skull size, determine the sex of the bear, record the location where the bear was taken, and collect a tooth for aging.

The number of bears taken from the Chukchi/ Bering Seas stock has declined since the 1980s. The average annual take in the 1980s was 92, about 50 per year during the 1990s, and about 33 per year over the past 10 years. The causes for this reduction are not well understood but may be related to (1) changing climate conditions and the altered duration, extent, movement, and thickness of the sea ice in the area, (2) a population decline, (3) the suspected but not quantified increase in the number of bears taken from this population in Russia, thus reducing the number of bears available to hunters in Alaska, and (4) a decline in the number of active Native hunters. In 2009 and 2010 the number of bears taken from this population for subsistence by Alaska Natives dropped to the lowest levels on record, but jumped back up in 2011.

Scientists have yet to produce a reliable quantitative estimate of abundance for the Chukchi/Bering Seas stock. The most recent estimate of 2,000 animals is based on expert opinion, and the IUCN Polar Bear Specialist Group recently identified the size of this population and its trend as declining. Up-to-date and reliable data are needed on bear recruitment, survival, and movement patterns. As noted earlier, questions remain about the number of polar bears being removed by hunters in Russia, where hunting currently is prohibited but illegal kill levels may be substantial. To address these concerns, the United States and Russia have concluded a bilateral agreement to conserve this stock, set hunting limits, and provide a vehicle for cooperative research. Efforts to implement that agreement are described in the following section. studied and maintained in good health. However, cub survival and the body condition of bears age three and older in this population have declined over the past 25 years, coinciding with a decline in the availability of preferred ice habitats (Rode et al. 2007). This prompted the parties to the agreement in 2010 to reduce the approved harvest level from 80 to 70 bears per year, apportioned evenly between hunters in Canada and the United States.

Taking levels from the Beaufort Stock show less inter-annual variation than from the Chukchi/Bering Seas stock and have remained between 14 and 18 bears per year between 2007 and 2011. It is not clear why hunting activity in this area has been more constant, but the reason may reflect management of this stock under the North Slope Borough/Inuvialuit Game Council agreement. However, recent harvests in the United States remain well below the authorized levels under that agreement.

International polar bear agreements

Polar bears can traverse great distances, often crossing national boundaries and moving into international waters. This being the case, efforts to conserve them often require international cooperation. The United States participates in both multilateral and bilateral agreements to conserve polar bears.

Agreement on the Conservation of Polar Bears: As noted earlier, polar bears occur throughout the Arctic. In the 1950s and 1960s hunters were taking an increasing number of polar bears. For that reason, the United States and other countries where polar bears occur negotiated the multilateral 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; it entered into force in 1976. Among other things, the agreement limits the purposes for which polar bears may be taken, prohibits certain methods of taking, and requires the parties to protect important bear habitats, such as denning and feeding areas and migratory corridors. It also requires signatory countries to maintain national research programs. Implementation of the agreement by the United States relies on domestic legislation, primarily the Marine Mammal Protection Act.

The Agreement on the Conservation of Polar Bears also calls on the party nations to consult with one another to further the conservation of polar bears and to exchange information concerning their research and management programs, particularly with respect to shared populations. However, until recently, the party nations had not established a formal mechanism for consulting and had met only rarely. Rather, for the exchange of information they relied largely on the IUCN's Polar Bear Specialist Group, which is composed of polar bear experts from the five polar bear range states. The Specialist Group meets periodically, usually every three or four years, to review matters pertaining to research and management of polar bears and to provide scientific advice and technical support that can be used by the contracting governments to implement the agreement.

Table IV-5. Numbers of polar bears reported taken by Alaska Natives, 1980-2012 (Data source: U.S. Fish and Wildlife Service)

Harvest Year	Alaska Total Take	Southern Beaufort Sea	Alaska Chukotka
1980	84	39	45
1981	109	27	82
1982	52	24	28
1983	167	41	126
1984	242	72	170
1985	109	33	76
1986	137	35	102
1987	119	33	86
1988	153	47	106
1989	83	39	44
1990	107	25	82
1991	88	30	58
1992	79	36	43
1993	92	49	43
1994	111	29	82
1995	80	19	61
1996	68	57	11
1997	79	39	40
1998	51	19	32
1999	120	30	90
2000	54	24	30
2001	106	41	65
2002	110	44	66
2003	73	43	30
2004	47	32	15
2005	78	37	41
2006	77	25	52
2007	69	17	52
2008	39	18	21
2009	31	17	14
2010	26	14	12
2011	60	18	42
2012	76	23	53
Average	**90**	**33**	**58**

In 2007 the United States called for a meeting of the parties to exchange information on polar bear research and management programs, review the status of polar bear populations, and consider additional measures that the parties could take to strengthen polar bear conservation programs. The United States hosted the meeting in Shepherdstown, West Virginia, in June of that year. This was the first time that the parties to the 1973 polar bear agreement had met since 1981. The participants considered the opportunity to discuss polar bear conservation needs to be valuable and agreed that more frequent meetings were needed to assess and oversee implementation of the polar bear agreement. They agreed to hold meetings biennially or as otherwise scheduled by the parties.

The parties met next in 2009 in Tromsø, Norway. Participants at that meeting identified climate disruption as the most important long-term threat to polar bears but recognized that actions needed to mitigate that threat are beyond the scope of the polar bear agreement. Nevertheless, the parties expressed concern that their obligations to conserve polar bears and to protect the ecosystems upon which polar bears depend can be met only if global temperatures do not rise to the point where sea ice retreats from extensive parts of the Arctic. Consistent with this view, the range states identified an urgent need for an effective global response to climate disruption and recommended that the significance of climate disruption to polar bears be brought to the attention of those working in other fora in which strategies to address the issue are being negotiated. The polar bear range states concluded that, absent an effective response to projected sea ice loss, the best available management strategy would be to reduce other stressors to polar bears and their habitats to the extent possible. Although of less importance than climate disruption, the parties identified several other threats to polar bears, including habitat loss, overharvesting, contaminants and pollution, disturbance from industrial development and other human activities in Arctic areas, and increased shipping as ice-free periods lengthen.

To respond to these threats, the parties agreed to develop a coordinated approach for identifying and implementing needed conservation and management measures. The first step would be for each range state to develop a national action plan, with the expectation that such plans would be integrated to form a comprehensive circumpolar plan. The parties expected that significant progress would be made toward drafting national plans before the next biennial meeting. Participants at the Tromsø meeting also recognized the value of the Polar Bear Specialist Group in meeting their research and coordination obligations under the agreement and asked the specialist group to serve as the scientific advisory group to the parties.

The parties to the Agreement held their next meeting in Iqaluit, the capital of the Canadian territory of Nunavut, on 24-26 October 2011. Each country provided an update on steps that it had taken to develop its national action plan. The United States discussed progress being made to draft a recovery plan for the species, which to a large extent will serve as its national action plan. While recognizing that increasing greenhouse gas emissions are the primary threat to polar bears, the United States described actions being taken to minimize other impacts, most notably those from interactions between people and bears. Russia reported that it had completed a Strategy for Polar Bear Conservation, approved by its Ministry of Natural Resources on 5 July 2010. Norway explained that it had a comprehensive legal and policy framework in place to manage polar bears on Svalbard and in the Barents Sea, including the designation of protected areas. Greenland noted that it was continuing to work on its national action plan, and described several steps that it already was taking to conserve polar bears. These included the adoption of new quotas, which have stabilized harvest rates. Canada stated that its national polar bear conservation strategy had been developed and was awaiting signature by federal, provincial, and territorial ministers, and by the relevant wildlife management boards.

The parties discussed a draft table of contents for integrating national action plans into a single range-wide circumpolar action plan. Among the key recommendations that emerged were the need to—

- incorporate an adaptive management approach to respond to ongoing and predicted changes to Arctic ecosystems and human activities in those areas;
- balance polar bear conservation with the needs of communities within the polar bear range;
- base decisions on the best available science and on traditional ecological knowledge;

- ensure the engagement of affected indigenous peoples in management actions; and
- follow a precautionary principle.

Members of the Polar Bear Specialist Group provided recommendations on how the table of contents for the circumpolar action plan might be improved. Among other things, the Specialist Group noted that a lack of capacity and shortage of funds are serious challenges to polar bear research and management. It therefore saw a need for the plan to set priorities among the identified threats and planned actions. The Specialist Group also provided the range states with a draft science chapter for inclusion in the action plan as requested by the parties in 2010. The draft noted that effective management and conservation of polar bears will require an integrated pan-Arctic research and monitoring effort to improve our ability to detect ongoing patterns and predict future trends, identify the most vulnerable populations, and provide managers with independent advice based on the best available scientific information. The text of the draft science chapter is available on the Polar Bear Specialist Group's web site.[20]

On a related point, the parties also discussed the adoption of a circumpolar monitoring plan for polar bears. As discussed in Chapter X of this report, the Marine Mammal Commission funded the preparation of this plan under the supervision of the Polar Bear Specialist Group. The original intent was for the plan to be adopted by the Circumpolar Biodiversity Monitoring Program of the Arctic Council's Conservation of Arctic Flora and Fauna working group. However, some members balked at that idea because that organization has no management authority for polar bears. Although generally supportive of the plan, the working group thought that it would be more appropriate for the plan to be referred to and considered by the parties to the Agreement on the Conservation of Polar Bears.

Because the Marine Mammal Commission had supported the development of the plan, its representative on the U.S. delegation introduced the plan at the Iqaluit range states meeting, asking that it be considered for adoption. Recognizing that its development had been spurred in large part by recommendations made at their 2009 meeting in Norway, the parties welcomed the opportunity to review the plan. Some delegations questioned whether traditional ecological knowledge had been sufficiently integrated into the plan, and thought that more time was needed to review it and to consult with Native groups before endorsing the plan. The parties agreed to pursue the necessary consultations and tasked the Polar Bear Specialist Group with providing recommendations as to which elements of the monitoring plan should be incorporated into the circumpolar action plan that the range states will consider at their 2013 meeting.

United States–Russia Polar Bear Agreement: In the early 1990s the Fish and Wildlife Service began discussions with its Russian counterparts to develop a unified management approach for the Chukchi/Bering Seas polar bear stock shared by the two countries. Those discussions culminated in the two countries signing a protocol in 1992 expressing their intent to pursue a joint management agreement. The 1994 amendments to the Marine Mammal Protection Act provided further impetus for a bilateral polar bear treaty. Section 113(d) of the Act called on the Secretary of the Interior, acting through the Secretary of State and in consultation with the Marine Mammal Commission and the state of Alaska, to consult with Russian officials on the development and implementation of enhanced cooperative research and management programs for the shared stock. In October 2000 efforts to pursue greater cooperation between the United States and Russia with respect to the Chukchi/Bering Seas polar bear stock culminated with the signing of the Agreement between the Government of the United States of America and the Government of the Russian Federation on the Conservation and Management of the Alaska–Chukotka Polar Bear Population. The agreement specifies that subsistence taking by Native residents of Alaska and Chukotka is to be the only allowable consumptive use of the affected stock of polar bears. It establishes a joint commission composed of a governmental official and a representative of the Native people from Russia and the same from the United States. The bilateral commission is to establish annual taking limits that may not exceed the sustainable harvest level determined for the stock. The allowable take will be divided equally between the two parties, but, subject to approval by the commission, either

[20] http://pbsg.npolar.no/en/news/archive/2011/Iqaluit-2011.html

party may transfer a portion of its allowable take to the other party. Once in place, the commission is to 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. Additional information concerning the Chukchi/Bering Seas polar bear stock and the treaty can be found at the web site maintained by the Fish and Wildlife Service's Alaska Region.[21]

Implementation of the bilateral agreement by the United States is governed by Title V of the Marine Mammal Protection Act, enacted as section 902 of Public Law 109-479 in 2007. That legislation provides domestic authority to carry out U.S. responsibilities under the agreement. Among other things, Title V—

- set forth the procedures by which U.S. commissioners are selected,
- established prohibitions on taking polar bears in violation of the U.S.–Russia agreement or any annual limit or other restriction on the taking of polar bears adopted by the parties to that agreement,
- relied on the existing authorities under Title I of the Act for enforcement,
- directed the Secretary of the Interior to promulgate regulations to implement the provisions of the Act and the agreement,
- authorized the Secretary to share authority for managing the taking of polar bears with the Alaska Nanuuq Commission,
- allowed the United States to vote on issues before the U.S.–Russia Polar Bear Commission (to be established under the agreement) only if the two U.S. commissioners have no disagreement on the vote, and
- authorized appropriations to carry out functions related to the agreement through fiscal year 2010.

The polar bear commission held its first meeting in September 2009. The adoption of rules of procedure to govern operation of the commission was a main topic of discussion. The parties agreed to hold annual meetings alternating between the two countries as the host nation. The parties also agreed that, in general, the commission would meet in open session and that observer status may be accorded to representatives of political subdivisions of the two countries, non-governmental organizations, and intergovernmental organizations that demonstrate an ability to contribute to the commission's work. The Alaska Nanuuq Commission and the Association of Traditional Marine Mammal Subsistence Hunters of Chukotka were granted permanent observer status. The commission also took note of the importance of the Agreement between the Native Peoples of Alaska and Chukotka Regarding the Conservation and Use of the Alaska-Chukotka Polar Bear Population and agreed to receive and consider recommendations from the joint committee established under that agreement.

Article VII of the agreement requires the commission to establish a scientific working group and allows it to establish other working groups as necessary. At the 2009 meeting, the commissioners agreed that, for the time being, only the scientific working group would be established. The parties agreed that the scientific working group would consist of 10 members, 5 from each country. The United States indicated that its members would include a habitat expert, a polar bear ecologist, a population biologist, a senior scientist, and someone with expertise in Native traditional ecological knowledge. The commission tasked the working group with providing guidance on a variety of scientific matters related to the

[21] http://alaska.fws.gov/fisheries/mmm/polarbear/issues.htm

commission's work, foremost among those being the formulation of recommendations concerning annual sustainable harvest levels and annual take limits.

The parties to the agreement deferred adopting any harvest levels pending the receipt of advice from the scientific working group. The commissioners agreed to maintain the status quo until its next annual meeting, with the United States continuing to allow hunting in accordance with the subsistence provisions of the Marine Mammal Protection Act and Russia retaining its ban on all hunting under a 1956 law.

The parties held their second meeting on 7-9 June 2010 in Anchorage, Alaska. Although the parties considered a wide variety of conservation-related issues, they focused attention primarily on identifying a sustainable harvest level. The scientific working group had met before the meeting and recommended a harvest quota of 45 bears to be shared by the two countries. Three of the four commissioners initially expressed support for adopting the recommended level. The Alaska Native Commissioner, however, thought that the recommended level was too low and unnecessarily conservative. He suggested setting the sustainable harvest level at 68 bears annually for a four-year period. This, he thought, would be consistent with the recommendations of the scientific working group, if one assumed a population size of 2,000 bears and a maximum potential growth rate for the population of 6 percent. Some Native participants on both sides and the representative of the state of Alaska supported this higher quota. The Marine Mammal Commission's representative on the delegation, however, questioned the scientific basis for this higher quota, noting that using a presumed growth rate of 0.06 is unrealistically high for polar bears in general and especially so for the Chukchi/Bering Seas population.

The U.S. Commissioner chairing the meeting put forward a compromise proposal. He suggested that the annual harvest limit be set at 58 bears under a five-year block quota of 290 bears, with no more than 68 bears to be taken in a given year. Consistent with the scientific working group's recommendation, the proportion of females in the harvest should not exceed one third (i.e., a 2:1 male to female ratio in the harvest each year). Under this proposal, the scientific working group would review the allowable harvest level each year and either confirm that it remains appropriate or recommend adoption of a new quota.

The head of the Russian delegation responded that he could not accept that option because it had not been considered and approved by the scientific working group. A recess was called while those members of the scientific working group in attendance (7 of 11 members) met in an ad hoc session to consider the new proposal. They concluded that the short-term impact of authorizing the removal of 58 bears per year would not be significantly different than the originally-proposed level of 45—it would translate in an additional harvest of only about four more female bears per year.

Based on this new analysis, the Commission approved an annual take of up to 58 polar bears per year, of which no more than 19 can be females. The parties agreed to defer implementation until the necessary legislative and enforcement mechanisms are in place. The parties also confirmed that all human-caused removals (e.g., bears taken illegally or in defense of life) would be counted against the quota. Representatives of the two countries were directed to identify the harvest seasons that would be established on each side. Each country also agreed to develop a plan for implementing a regulated harvest to be discussed at the next meeting of the parties.

The Marine Mammal Commission's representative at the meeting acknowledged the importance of that decision. Once implemented, the new quota would, for the first time, place enforceable limits on the number of polar bears that can be taken by Alaska Natives for subsistence. Equally significant, the decision would allow the legal taking of polar bears by Russian Natives for the first time in more than 50 years. However, he expressed reservations over the scientific basis for the quota. Although a quota of 58 bears might be supportable on an interim basis, he cautioned that a more rigorous review of the science underlying that quota is needed.

In response, the bilateral Commission agreed that the scientific working group would conduct an annual review of this harvest limit and make recommendations confirming continuation of the limit or specifying a new limit. The Commission also tasked the working group with formulating recommendations on how the new limit would be administered, including consideration of multi-year harvest limits.

The other key action taken at the 2010 meeting concerned the need to develop a cooperative research plan. Russia stated that the parties need to develop not only a compatible harvest monitoring and regulatory systems, but also a cooperative research program to provide the information on which harvest limits are based. The United States and the chair of the scientific working group concurred. However, the parties did not specify a process or timetable for developing such a plan.

The parties to the bilateral agreement next met in Moscow on 27-29 July 2011. The scientific working group held a meeting on 26 July in conjunction with the Commission meeting. The working group made recommendations concerning the adoption of a multi-year harvest management system that would reflect the life history of polar bears and the inter-annual variability in subsistence hunting. The proposal highlighted the need to establish upper limits both on the total number of bears and the number of female bears that could be taken in a given year. It also identified the desirability of addressing both credits and debits that could be carried over into future years, such that a certain number of unused hunting opportunities could be carried forward to the subsequent year or that reductions would be made if the annual allocation were exceeded. The Commission approved the recommendation that a multi-year quota system be introduced for an initial five-year period, and asked the scientific working group to develop a more detailed proposal for consideration at the next Commission meeting.

The Commission also adopted two other recommendations from the scientific working group. To address concerns that the working group needed to incorporate traditional ecological knowledge into its deliberations, the Commission decided to expand the size of the working group to include Native representatives. The United States was allowed to add two members from the North Slope Borough and Russia a representative from the Union of Marine Mammal Hunters. Following up on the discussion at the previous Commission meeting, the working group recommended that a joint United States-Russia research plan be developed. The Commissioners agreed and tasked the scientific working group with developing the plan.

The two countries provided updates on the steps being taken to establish mechanisms to implement, monitor, and enforce the authorized harvest levels. On the U.S. side, the Fish and Wildlife Service is working to conclude a cooperative management agreement with the Alaska Nanuuq Commission. The Russian representatives expressed interest in developing a similar program and, in response, the parties agreed to hold a joint workshop in Chukotka to support development of a Russian plan.

The Commission also believed that it would be useful to develop a public outreach strategy to disseminate information about its activities. Toward this end, it established a working group to develop press releases, a web site, and other materials for distribution. As an interim step, the parties agreed to post documents on the web site maintained by the Government of Chukotka. The parties agreed to hold the next meeting in Anchorage, Alaska, in June 2012.

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) regulates international trade in animal and plant species that are threatened with extinction or may become so if trade is not controlled. Although not specific to polar bears, CITES contributes to the conservation of polar bears, which are listed on Appendix II to the Convention, by controlling international trade.

In preparing for the 2010 Conference of Parties to CITES, the Fish and Wildlife Service, which has primary responsibility for implementing CITES for the United States, published a notice in the *Federal Register* seeking recommendations on a proposal that it might put forward. In line with its listing of polar bears as threatened under the Endangered Species Act, the Service specifically solicited comments on whether it should propose changing the listing status of polar bears to Appendix I. As discussed in the 2009 annual report the Commission believed that trade was not then a significant threat to polar bears and recommended against submitting an up-listing proposal for consideration at the Conference of Parties.

The Service nevertheless submitted a proposal to transfer the polar bear from Appendix II to Appendix I. The proposal noted that Article II of the Convention indicates that Appendix I shall include all species that are threatened with extinction and that are or may be affected by trade. The proposal also stated that the polar bear is threatened with extinction in accordance with the biological criteria set forth in CITES' Conference Resolution 9.24. In addition, the proposal noted that countries have been and are

engaged in active trading of polar bear parts, most of which are from wild bears. From 1992 through 2006, approximately 31,294 polar bear items (an average of 2,086 items annually) were exported or re-exported around the world, with 73 countries reporting polar bear imports. Finally, the proposal reviewed the predicted effects of receding sea ice habitat and concluded that the decrease in suitable habitat will exacerbate all other potential threats to the polar bear, "including, but not limited to, utilization and trade, disease or predation, contaminants, ecotourism, and shipping." In its proposal, the United States asserted that a precautionary approach, including listing the polar bear in Appendix I is necessary to ensure that commercial trade does not compound the threats posed to the species by loss of habitat.

Some CITES parties supported the U.S. proposal. They agreed that a precautionary approach to regulating international trade in polar bears was needed to help offset the threat to the species posed by climate disruption. Other countries, including three of the other range states (Canada, Norway, and Denmark on behalf of Greenland) opposed the proposed transfer. They argued that the species did not meet the biological criteria established under CITES to warrant an Appendix I listing. Opponents of the proposal also noted that there had been no recent increase in trade. They observed that what trade there was did not appear to be market-driven, but rather was based on an adaptive quota system to manage subsistence hunting. When put to a vote, the U.S. polar bear proposal failed to garner the required two-thirds majority, with 48 parties favoring the proposal, 62 against, and 11 abstaining.

At the end of 2011, the Fish and Wildlife Service was beginning to initiate its preparations for the 2013 Conference of Parties. It was unclear whether the Service would again propose a transfer of polar bears to Appendix I. However, recent information suggests that there has been an increase in polar bear trade since the 2010 CITES meeting and that market-demand seems to be fueling some of that increase. Prices for polar bear hides at auctions in Canada have more than doubled and prime pelts may sell for more than $10,000. This has translated into increased hunting pressure and moves to increase harvest levels for some populations. Thus, the situation seems to have changed since consideration of the 2010 proposal.

Arctic Ice-Associated Seals

Five species of pinnipeds occur commonly in U.S. Arctic waters, including the ringed seal (*Pusa hispida*), ribbon seal (*Histriophoca fasciata*), bearded seal (*Erignathus barbatus*), spotted seal (*Phoca largha*), and the walrus (*Odobenus rosmarus*). Alaska natives, scientists, managers, and conservationists often refer to the first four of these species as "ice seals" because, like the walrus, they associate with—and to varying degrees depend on—sea ice.

The National Marine Fisheries Service is the lead federal agency responsible for conservation of seals, and on matters pertaining to ice seals it cooperates with the Ice Seal Committee, which is composed of Alaska Natives who harvest seals for subsistence purposes. The Fish and Wildlife Service is the lead federal agency responsible for conservation of the walrus, and it cooperates primarily with the Alaska Eskimo Walrus Commission. The Services and these organizations work with Alaska Native communities, the Arctic Marine Mammal Program of the Alaska Department of Fish and Game, the U.S. Geological Survey, university researchers, and conservation organizations to conduct and support research and management activities related to ice seal species and walrus.

Until recently scientists generally have assumed that ice seal populations in U.S. waters were relatively unaffected by human activities other than in local areas (e.g., as a result of subsistence harvests by Alaska Natives). As is now evident, climate disruption, the associated rapid changes in sea-ice habitat and other environmental and ecological conditions, and the current and anticipated increases in human activities in the Arctic all pose serious risks to these species and to Arctic marine ecosystems (Laidre et al. 2008, Moore and Huntington 2008).

On the whole, however, support for research and assessment activities involving these species has been and continues to be inadequate, as is readily apparent in their stock assessment reports.[22] Undoubtedly, these species live in remote and inhospitable environments, and research and assessment are logistically difficult and expensive. Nonetheless, even with the growing awareness of climate disruption and the associated threats to Arctic marine ecosystems, the Services have yet to secure and provide resources needed to assess changes in the health and status of these species and to develop management strategies to protect and conserve them in the foreseeable future.

The record low sea-ice year in 2007 exacerbated concerns about the effects of climate disruption on these species. They use the ice for multiple purposes, including resting, reproduction, foraging, molting, and predator avoidance. In addition to changes in the physical environment, climate disruption will make possible increased human activities aimed at securing and using the Arctic's natural resources. Such activities include oil and gas development, commercial shipping, commercial fishing, military activities, tourism, and coastal development.

Collectively these activities may affect ice seals and walruses by disturbing them at sea and on land and ice, displacing them from important habitat, contaminating their feeding and resting areas, and injuring or killing them in fishing gear. For example, oil and gas development may disturb each of these species by generating noise, moving vessels and barges to support construction and drilling operations, constructing various types of infrastructure (e.g., platforms, pipelines), and developing coastal areas needed to support oil and gas operations. Oil and gas development also poses a risk of habitat contamination through discharge of drilling wastes and leaks or spills of oil, fuel, and other toxic chemicals. A large spill could have significant consequences for the walrus population if it occurred or spread at a time and in an area occupied by a large number of walruses, such as happens seasonally near the Bering Strait. Similarly, commercial shipping through the Arctic is increasing as sea ice recedes and brings with it a risk of collisions with cetacean species (e.g., bowhead whales). Although the risk of collision likely is not significant to pinniped species, it may increase disturbance from noise or the simple presence of vessels. Shipping also may lead to contamination of habitats, particularly from accidents that spill oil, fuels, or other toxic chemicals.

Prompted by listing petitions, the National Marine Fisheries Service and Fish and Wildlife Service conducted status reviews of all five species to determine if they warrant listing under the Endangered Species Act. The following sections describe the general biology of each species, the threats they face, recent information from the status reviews, and the status of listing decisions at the end of 2011.

Petitions to list ice associated pinnipeds under the Endangered Species Act

On 20 December 2007, 7 February 2008, and 28 May 2008, the Center for Biological Diversity submitted three petitions to list, respectively, the ribbon seal, the walrus, and bearded, ringed, and spotted seals under the Endangered Species Act. The petitions were based on threats from (1) loss of Arctic sea ice, (2) suspected high harvest levels in Russia, (3) oil and gas exploration and development, (4) rising contaminant levels in the Arctic, and (5) bycatch and competition for prey resources from commercial fisheries. Status reviews were completed for the ribbon seal (December 2008, spotted seal (October 2009) walrus (May 2010, bearded seals (December 2010), and ringed seal (December 2010). The results provide a comprehensive and valuable synthesis of current knowledge of these species, but also reveal significant deficiencies in the data needed to make informed management decisions. The details of the status review for each species, proposed listings, and progress are discussed below.

[22] http://www.nmfs.noaa.gov/pr/sars/region.htm

Ribbon seal (*Histriophoca fasciata*)

Figure IV-25. Adult male ribbon seal (Photo courtesy of Michael Cameron, NOAA)

The ribbon seal is one of the most recognizable of all pinnipeds because of the striking pelage pattern of adults (Figure IV-25). They are distributed primarily in the Okhotsk, Bering, East Siberian, and Chukchi Seas. They breed in two distinct areas, one in the Sea of Okhotsk and the other in the Bering Sea. They appear to use sea ice only during whelping, mating, and molting, all of which occur between March and June. During that period, they appear to prefer marine habitats with broken sea ice covering 60 to 80 percent of the surface or less than 15 cm thick so that they can break through to breathe. Mature females usually produce a single pup every year and nurse the pup for three or four weeks before weaning it. As the ice retreats into the Chukchi Sea, some ribbon seals follow it while others remain in the Bering Sea. Seals that do not follow the retreating ice do not haul out on land and recent tracking data indicate that they disperse throughout the Bering Sea–Aleutian Islands region and even into the North Pacific. Ribbon seals can live for up to 30 years, and they tend to be solitary throughout much of their lives. They feed on pelagic fish species such as walleye pollock but are thought to be relatively flexible in their foraging locations and habits.

Status and trends: Ribbon seals are difficult to count because they are widely dispersed. Burns (1981) estimated 240,000 ribbon seals worldwide in the mid-1970s, with 90,000 to 100,000 in the Bering Sea. Fedoseev (2002) estimated that the ribbon seals in the sea of Okhotsk increased from 200,000 (1968-1974) to 630,000 (1988-1990). The accuracy of these estimates is unknown. Ribbon seal numbers are thought to have varied markedly in the late 1900s because hunters harvested them and the numbers taken each year varied widely. In its status review of ribbon seals (Boveng et al. 2008), the National Marine Fisheries Service assumed a single global population of more than 200,000 animals. However, the review considered the accuracy of that estimate to be uncertain and cautioned that it should be considered an approximation based on limited information.

The effects of climate disruption and the need for listing: The National Marine Fisheries Service's status review (Boveng et al. 2008) concluded that the population is not currently in danger of extinction or likely to become so in the foreseeable future. However, the Service expects that ribbon seal abundance will decline gradually as the extent, quality, and duration of sea ice declines with climate disruption. It therefore added the ribbon seal to its Species of Concern list[23] and noted in its final rule that "there are no known regulatory mechanisms that effectively address global reductions in sea ice habitat at this time."

The Service's conclusion was based in part on the fact that the summer sea ice minimum generally occurs in September, whereas ribbon seals depend on the ice for reproduction and molting in the spring months. Sea ice will undoubtedly recede in the coming decades, but existing information is not sufficient to project the extent and quality of sea ice during the spring. The seals may be able to adapt by whelping, breeding, and molting earlier in the spring. In addition, changes in ice conditions almost certainly will act as a strong selective force on the ribbon seal population, favoring those seals that reproduce earlier in the season or are more capable of whelping and rearing their young in poor ice conditions. Finally, it is possible that the seals will use terrestrial haul out areas, although doing so in many areas will expose them to disturbance and predation.

Changes in the trophic structure of Arctic ecosystems also may affect ribbon seals and their ability to forage. However, they appear to be flexible foragers so they may be able to adapt to changing foraging

[23] http://www.nmfs.noaa.gov/pr/species/concern/#list

conditions. Given their tendency to disperse widely and lead relatively solitary lives, they also appear to be less vulnerable to human activities. Nonetheless, it remains to be seen whether and to what extent they are or will be affected by oil and gas development, commercial shipping and fishing, and other human activities, particularly when all these factors are considered together. At present, they do not appear to interact directly with commercial fishing operations. Whether they interact ecologically (i.e., compete) is not known.

The Center for Biological Diversity appealed the Service's finding for the ribbon seal and, on 13 December 2011 the Service published a notice (76 Fed. Reg. 77467) initiating a new status review. It did so, at least in part, based on (1) new information on ribbon seal movement patterns and diving behavior and (2) the Service's use of a modified threat-specific approach for analyzing the foreseeable future that the Service used in status reviews of the spotted, bearded, and ringed seals. The Service expected to complete its revised status review and provide its 12-month finding at the end of 2012.

Subsistence harvests: Russian commercial harvests removed as many as 20,000 ribbon seals per year in the 1950s, but current harvests are primarily for subsistence purposes. In Alaska, household surveys in the 1980s and 1990s indicate that Alaska Natives harvested about 200 ribbon seals per year (Allen and Angliss 2011). Kawerak, Inc., in conjunction with the Alaska Department of Fish and Game conducted household subsistence surveys in 2006–2007 and estimated that 12 Alaska Native communities harvested 91 ribbon seals in the Bering Strait area. Those estimates do not include seals that were struck but lost.

Stock assessment report: The most recent stock assessment report for the ribbon seal was completed in 2009.[24] It included a preliminary abundance estimate for the eastern and central Bering Sea of 49,000 seals, which is considered comparable with historical estimates and was used to infer that the stock has not experienced any major changes in recent decades. Given the uncertainty in the abundance estimate, the report did not include a minimum population estimate or an estimate of the potential biological removal level. The lack of such information undermines the Service's ability to determine the status of the ribbon seal, assess the risk to it from climate disruption, and develop measures to ensure its conservation.

Spotted seal (*Phoca largha*)

Spotted seals are distributed along the western north Pacific continental shelf from as far south as the Yellow Sea and Sea of Japan to the Sea of Okhotsk and into the Bering, Chukchi, and Beaufort Seas (Figure IV-26). Their distribution overlaps that of closely related harbor seals (*Phoca vitulina richardi*) and, like harbor seals, they prey on a range of species in coastal waters and periodically haul out on shore to rest. They have been reported breeding in eight distinct areas. However, the National Marine Fisheries Service treats them as three distinct population segments occurring in the Bering Sea; the Sea of Okhotsk; and the Yellow Sea and Peter the Great Bay in the Sea of Japan. Those divisions are based on small samples and preliminary analyses of genetic composition, potential geographic barriers, and significance of breeding groups.

Spotted seals are more gregarious than ribbon and bearded seals, and scientists have reported groups of more than 10,000 hauled out on the Kamchatka coast (Lowry and Burkanov 2008). In the late fall when sea ice begins to advance southward spotted seals leave their coastal haul out sites and begin to use the ice as a resting and foraging platform. They are common on small ice flows close to the ice edge, although tracking data indicate that some animals occur well within the pack ice, hundreds of kilometers from the ice edge.

Adult spotted seals are between 1.5 and 1.7 m long and weigh 70 to 130 kg with little difference between the sexes. They can live for up to 35 years. They breed in late winter, and adult females give birth in March. They wean their pups after 3 to 4 weeks and they mate shortly thereafter. Three of the eight known breeding areas are in the Bering Sea and the other five are in the sea of Okhotsk or Sea of

[24] http://www.nmfs.noaa.gov/pr/sars/species.htm

Japan. Spotted seals feed mostly on schooling fish (e.g. pollock, capelin, arctic cod, herring) and epi-benthic fish (e.g. flounder, halibut, sculpin), as well as crab and octopus. In turn, they are preyed upon by Pacific sleeper sharks, killer whales, golden eagles, Steller's sea eagles, ravens, gulls, polar and brown bears, wolves, arctic foxes, walruses, and Steller sea lions (Quakenbush 1988).

Status and trends: The National Marine Fisheries Service does not have what it considers a reliable estimate of current abundance for the spotted seal. Burns (1973) estimated a world population in the early 1970s of 335,000 to 450,000 spotted seals with 200,000 to 250,000 in the Bering and Chukchi Seas. Fedoseev (1971) estimated 168,000 spotted seals in the Okhotsk Sea in 1969 but later estimated a population ranging from 67,000 to 268,000 between the late 1960s and 1990s. In its status review for the spotted seal, the National Marine Fisheries Service estimated that the current Bering Sea and Sea of Okhotsk populations each exceed 100,000 seals. In contrast, the population in the Yellow Sea and Peter the Great Bay is much reduced. Counts of seals hauled out at this population's two breeding sites indicated 2,500 and 800 seals respectively (not corrected for seals in the water). This last population appears to be at far greater risk of extinction, and in recent decades China, South Korea, and Russia have sought to protect it by banning hunting, establishing a nature reserve, and giving the spotted seal special conservation status in portions of its habitat. To date, those measures have not proven sufficient to conserve and recover the population.

Effects of climate disruption and the need for listing: Compared with the ringed, bearded, and ribbon seals, spotted seals may be the least dependent on ice. For the most part, they appear to use the southern ice edge for pupping and foraging, but they also are capable of using coastal waters without ice, at least for a portion of their annual cycle. As with most Arctic marine mammals, the likely effects of climate disruption remain uncertain (see, for example, Burek et al. 2008). However, the Arctic Marine Mammal Program of the Alaska Department of Fish and Game has studied the diet, growth rates, body condition, age distribution, and productivity of spotted seals since 1962, and the results suggest that conditions in Alaska were least favorable for spotted seals in the 1970s. The explanation for this observation is not clear, but it may reflect decreased prey availability during that period (Quakenbush et al. 2009). Quakenbush et al. (2009) also reported that conditions appear to have improved since then. That finding supports the idea that climate disruption may not have affected spotted seals adversely in recent decades.

On 4 September 2008 the National Marine Fisheries Service released its 90-day finding regarding the petition to list spotted seals. The Service found that this petition contained substantial scientific and commercial information and that the status of the species warranted full review. On 20 October 2009 the Service released its proposed rule and 12-month finding regarding the spotted seal. It identified three distinct population segments of the spotted seal and indicated its intent to proceed with listing the southern distinct population segment as threatened under the Endangered Species Act.

On 21 December 2009 the Marine Mammal Commission wrote to the Service, supporting listing of the spotted seal southern distinct population segment and identifying the need to develop more suitable information to assess the status of the Okhotsk and Bering Sea distinct population segments. The Commission reiterated the need to devise and implement a research plan to address the major uncertainties and programmatic shortcomings revealed in the status review, including an adequate research budget. The Commission was particularly concerned about the inadequate basis for the Service's conclusions regarding the Okhotsk and Bering Sea distinct population segments, as revealed in the Service's statement that "in the absence of current information on the abundance levels or threats that may occur within each of the subdivisions… [we] have no basis to conclude that the spotted seal may be considered threatened or endangered." Finally, the Commission called for (1) strengthening efforts under the existing agreement between the United States and Russia on Cooperation in the Field of Protection of the Environment and Natural Resources and (2) consultation with the Department of State on ways to improve collaboration with Russian, Korean, Chinese, and Japanese researchers and managers responsible for the threatened southern distinct population segment.

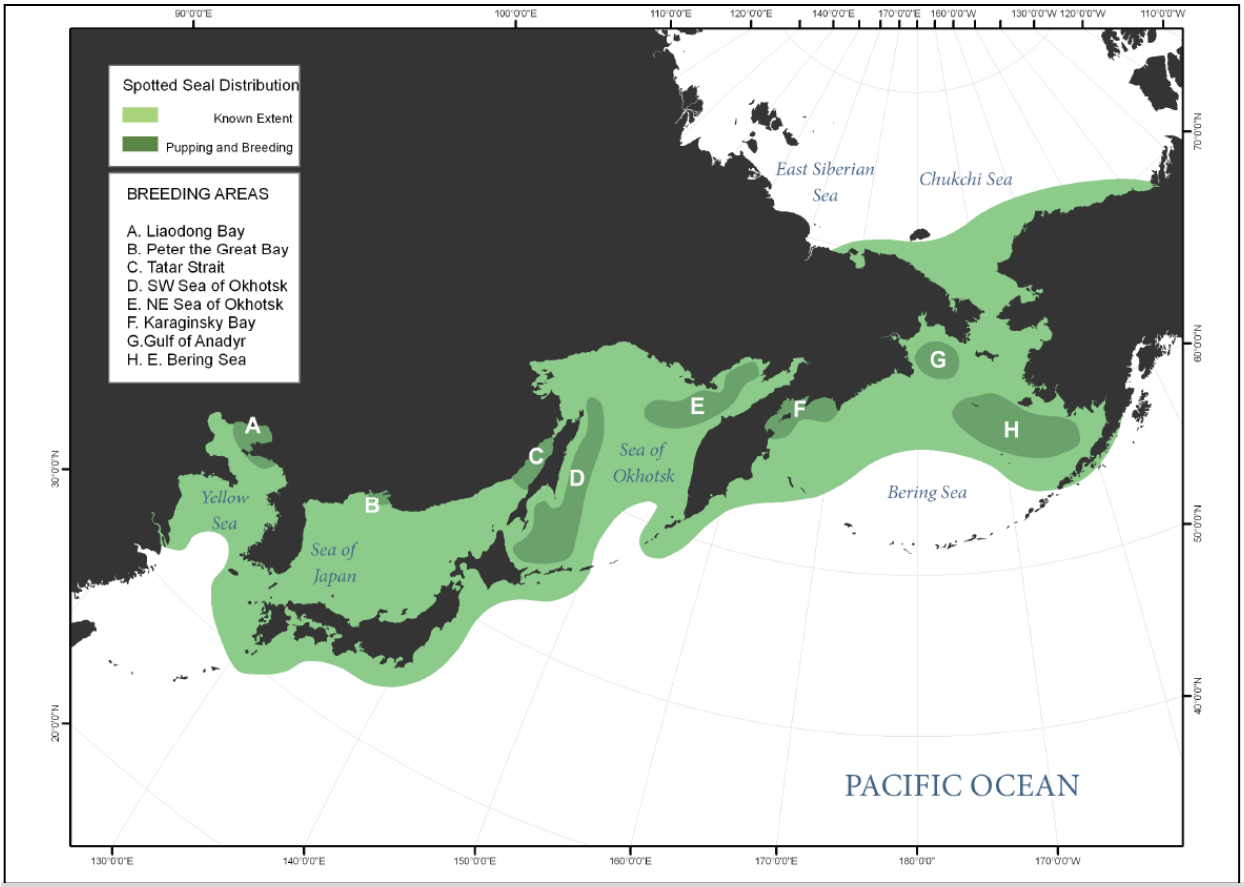

Figure IV-26. The global distribution of spotted seals (Boveng et al., 2009); seals at breeding and pupping areas comprise three distinct population segments: southern (A and B), Okhotsk (C, D and E) and Bering (F, G and H).

On 22 October 2010 the National Marine Fisheries Service issued a final rule to list the southern distinct population segment of the spotted seal (*Phoca largha*) as a threatened species under the Endangered Species Act. Because that population occurs outside the United States, the Service did not designate critical habitat.

Subsistence harvests: Historically the Russians harvested spotted seals for commercial purposes. In Alaska they are harvested for subsistence purposes, and household surveys indicate that Alaska Natives took about 5,300 spotted seals per year in the 1980s and 1990s (Allen and Angliss 2011). Kawerak, Inc., in conjunction with the Alaska Department of Fish and Game, conducted household subsistence surveys in 2006–2007 and estimated that the 12 surveyed communities harvested 2,509 spotted seals in the Bering Strait area. This estimate does not include animals struck and lost. Current harvest levels are unknown, and, absent better information, the effect of subsistence harvests of spotted seals cannot be described on a local basis or for the North Pacific population as a whole.

Stock assessment report: The National Marine Fisheries Service completed the most recent stock assessment report for the spotted seal in 2009.[25] The report did not include a minimum population estimate, description of population trends, or an estimate of the potential biological removal level. In the absence of reliable information about population abundance and demography, scientists are currently unable to describe with confidence the current status of spotted seals in Alaska waters, the current or pending effects of climate disruption on them, or the sustainability of current subsistence harvests.

[25] http://www.nmfs.noaa.gov/pr/sars/species.htm

Ringed seal (*Pusa hispida*)

The ringed seals are the smallest, most common, and most ice dependent of the Arctic seals. They comprise five subspecies. The most widely distributed (*P.h. hispida*) occurs throughout the Arctic Ocean. The others are *P.h. ochotensis* in the sea of Okhotsk and Sea of Japan, *P.h. botnica* in the Baltic Sea, and two freshwater sub species, *P.h. saimensis* in Lake Saimaa in eastern Finland and *P.h. ladogensis* in Lake Ladoga in Russia. Ringed seals can live for up to 30 years. Adults range from 115 to 136 cm in length and weigh 40 to 65 kg, males being slightly larger than females. Ringed seals play an especially important role in the Arctic where they prey on Arctic cod and a variety of invertebrates and are themselves the primary prey of polar bears. Polar bears prefer fat to a seal's other parts and ringed seal pups are approximately 50 percent fat by wet weight (Stirling 2002). In the eastern Beaufort Sea, up to 80 percent of polar bear diets may be young of the year ringed seals. If ringed seal productivity declines, the health of the polar bear population is likely to suffer accordingly (Stirling 2002).

Status and trends: Scientists have not surveyed Arctic ringed seals in all parts of their range, and current overall abundance is unknown. Educated guesses generally range from 1 to 4 million (e.g., Frost et al. 1988). The Arctic and Okhotsk subspecies are the most abundant. A century ago, the Baltic subspecies numbered between 190,000 and 220,000, but by the late 1970s it had been reduced to as few as 5,000 (Harding and Härkönen 1999). Although the decline likely resulted from commercial harvesting, reduced fertility from exposure to environmental contaminants also may have contributed (Harding and Härkönen 1999). The future status of this subspecies is unclear but likely will depend heavily on changes in ice habitat and contaminants. At the start of the 20th century the Ladoga subspecies numbered 20,000 animals, but by the 1970s it had been reduced to 10,000, in part by bounty hunting (Agafonova et al. 2007). Recent yearly bycatch of Ladoga ringed seals is as high as 10 to 16 percent (Verevkin et al. 2006), which is clearly unsustainable, as this population also is subject to high harvest levels. The IUCN lists the Ladoga ringed seal as endangered (Kovacs et al. 2012). The Saimaa ringed seal numbers in the low hundreds, is listed by the IUCN as critically endangered, and is vulnerable to climate disruption, inbreeding, fisheries bycatch, and high pup mortality. Conservation of this subspecies will require careful and steadfast management (Sipilä and Kokkonen 2008).

Effects of climate disruption and the need for listing: Ringed seals depend on ice and may decline greatly or even be extirpated throughout much of their range as a consequence of climate disruption. Arctic ringed seals in particular rarely haul out on land but rather use sea ice habitat to reproduce, molt, rest, feed, and avoid predators. In the winter and spring, they use shorefast ice (ice attached to land) or the pack ice, often in areas with greater than 90 percent ice coverage. In consolidated ice, which can be up to 2 or 3 m thick, they maintain breathing holes by abrading ice along the inside of the holes. Females excavate birth lairs in snowdrifts that form over their breathing holes to protect themselves from predators while they rest, give birth, and nurse their pups. Such lairs also protect the females and their pups from harsh Arctic weather.

Changes in sea ice habitat undoubtedly will have a significant impact on ringed seals. If poor ice conditions or precipitation causes a lair occupied by a pup to collapse before the pup is capable of fending for itself, it may die from exposure to inclement weather or predation. Late ice formation, early breakup of shorefast ice, and increased precipitation already have affected ringed seal denning behavior along the shorefast ice of the eastern Beaufort Sea, threatening female reproductive success and pup survival (Harwood et al. 2000). When summer sea ice has receded to the point that the Arctic is ice free, the seals will either have to remain at sea during the ice free period or haul out on land. Ringed seals in the Baltic Sea, Sea of Okhotsk and the freshwater lakes of Finland do haul out on land (Laidre et al. 2008), suggesting that seals of the Arctic subspecies may be able to do so as well, but they likely will be restricted to those areas that are not easily accessible to predators (e.g., polar bears, wolves, foxes, grizzly bears). Ringed seals also are vulnerable to climate disruption because the loss of ice likely will alter the nature and extent of primary production and the trophic food web that is based on that production.

Whether individual seals can adapt by changing their behavior or the ringed seal population can persist by virtue of strong selection on their natural history traits is not clear. The ability of scientists to

predict the effects of climate disruption on ringed seals will depend heavily on whether the necessary research is conducted to investigate their natural history, behavior, adaptability, and changes in abundance as the ice recedes. Undertaking such studies will require collaboration and cooperation by all interested and concerned stakeholders. Research by the Alaska Department of Fish and Game, federal agencies, and university researchers has been improved in recent years by participation of Alaska Natives, who have helped tag and track ringed and bearded seals and collected samples for genetic research and stock identification. Such research provides information on seasonal movements, diving behavior, and habitat use. Participation in research builds management capacity in Alaska Native villages through education and direct involvement in the research effort. It also provides cost-effective and practical support for researchers studying Arctic pinnipeds and promotes exchange between scientists and Alaska Natives, who contribute traditional ecological knowledge of the animals and their habitat.

On 4 September 2008 the National Marine Fisheries Service released its 90-day finding regarding the petition to list ringed seals. It found that the petition contained substantial scientific and commercial information and that the status of the species warranted full review. Based on the status review (Kelly et al. 2010), on 10 December 2010 the Service released its proposed rule and 12-month finding indicating its intent to list four of the five subspecies (the Arctic, Okhotsk, Baltic, and Ladoga subspecies) as threatened under the Endangered Species Act. The Lake Saimaa ringed seal was listed as endangered in 1993.

On 23 March 2011 the Marine Mammal Commission wrote to the Service to—

- support listing of the Okhotsk subspecies as threatened;
- recommend further evaluation of the population structure of the Arctic subspecies and, particularly, whether ringed seals in the Canadian Archipelago might comprise a separate subspecies;
- recommend further evaluation of the status of and threats to the Baltic and Lake Ladoga subspecies, and consider whether they should be listed as endangered;
- reiterated the need to devise and implement a research plan to address the major uncertainties and programmatic shortcomings revealed in the status review, including a realistic research budget;
- encourage the Service to strengthen collaborative efforts among range states to assess the status and trend of ringed seal populations throughout the species' range; and
- encourage the Service to collaborate with the Alaska Native community to monitor abundance and distribution of ringed seals, and use seals taken in the subsistence harvest to obtain data on demography, body condition, reproductive status, seasonal movements, patterns of dispersal of young, fidelity of adults to breeding areas, population structure, disease and parasites, contaminant loads, and other pertinent topics.

In March and April 2011, the Service held public hearings on the proposed listings in Anchorage, Barrow, and Nome, Alaska. At the end of 2011 the Service published a notice (76 Fed. Reg. 77466) delaying a final rule on listing ringed seals by six months to further consider the uncertainty in model predictions of future snow and ice conditions and the potential impacts on the seals.

Subsistence harvests: Historically ringed seals have been harvested for both commercial and subsistence purposes. Russian commercial harvests were as high as 72,000 animals a year between 1955 and 1965 (Kovacs et al. 2008). During the 1990s Canadian Inuit harvests were estimated in the tens of thousands (Reeves et al. 1998), and Greenland hunters harvested 70,000 annually (Teilman and Kapel 1998). Household surveys during the 1980s and 1990s indicate that Alaska Natives took between 9,000 and 10,000 ringed seals per year (Allen and Angliss 2011). Kawerak, Inc., in conjunction with the Alaska Department of Fish and Game, conducted household subsistence surveys in 2006 to 2007 and estimated that Alaska Natives from 12 communities in the Bering Strait region harvested 1,357 ringed seals per year. None of those numbers include animals struck and lost. In the Arctic, subsistence harvesting will have a far smaller influence on ringed seals than climate disruption. Nonetheless, ill-managed harvests may compound the effects of climate disruption, contributing to local reductions in seals or possibly even

extirpation in areas that might otherwise support some seals. Careful management of harvests will be essential to prevent such adverse effects.

Finally, climate disruption may affect ringed and other ice seals in a variety of ways. Chapter IX of this report describes an unusual mortality event involving the ringed seal, other ice seals, walrus, and potentially polar bears. The cause has not been determined but one hypothesis is that it was caused by a pathogen extending its range northward as the Arctic warms.

Stock assessment report: The National Marine Fisheries Service's most recent stock assessment report for the ringed seal was completed in 2009.[26] The report does not include a minimum population estimate, provides only a brief description of population trends, and does not include an estimate of the subspecies potential biological removal level. In the absence of such information, scientists are hampered in their ability to describe the current status of ringed seals in the Arctic, judge the sustainability of local subsistence harvests, or predict the future impact of climate disruption.

Bearded seal (*Erignathus barbatus*)

The bearded seal species (*Erignathus barbatus*) is comprised of an Atlantic subspecies (*E.b. barbatus*) and a Pacific subspecies (*E.b. nauticus*) that overlap in distribution in the Russian and Canadian Arctic. In the western North Pacific, bearded seals use continental shelf habitat as far south as Hokkaido, Japan, and in Alaska they inhabit the continental shelf of the Chukchi and Beaufort Seas. They generally prefer loose, mobile pack ice with 70 to 90 percent sea ice coverage, cracks in large floes, and shorefast ice. In the spring in Alaskan waters, they tend to be more abundant from 20 to 100 nmi offshore except in Kotzebue Sound, where they are found in relatively high concentrations in nearshore waters (Bengtson et al. 2000, Bengtson et al. 2005, Simpkins et al. 2003). They may maintain breathing holes but do so less frequently than ringed seals. Bearded seals in the Okhotsk, White, and Laptev Seas use terrestrial haul out sites when sea ice is not available. However, seals in the Bering and Chukchi Seas rarely do so. Instead, those seals not migrating north with the sea ice remain in open waters. Bearded seals can live for about 30 years. At full size, they measure up to 2.5 m in length, are the largest of the northern ice associated seals and weigh as much as 361 kg (female) to 390 kg (male) (Kelly 1988). A dense "beard" of whiskers on the top lip and a relatively small head distinguish the species from other seals. They are especially vocal underwater and, for millennia, Native hunters have used their sounds to locate them. They tend to be solitary, occurring in low densities throughout their range. They congregate in late winter in nearshore pack ice to give birth to pups on sea ice, nurse pups for about 15 days before weaning them, and then mate. They do not excavate lairs like ringed seals, and pups can swim within a few hours of birth. Females with pups stay in the water more than 90 percent of the time, presumably to avoid predation by polar bears. They molt between April and August. They prefer continental shelf areas and are primarily benthic foragers, preying on various invertebrates and demersal fishes. Killer whales, Greenland sharks, and occasionally walruses prey on bearded seals, and Arctic Natives harvest them for subsistence purposes.

Status and trends: Current population size and trends are not well known. Cameron et al. (2010) reviewed historic and current abundance and trends and estimate an abundance of 95,000 in the Sea of Okhotsk population and 155,000 for the Beringia population. They considered all regional estimates for the Atlantic subspecies to be unreliable except in Hudson Bay, the Canadian Archipelago, and western Baffin Bay, where they cited an estimate of 188,000 bearded seals.

Effects of climate disruption and the need for listing: Like the walrus, bearded seals use sea ice as a resting platform between benthic feeding bouts and depend on relatively shallow areas for feeding. An early northward retreat of spring sea ice over the Chukchi Sea continental shelf may reduce bearded seal foraging efficiency, thereby affecting their condition, health, and ability to survive and reproduce. As the ice edge moves out over deep water, bearded seals may be forced to haul out on land, where they are

[26] http://www.nmfs.noaa.gov/pr/sars/species.htm

more vulnerable to disturbance and predation. As generalist feeders, they may adapt more readily than other ice seals to changes in ecosystem food webs.

As with all Arctic species, determining the effects of climate disruption on bearded seals will require baseline information for comparative studies. In recent years, Alaska Natives have joined scientists from the Alaska Department of Fish and Game, University of Alaska, and National Marine Mammal Laboratory to study bearded seal life history traits. Most recently, this collaboration has focused on methods to capture live adult seals and fit them with satellite-linked data recorders. The results from such studies will be useful in describing bearded seal distribution and movement patterns, diving and foraging behavior, key habitats, and other traits that can be used to develop correction factors for surveys of abundance.

On 4 September 2008 the National Marine Fisheries Service released its 90-day finding regarding the petition to list bearded seals. The Service found that this petition contained substantial scientific and commercial information and that the status of the species warranted full review. On 10 December 2010 the Service released its proposed rule and 12-month finding regarding the bearded seal. In the status review (Cameron et al. 2010) the Service indicated its intent to list as threatened both the Sea of Okhotsk and Beringia bearded seal populations as distinct population segments of the Pacific sub-species. The Service concluded that listing of the Atlantic subspecies is not warranted at this time.

On 23 March 2011 the Marine Mammal Commission wrote to the Service, supporting listing of the Okhotsk and Beringia population segments as threatened and recommending further monitoring and periodic re-evaluation of the status of the Atlantic subspecies. Additionally, the Commission reiterated the need to devise and implement a research plan to address the major uncertainties and programmatic shortcomings revealed in the status review, including an adequate research budget. The Commission recommended that the Service facilitate research and management cooperation among the five nations with jurisdiction over parts of the species' range. The Commission also recommended that the Service continue to collaborate with the Alaska Native community to monitor abundance and distribution of bearded seals, and use seals taken in the subsistence harvest to obtain data on demography, body condition, reproductive status, seasonal movements, patterns of dispersal of young, fidelity of adults to breeding areas, population structure, disease and parasites, contaminant loads, and other pertinent topics.

In March and April 2011, the Service held public hearings on the proposed listings in Anchorage, Barrow, and Nome, Alaska. At the end of 2011 the Service published a notice (76 Fed. Reg. 77465) delaying a final rule on listing bearded seals by six months to further consider the uncertainty in model predictions of future snow and ice conditions and the potential impacts on the seals.

Subsistence harvests: The bearded seal is one of the most important subsistence resources for Alaska Native communities along Alaska's western and northern coasts. The Alaska Department of Fish and Game (2000) estimated that Alaska Natives harvested between 6,500 and 7,000 bearded seals annually prior to 2000. Current statewide harvest levels are not known, but household subsistence surveys conducted in 2006 to 2007 by Kawerak, Inc., and the Alaska Department of Fish and Game indicate that 2,476 bearded seals were harvested by 12 communities in the Bering Strait area. Some unknown number of bearded seals are struck and lost each year, and Reijnders et al. (1993) estimated that the loss rate for bearded seals in Greenland may be as high as 50 percent. If struck and lost rates are similar in Alaska, then a large and potentially significant number of bearded seals that are killed each year are not accounted for in subsistence harvest management. Here again, human activities that affect this Arctic marine mammal cannot be managed effectively without better information.

Stock assessment report: The National Marine Fisheries Service prepares a stock assessment report only for the Pacific subspecies because, with rare exceptions, bearded seals occur in U.S. waters only in the North Pacific, Bering Sea, and Alaskan Arctic. The service completed its most recent stock assessment report for the Pacific bearded seal stock in 2009.[27] It did not include a minimum population estimate, description of population trends, or an estimate of the potential biological removal level. The lack of basic information about the stock precludes a meaningful assessment of its status and its

[27] http://www.nmfs.noaa.gov/pr/sars/species.htm

vulnerability to climate disruption, subsistence harvests, and the other human activities projected to increase in the Arctic in the foreseeable future.

Pacific Walrus (*Odobenus rosmarus divergens*)

Scientists divide the walrus species (*Odobenus rosmarus*) into two subspecies: the Atlantic walrus (*O. r. rosmarus*) and the Pacific walrus (*O. r. divergens*). The Atlantic subspecies is considerably less abundant than the Pacific subspecies and does not occur in U.S. waters (Table IV-6). Although some marine mammal and taxonomic literature recognizes the population of walruses centered in the Laptev Sea as a separate subspecies (*O.r. laptevi*), the Society for Marine Mammalogy does not.[28] Pacific walruses occur over the continental shelf of the Bering, East Siberian, Chukchi, western Beaufort, and now Laptev Seas and are easily recognized by their prominent tusks and large size—an average male weighs about 1,200 kg (2,645 lbs). Walruses can live for up to 40 years. Mature females produce a calf every two or three years, breeding in late winter and usually giving birth about 15 to 17 months later. Walruses feed in shallow waters, usually less than 80 m deep, and consume mostly clams and mussels and other benthic invertebrates such as snails and marine worms. They use their snouts to root in soft sediments, feeling for prey with their sensitive vibrissae. They use their mouths to create suction and remove animals from their shells. They also are known to eat seals, although the frequency with which they do so is not clear, and seals are not considered common prey. Walruses collectively consume an estimated 3 million metric tons of prey per year, making them an important ecological component of the Bering and Chukchi Sea ecosystems (Ray et al. 2006). Polar bears and killer whales are the only nonhuman predators on walruses, although adult walruses are formidable prey.

In winter, most Pacific walruses concentrate in polynyas and open leads southwest of St. Lawrence Island in Bristol Bay and the Gulf of Anadyr (Russian Federation). In summer, most females, juveniles, and calves follow the retreating pack ice into the Chukchi Sea, staying with the ice edge throughout the summer as it recedes and passes over the continental shelf. The retreating ice edge provides a resting platform that passes over feeding grounds, facilitating access to prey while reducing the likelihood of depleting any single feeding site. Once the ice edge has retreated beyond the continental shelf the walruses begin to use coastal haulouts until the ice reforms in winter. Other females and calves use coastal haulouts, particularly in the Gulf of Anadyr. Most adult males remain year-round in the Bering Sea, Gulf of Anadyr, and Karaginski Bay. During the summer, they rest on and feed from terrestrial haulout sites. The most common haulout sites in Alaska are Round Island, Cape Pierce, Cape Newenham, Hagemeister Island, and Cape Seniavin, all in Bristol Bay. In addition, walruses sometimes haul out on Punuk Island (near St. Lawrence Island), in the fall. Other walruses remain at terrestrial haulout sites

Table IV-6. Current abundance and trend estimates for Pacific, Atlantic, and Laptev Sea walrus populations.

Region	Abundance	Year	Trends
Bering-Chukchi Seas[a]	129,000[*]	2006	Unknown
Atlantic[b]	18,000–20,000	2005–2008	Mixed
Laptev Sea[c]	4,000–5,000	1982	Unknown

[a] Speckman et al. (2011)
[b] COSEWIC (2006), Lydersen et al. (2008), Witting and Born (2005)
[c] Fay (1982)
[*]Not corrected for the full range of Pacific walruses (see text)

[28] http://www.marinemammalscience.org/index.php?option=com_content&view=article&id=645&Itemid=340

along the north coast of the Chukotka Peninsula and on Wrangel Island in the Chukchi Sea. Haul out patterns are changing with climate disruption and in 2008, 2010, and 2011 large numbers (20,000 plus) of walruses used the barrier island north of Point Lay, Alaska as a haulout site. During fall, walruses move south with the advancing ice, sometimes aggregating in herds of thousands as they pass back through the Bering Strait and northern Bering Sea.

Status and trends

The abundance of Pacific walruses before European contact is not known but may have been on the order of 200,000 to 300,000. Commercial hunting began in earnest in the mid-1800s and caused wide fluctuations in walrus abundance over the next century (Fay 1982). By the late 1800s declines in walrus numbers were so severe that they contributed to widespread famine and starvation among Native populations (Allen 1895). The walrus population must have recovered to some extent by the early 1900s, but commercial hunting intensified again in the 1930s, peaking in 1937-1938 when Soviet hunters alone took more than 8,000 Pacific walruses (Krylov 1968). By the 1950s the Pacific walrus population had been reduced to 50,000 to 100,000 animals (Fay 1982). In the 1960s the Soviet Union and the state of Alaska independently established conservation measures to protect the Pacific walrus and the population rebounded. From 1975 to 1990 U.S. and Russian scientists conducted joint range-wide aerial surveys every five years to estimate abundance of the Pacific walrus population. The surveys produced population estimates with such wide confidence intervals that they were considered of little value for assessing population trends. The 1990 survey resulted in an estimate of 201,039 animals (Gilbert et al. 1992). Scientists did not survey the population between 1990 and 2006, partly because surveys are expensive and difficult to coordinate. In 2006 the Fish and Wildlife Service, U.S. Geological Survey, and the Russian institutes Giprorybflot and Chukotka TINRO surveyed the population again using newly developed aerial census techniques. The Fish and Wildlife Service reported the population estimate for the surveyed area as 129,000 with a very wide 95 percent confidence interval of 55,000 to 507,000 individuals. These figures were not corrected to account for the full geographic range of walruses including two areas where walruses normally occur, and therefore the estimates are biased low. Because of the wide confidence interval and the bias in the estimate owing to the incomplete geographic coverage, the 2006 estimate is considered unreliable and of little value for estimating population abundance and trends.

The effects of climate disruption and the need for listing

Climate disruption and the associated ongoing and projected reduction in sea ice habitat pose a serious threat to walruses. These animals are able to swim and feed for only a limited number of days and require resting habitat, either suitably thick sea ice or land near feeding areas (Figure IV-27).

The proximity of such habitat to adequate food sources determines whether walruses are able to consume enough prey to meet their energy needs. Since 2007 the summer sea ice has declined compared with previous years and large numbers of walruses have come ashore in 2007, 2009, 2010, and 2011 in Alaska and northern Chukotka following the northward retreat of the sea ice. Such use of land haulouts was not common in Alaska in recent decades and is consistent with the concern that the walruses will deplete the local food supply because they are limited to feeding around the haulout area. In addition, when hauled out on land they are more vulnerable to disturbance and, if disturbed, more prone to injury from trampling. Calves and yearlings are particularly vulnerable to injury by large adults moving to and from the water. The risk of injury is exacerbated if the animals are startled and stampede toward the water.

In 2007 Chukotka Natives and biologists observing haulout areas reported high levels of mortality, particularly of calves, and suspected that the cause was trampling. Seasonal sea ice was not as diminished in 2008 and relatively few walruses hauled out on land in northern Alaska. In 2008 the Eskimo Walrus Commission passed a resolution to limit disturbance of walruses at land haulouts. In 2009 walruses again hauled out in large numbers along the coasts of northern Alaska and Russia. At Icy Cape, Alaska, the

animals apparently stampeded, killing at least 131 calves. The cause of the stampede is not known, but the Fish and Wildlife Service and the Eskimo Walrus Commission continue to work with communities in Russia and Alaska to prevent such occurrences by avoiding activities that might disturb walruses hauled out on land. These efforts appear to be working as stampede-related mortality was reduced in 2010 and 2011.

Because of the risks posed to walruses by climate disruption, in February 2008 the Center for Biological Diversity petitioned the Fish and Wildlife Service to list the walrus under the Endangered Species Act. In December 2008 the Center sued the Service and the Secretary of the Interior for failing to respond to its petition. On 10 September 2009 the Fish and Wildlife Service acknowledged that there was sufficient information in the petition to indicate that listing the Pacific walrus under the Endangered Species Act may be warranted and initiated a status review. The Marine Mammal Commission reviewed the petition and, in January 2011, recommended that the Service propose to list the Pacific walrus as threatened and give the public the opportunity to comment. The Commission based its recommendation on concerns regarding four of the five listing factors set forth in the Endangered Species Act, including the—

- present or threatened destruction, modification, or curtailment of the species' habitat or range;
- potential overutilization for commercial, subsistence, recreational, scientific or educational purposes;
- secondary threats such as diseases, parasites, and predation; and
- inadequacy of existing regulatory mechanisms.

On 10 February 2011 the Fish and Wildlife Service published a 12-month finding on the petition to list the Pacific walrus (76 Fed. Reg. 7634). It found that listing was warranted but precluded at that time by higher-priority actions and it added the Pacific walrus to the list of candidate species. The Service stated that it would develop a proposed rule to list the Pacific walrus as its priorities allowed. On 12 July 2011, and as part of a multi-district litigation settlement agreement, the Service agreed to either submit a Proposed Rule or a not-warranted finding to the *Federal Register* for the Pacific walrus no later than Fiscal Year 2017.

Subsistence harvests

For several thousand years, Native communities in Alaska and Russia have relied on the Pacific walrus as a vital nutritional, cultural, and economic resource. Natives have depended, and continue to depend, on meat, ivory, and other walrus parts for food and other subsistence needs, including the production of handicrafts. In modern times, ivory carvings have become a particularly important source of income in some villages.

The Marine Mammal Protection Act of 1972 included exemptions to its moratorium on taking to allow Alaska Natives to continue harvesting marine mammals for subsistence purposes, or for making authentic handicrafts and clothing, provided that the take is not wasteful. In the 1960s and 1970s the Alaska Department of Fish and Game monitored the subsistence harvest. In 1980 the Fish and Wildlife Service assumed responsibility for harvest management. Currently, the Service and the Eskimo Walrus Commission work together with Native communities to monitor the subsistence harvest, collect biological samples from harvested animals, and conduct a statutorily required ivory tagging program.

In the 1960s and 1970s authorities monitored the harvest in seven villages. At present they monitor only the spring hunt in two villages—Gambell and Savoonga on St. Lawrence Island—where as much as 90 percent of the reported statewide harvest occurs.

In 1988, and as a result of amendments to the MMPA, the Fish and Wildlife Service initiated a marking, tagging, and reporting program for the Pacific walrus, as well as northern sea otter and polar bear, to help monitor subsistence harvest and prevent illegal trade in ivory or other marine mammal products. As a part of this program, it is required that all walruses harvested be reported and the tagging

Figure IV-27. A walrus herd resting on and swimming around a chunk of pack ice during the spring breakup in the Chukchi Sea, off the National Petroleum Reserves, Alaska (Photo courtesy of Steven Kazlowski, Minden Pictures)

of tusks occur within 30 days of the harvest. Although the Service intends for the program to be comprehensive, compliance is incomplete in some villages.

As part of the Walrus Harvest Monitoring Project, Fish and Wildlife Service employs or contracts with residents of Gambell and Savoonga to record the number of walruses taken and collect biological samples during a four week period each spring. This information is used to estimate the harvest and to gather information on the walruses harvested (e.g., reproductive rates). Because the harvesting of some walruses is not reported through the tagging program, above, and calves do not have tusks to tag, this second program also serves the purposes of counting harvested calves as well as developing tagging compliance correction factors that are applied to data from the tagging program to estimate the total harvest in the United States.

Hunters also shoot and then fail to recover an additional number of walruses. Fay et al. (1994) used data collected between 1952 and 1972 to estimate that 42 percent of shot walruses were not recovered. The Fish and Wildlife Service still uses that correction factor for struck and lost animals, although its accuracy is uncertain, particularly given changes to hunting practices and equipment. The total estimated annual harvests by Russians and Americans from 2003 to 2011 are listed in Table IV-7. The numbers taken in recent years are about half of those taken in the mid-1980s. The change could reflect a shift in harvesting practices, a purposeful reduction in harvests, a decline in the walrus population, changes in weather, ice and migration patterns that affect the harvest, or some combination of these factors.

The fishery department in Russia's Agricultural Ministry manages walrus harvests in Russia. Since 1992 Russian managers have allowed only Native people to harvest walruses. In 1998 Russia suspended its walrus harvest monitoring and research programs because of economic constraints. In 1999 the

Table IV-7. Combined U.S. and Russian harvest of Pacific walruses, 2003 to 2011. (Source: Fish and Wildlife Service)

Year	Number harvested U.S.	Standard error of number harvested U.S.	Number harvested Russia	Total number struck and lost	Estimated total number removed	Standard error of estimated total number removed
2003	2,162	128	1,425	2,598	6,185	221
2004	1,549	44	1,118	1,931	4,598	76
2005	1,399	8	1,436	2,053	4,889	14
2006	1,286	91	1,047	1,689	4,022	157
2007	2,376	74	1,173	2,570	6,119	127
2008	1,442	107	778	1,608	3,827	185
2009	2,123	379	1,110	2,341	5,574	654
2010	1,682	178	1,053	1,981	4,716	308
2011	1,104	112	NA	799	1,903	194

Eskimo Walrus Commission and the Fish and Wildlife Service secured funding from various sources, including the North Slope Borough and the National Park Service, to train and support Native villagers from Russia's Chukotka region in the collection of walrus harvest data. That support continued through 2005. In 2008 the National Park Service's Beringia Program provided further funding under a cooperative agreement with the Eskimo Walrus Commission, and that funding was to be used to collect Russian harvest data through 2009.

The management of the walrus harvest has been improved by co-management efforts involving the Eskimo Walrus Commission and the Fish and Wildlife Service. In 2002 the Marine Mammal Commission recommended initiation of a long-term tissue sampling effort to provide information on age-specific reproduction, prey selection, contaminant levels, and other important parameters to facilitate evaluation of the population' s status and trends. Accordingly, the Service and the Eskimo Walrus Commission have been collecting biological samples annually as funding allows. Much of this sample collection is driven by the goals of a variety of research projects. In addition, in 2007 the Alaska Native villages of Gambell and Savoonga decided to renew their local hunting ordinances, which dated back to the 1920s. They developed new ordinances, which were put into place in 2010, that limit the number of walruses that can be harvested on a hunting trip to 4 or 5 depending on the sex and age composition of the harvested animals. In 2011, the Native Village of Gambell was awarded a Tribal Wildlife Grant from the Service to administer the program and enforce the ordinances in both villages. The two communities have been working to ensure consistency with each other and with the Marine Mammal Protection Act.

Stock assessment report

The Fish and Wildlife Service completed its most recent stock assessment report for the Pacific walrus on 30 December 2009.[29] The report estimates the potential biological removal level at 2,580 walruses based on a minimum population estimate of 129,000. For the most recent five years of complete U.S. and Russian harvest data, the mean annual harvest estimate (corrected for hunting loss) is about 4,850 (Table IV-7). A large part of the discrepancy between these two figures (2,580 and 4,850) may be caused by the negative bias in the abundance estimate, which did not account for the full range of Pacific walruses. Nevertheless, the difference between the estimated potential biological removal level and the reported harvest level is substantial and sufficient to raise concerns about the population's ability to

[29] alaska.fws.gov/fisheries/mmm/stock/final_pacific_walrus_sar.pdf

sustain current harvests. Those concerns add emphasis to the need for better population assessment and are compounded by concerns about the effects of climate disruption on walrus habitat, poor calf survival, and an unusual mortality event at the end of 2011.

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Chapter V

INTERNATIONAL ASPECTS OF MARINE MAMMAL CONSERVATION AND MANAGEMENT

Section 108 of the Marine Mammal Protection Act directed the Departments of Commerce and the Interior, through the Department of State, to initiate negotiations to protect and conserve marine mammals under existing international agreements and to negotiate additional agreements as needed to achieve the purposes of the Act. Section 202(a)(5) of the Act directs the Marine Mammal Commission to "recommend to the Secretary of State appropriate policies regarding existing international arrangements for the protection and conservation of marine mammals, and suggest appropriate international arrangements for the protection and conservation of marine mammals."

During 2010 and 2011 the Commission was engaged in a number of international efforts to protect and conserve marine mammals, both through participation in international organizations and working bilaterally and multilaterally with scientists, managers, agencies, and organizations of other nations to address specific issues involving marine mammals. These activities are discussed in the following sections.

Global Assessment of Marine Mammals

In 2010 and 2011, the Marine Mammal Commission continued its work to develop a comprehensive global assessment of marine mammals. The goal of the project is to identify marine mammal species and stocks most in need of protection, to characterize the threats to these species and stocks, and to provide the Commission, U.S. government agencies, and the international community of scientists, managers, and interested organizations a basis for prioritizing their conservation efforts. The Commission formed a steering committee, developed partnerships with several other organizations interested in the project, and compiled data on the status and threats to marine mammal populations. The Commission also is seeking a means to identify needs and support the development of local or regional research/conservation capacity in foreign and international areas where marine mammal species are at high risk of extirpation or extinction.

In 2011, concurrent with the Commission's project, two expert groups produced a global assessment for pinnipeds (Kovacs et al. 2011) and another for sirenians (Marsh et al. 2011). The Commission will incorporate these assessments into its work. To avoid duplication of effort, the Commission has focused initially on producing a comparable assessment for cetaceans. When the background assessments are completed, the Commission will convene a group of international experts to develop conservation priorities across all marine mammal species. The results will be summarized in a report on the status of species, the key threats to them, and the highest priorities for conservation and research.

Global Threats to Pinnipeds

In 2008 the Marine Mammal Commission provided support to the Pinniped Specialist Group of the Species Survival Commission, International Union for Conservation of Nature (IUCN), to update Red List assessments for all pinniped species and subspecies. The results of that effort were summarized in a publication by Kovacs et al. (2011). The conclusions were as follows. The specialist group classified 32 percent of the 47 recognized pinniped species and subspecies as critically endangered, endangered, or

vulnerable. The three critically endangered taxa—Mediterranean monk seal (*Monachus monachus*), Hawaiian monk seal (*Monachus schauinslandi*), and Saimaa ringed seal (*Phoca hispida saimensis*)—also are listed as endangered under the U.S. Endangered Species Act. All three species are continuing to decline. The threats to the Mediterranean monk seal (see later section in this Chapter) include fisheries bycatch, intentional killing, and habitat destruction. The Hawaiian monk seal is threatened by entanglement in debris, shark predation, low food availability, direct fishery interactions in the Main Hawaiian Islands, and habitat loss from climate disruption and sea level rise (see Chapter IV). The Saimaa ringed seal is threatened by fisheries bycatch as well as climate-related changes in winter ice and snow conditions essential for breeding. Due to their low numbers, all three species could be seriously affected by an outbreak of disease.

The specialist group classified as endangered the Galapagos fur seal (*Arctophoca galapagoensis*), Galapagos sea lion (*Zalophus wollebaeki*), Steller sea lion (*Eumetopias jubatus*), Australian sea lion (*Neophoca cinerea*), Ladoga ringed seal (*Phoca hispida ladogensis*), and Caspian seal (*Pusa caspica*). They range in abundance from a few thousand to tens of thousands. Those with a larger abundance qualify for listing as endangered because of their high rates of decline. Galapagos fur seals and sea lions have been affected by repeated El Niño events and the Australian sea lion is threatened primarily by fisheries bycatch. Threats to Steller sea lions are discussed in Chapter IV; the western stock of Steller sea lions is listed as endangered under the U.S. Endangered Species Act and the eastern stock as threatened. Threats to Caspian seals are discussed later in this chapter.

The specialist group classified as near threatened the Guadalupe fur seal (*Arctophoca philippii townsendi*) and the Juan Fernandez fur seal (*A. p. philippii*). The Guadalupe fur seal is listed as threatened under the U.S. Endangered Species Act. Both of those species have small but increasing populations, but in reduced ranges (Kovacs et al. 2011).

The specialist group classified as vulnerable the northern fur seal (*Callorhinus ursinus*), New Zealand sea lion (*Phocarctos hookeri*), Baltic ringed seal (*Phoca hispida botnica*), and hooded seal (*Cystophora cristata*). The northern fur seal is designated as depleted under the U.S. Marine Mammal Protection Act. It is most threatened by indirect fishery interactions that—along with bycatch—also threaten the New Zealand sea lion (see the section on the New Zealand sea lion below). Both the Baltic ringed seal and hooded seal are threatened by climate-related changes in sea ice that affect their pupping and breeding habitat (Kovacs et al. 2011).

Finally, the specialist group classified both walrus subspecies, the Pacific walrus (*Odobenus rosmarus divergens*) and the Atlantic walrus (*O. r. rosmarus*), as data deficient, meaning the available information is not sufficient to assess status. The group also classified three other ice-associated pinnipeds, spotted seals (*Phoca largha*), Sea of Okhotsk ringed seals (*P. h. ochotensis*), and ribbon seals (*Histriophoca fasciata*), as data deficient (Kovacs et al. 2011).

Kovacs et al. (2011) discussed the status and geographical distribution of pinnipeds relative to global patterns of mammal biodiversity and status as described by Schipper et al. (2008). Because most marine mammal species, particularly cetaceans, occur in temperate or tropical regions, the Schipper et al. (2008) review focused on threats to marine mammals in those regions. Kovacs et al. (2011) found that the patterns described by Schipper et al. (2008) did not apply to pinnipeds, which are largely associated with cold water and high marine productivity such as occurs in upwelling areas, near the sea-ice edge, and around ocean fronts. Polar and sub-polar pinniped species have pelagic habits and large—and in many cases, circumpolar—ranges. The ranges of tropical and sub-tropical pinniped species are more restricted and often are tied to specific breeding locations. Kovacs et al. (2011) emphasized that the polar distribution of some pinnipeds makes them especially vulnerable to the long-term effects of climate change.

The major recognized threat to pinnipeds is from fishery interactions, whether direct (operational) or indirect (ecological, see Chapter VIII). Although the IUCN mammal assessment (Shipper et al. 2008) referred to pollution as a major threat to marine mammals, Kovacs et al. (2011) concluded that toxic contaminants are a primary population-level threat only for seal populations in the Baltic Sea. Organochlorines, such as pesticides, which concentrate in the blubber of seasonally fasting mammals, are

also of concern in regard to Mediterranean monk seals, Baltic ringed seals, and Caspian seals. Kovacs et al. (2011) also noted that concentrations of these substances in the environment and their threat to pinnipeds are decreasing dramatically in the areas where they have been banned. Entanglement in marine debris (as opposed to deployed fishing gear) is a threat to individual pinnipeds of many taxa, but Kovacs et al. (2011) concluded that marine debris is a significant population-level threat only to Hawaiian monk seals. Sources of noise pollution such as seismic exploration and mid-frequency sonar are documented threats for cetaceans, but the impacts of noise on pinnipeds are largely in the form of local disturbance.

Kovacs et al. (2011) also reviewed the history of sealing that brought many colonial breeding sea lion and fur seal populations close to extinction and left many with "fragmented, reduced distributions" and reduced genetic diversity. Many species have recovered under complete protection or harvest management but others have not returned to pre-harvest levels. Walruses were reduced dramatically throughout their Arctic range during early periods of sealing and whaling. Before a recent decline, the Pacific subspecies is thought to have recovered to pre-exploitation levels. The impact of current harvests of Atlantic walruses is difficult to assess with the available information. Two phocid (true seal) species are threatened by direct harvest today: the Caspian seal is threatened by both legal and illegal hunting, as well as fishery bycatch, and the Ladoga ringed seal is taken in unsustainable harvests and illegal hunting, and also is threatened by bycatch, habitat loss, disturbance, and pollution.

Climate disruption is emerging as the most important threat to pinnipeds worldwide. Kovacs et al. (2011) predicted that physical changes in pinniped habitats will lead to extinction of taxa currently listed as threatened (that is, critically endangered, endangered, or vulnerable) and force species of least concern into threatened status. In the higher latitudes, walruses are already showing dramatic responses to seasonal sea-ice retreat (see Chapter VI regarding the Arctic Report Card) and they and other ice-associated seals are losing sea ice habitat required for pupping, resting, molting, predator avoidance, and, for some species, mating (Laidre et al. 2008; Moore and Huntington 2008). Seasonally diminished ice will change regional productivity in Arctic and sub-arctic areas, altering the food web upon which ice-dependent and ice-associated pinnipeds depend. Land-locked pinnipeds in Lake Saimaa and Lake Ladoga, as well as Caspian seals, are already experiencing reductions in suitable ice-breeding habitat. If bycatch is not addressed, it is likely that the additional effects of climate disruption will push the Saimaa seal to extinction and the Caspian seal and Ladoga ringed seal to critically endangered status in the foreseeable future. In the tropics, rising sea levels, warmer temperatures, and ocean-acidification have the potential to reduce breeding areas for Mediterranean and Hawaiian monk seals and undercut the viability of the coral reef ecosystems that support Hawaiian monk seals. As tropical conditions expand into temperate zones, the amount of habitat available for cold-water pinniped populations will decline.

The Antarctic seals—Weddell seals (*Leptonychotes weddellii*), Ross seals (*Ommatophoca rossii*), crabeater seals (*Lobodon carcinophaga*), and leopard seals (*Hydrurga leptonyx*) —are classified in the Red List as least concern, with large populations and no evidence of significant declines. The effects of climate disruption are occurring more slowly in the Antarctic and are more regionally variable than in the Arctic, except for the western Antarctic Peninsula. As warming continues, future sea ice reductions and corresponding ocean changes are predicted to have similar impacts on these ice-breeding seals, including changes in their foraging, breeding, and molting habitat and in the availability and suitability of sea ice for pupping and predator avoidance (Kovacs et al. 2011).

Sirenian Conservation Assessment

Sirenians occur in the waters of more than 80 subtropical and tropical countries on five continents (Marsh et al. 2011). Dugongs (*Dugong dugon*) are exclusively marine, depending on shallow seagrass communities along the Indian Ocean, Red Sea, Persian Gulf, and western Pacific Ocean coasts from East Africa, the Indian subcontinent, and continental and archipelagic Southeast Asia to Japan, the western Pacific Islands, and Australia (Figure V-1). The Amazonian manatee (*Trichechus inunguis*) lives e

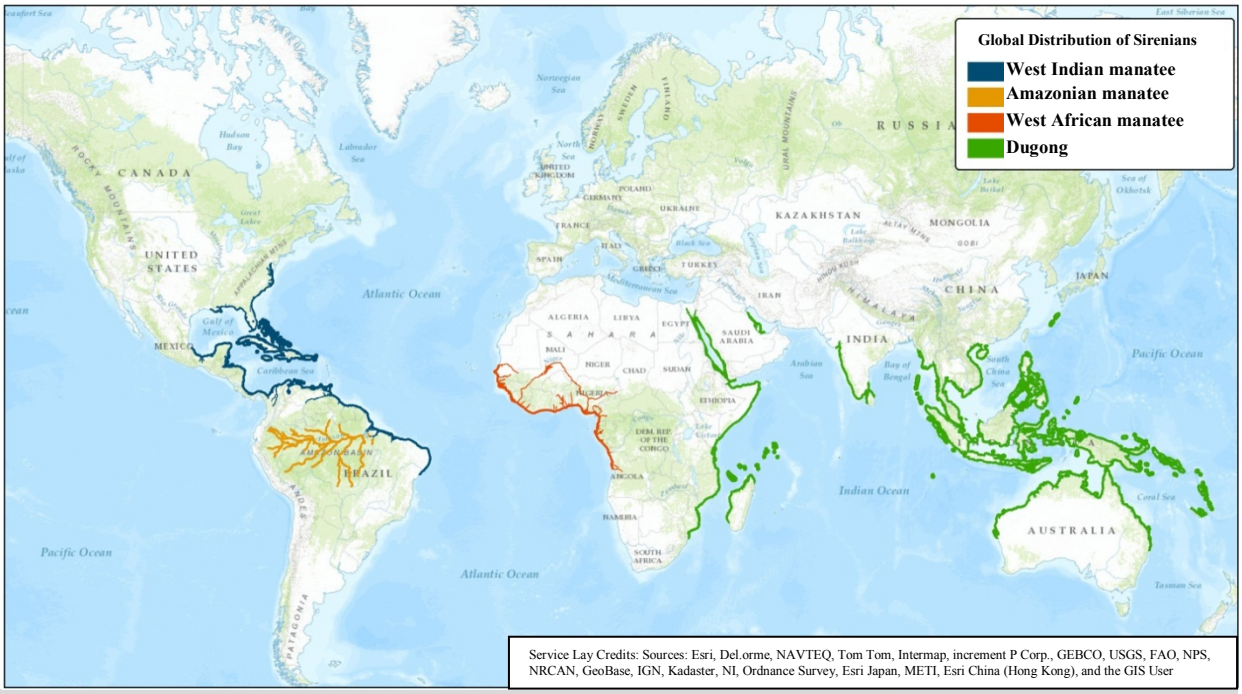

Figure V-1. Global distribution of the four species of Sirenia. The West Indian manatee includes both subspecies, the Florida manatee (*T.m. latirostris*) and Antillean manatee (*T.m. manatus*). Note that the range depicted in the map represents the extant range for each species, including seasonal or occasional distribution – i.e. in the case of the Florida manatee, which is predominantly in Florida, the overall range extends along the East Coast of the United States. (Spatial data source: IUCN 2012)

xclusively in fresh water, while West Indian (*T. manatus*) and West African (*T. senegalensis*) manatees occur in estuaries and shallow coastal waters as well as in freshwater lakes and rivers.

Marsh et al. (2011) reviewed the conservation status of sirenians and updated earlier assessments (Marsh et al. 2002, Marsh 2008) in the volume *Ecology and Conservation of the Sirenia: Dugongs and Manatees* (Table V-1). In its Red List, the IUCN lists all four sirenian species as vulnerable (Deutsch et al. 2008, Marsh 2008). However, it lists the Antillean manatee (*T.m. manatus*), a subspecies of the West Indian manatee, as endangered (Self-Sullivan and Mignucci-Giannoni 2008). Marsh et al. (2011) suggest that the status of the Florida manatee (*T.m. latirostris*), also a subspecies of the West Indian manatee, can be changed from endangered (Deutsch 2008) to vulnerable because a 2010 survey revealed that it contains more than 2,500 mature individuals. Florida manatees are discussed in detail in Chapter IV of this report. As indicated there and in Table V-1 below, the most significant threats to the Florida manatee include watercraft strikes and loss of warm-water habitat. The major threat to Antillean manatees and Amazonian and West African manatees is illegal and legal hunting for meat and other products. Incidental entanglement, habitat destruction, and waterway contamination and modification also pose threats to these species.

Dugongs are known or thought to occur in the waters of 43 range states. Their status and threats, and the measures in place to protect them, vary widely across those states. The species as a whole is listed as vulnerable. Building on previous assessments (Marsh 2008, Marsh et al. 2002), Marsh et al. (2011) were the first to classify regional populations using IUCN listing criteria. Although their classifications have not been formally accepted, they suggest listing the small dugong populations in Japan, Palau, and along the urban coast of Queensland, Australia as critically endangered; the East African, Indian subcontinent, Andaman and Nicobar Islands, and continental east and south-east Asia populations as endangered; and the archipelagic populations in east and southeast Asia (including Indonesia, Malaysia and the Philippines) and along the northern Great Barrier Reef and Torres Strait in Australia as vulnerable. The

existing data are not sufficient to assess several populations, including those in the Red Sea, Gulf of Aden, and Persian Gulf, warranting a data-deficient listing for these populations. Table V-1 summarizes status and threats by region as described by Marsh et al. (2011). Common threats to dugongs include incidental catch in fishing gear, intentional take, and indigenous and traditional hunting. Habitat loss from coastal development is widespread, especially in the highly populous regions of Asia and in areas of high industrial and urban development such as the Persian Gulf.

Marsh et al. (2011) also reviewed the conservation measures in place throughout the range of sirenians. Many range states have laws that prohibit killing of manatees or dugongs and many countries are party to international conventions broadly protective of species and habitat (e.g., Convention on International Trade in Endangered Species of Wild Fauna and Flora, Convention on Migratory Species, Ramsar Convention on Wetlands). However, the resources, personnel, and commitment to enforce protective measures, establish conservation programs, and actively manage protected areas are weak or absent in many states. Marsh et al. (2011) use the Human Development Index (United Nations Development Programme 2010) as a proxy for the ability of manatee and dugong range states to implement conservation actions. Their review indicates that Antillean manatee numbers are low and there is insufficient capacity to conserve them in the Caribbean, Central America, and northern South America. The IUCN Red List entry for the West African manatee[1] indicates that fewer than 10,000 exist and their conservation risks are thought to be high because 18 of their 21 range states rank low on the Human Development Index. With regard to dugongs, range states vary markedly in development and conservation capacity. Dugong populations and conservation capacity generally are low in East Africa, Sri Lanka, and continental southeast Asia. Australia and the Persian Gulf (Bahrain, Qatar, United Arab Emirates) are exceptional because they have the largest dugong populations and high conservation capacity. Despite the considerable conservation capacity of some dugong range states (e.g., Japan, Australia), coastal development still poses considerable risks to dugongs around Okinawa and in coastal regions of southeast Asia and Queensland, Australia.

To increase the availability of conservation and management information, the Marine Mammal Commission and several additional organizations provided support to distribute the assessment by Marsh et al. (2011) to libraries in developing countries where manatees and dugongs occur.

Regional Management Plan for the West Indian Manatee

In 2010, the United Nations Environment Programme, Caribbean Environment Programme, published the Regional Management Plan for the West Indian Manatee (*Trichecus manatus*) (United Nations Environment Programme 2010). The plan replaces its 1995 version and reviews the overall status of West Indian manatees in 20 countries of the wider Caribbean region from the southeastern United States to northeastern South America and Brazil. It evaluates manatee distribution and abundance in each range country, identifies threats, and provides short- and long-term conservation and research recommendations by country and for the overall region.

The United Nations Environment Programme (2010) estimates the overall number of West Indian manatees in the wider Caribbean to be "in the neighborhood of 9,000 animals." In most countries, the manatee population numbers from 100 to 500 animals. When the first action plan was developed in 1995, manatee numbers were estimated to be about 3,400 individuals in Florida and as few as 10 in the Bahamas (See Table V-2).

Habitat degradation and watercraft strikes are major threats throughout the manatee range. Other threats to West Indian manatees include entanglement in fishing gear, pollution, human disturbance, and hunting. Manatees are protected by law in much of their range and manatee protection areas have been declared or are under development in several countries. Nevertheless, the activities that threaten manatees continue. For example, hunting manatees is often illegal, but they are still killed in many countries for "meat, oil, amulets, and other products and, on a more restricted basis, as a socio-cultural activity."

[1] http://www.iucnredlist.org/details/22104/0

Table V-1. Regional assessments of dugong and manatee conservation status, based on Marsh et al. (2011). The authors assessed the status of sirenian populations based on IUCN Red List criteria. The status given for regional dugong populations is proposed but not yet adopted by the Red List authority. Manatee status reflects the current Red List, except where noted.

Species/Region	Status	Primary Threats	Conservation Actions
Dugong: East Africa	**Endangered** Isolated from other populations, fewer than 2,500 individuals and decline of at least 20 percent within two generations	Incidental capture in fishing gear, especially gillnets	Protective legislation in place, capacity to implement protection limited; protected area initiatives aim to protect dugongs in Kenya, Mozambique, Seychelles, and Tanzania
Dugong: Red Sea and Gulf of Aden	**Data Deficient** No current abundance estimates or trend information	Incidental capture in fishing gear, especially gillnets; habitat alteration and degradation; pollution; boat strikes; disturbance	Protected by legislation in most countries of the region; a Strategic Action Program for the Red Sea and Gulf of Aden aims to develop a framework for protection of the environment and sustainable development
Dugong: Arabian/Persian Gulf	**Data Deficient** Several thousand dugongs, the largest population outside Australian waters	Incidental and deliberate capture in mesh nets and habitat loss caused by dredging and development of seagrass beds; risk of catastrophic oil spills; potential impact of climate change	Protected by national legislation in Bahrain and the United Arab Emirates (UAE); major marine protected area in core dugong habitat in UAE; leadership provided by UAE, which hosts the Dugong Memorandum of Understanding under the Convention on Migratory Species
Dugong: Indian subcontinent and Andaman and Nicobar Islands	**Endangered** Fewer than 2,500 mature individuals and decline of at least 20 percent within two generations; numbers very low and populations fragmented and isolated	Illegal hunting; incidental capture in fishing gear; habitat destruction; threats almost certain to continue because of high levels of rural poverty	Protective legislation in India and Sri Lanka; lack of resources and personnel for effective enforcement; need for alternative livelihoods for fishermen using gillnets and other destructive gear
Dugong: Continental east and southeast Asia, including the coastal islands and countries from Myanmar east and north to the southern coast of China south of Hong Kong	**Endangered** Fewer than 2,500 mature individuals and decline of at least 20 percent within two generations; populations small and patchy at the local scale	Incidental capture in fishing gear or through cyanide and dynamite fishing; habitat loss from coastal development, agricultural expansion (mostly shrimp farms), and destructive fishing practices; threats almost certain to continue because of high levels of rural poverty	Protective legislation throughout the region and some important dugong habitat protected by Marine Protected Areas; lack of resources/personnel for effective enforcement; need for alternative sustainable livelihoods

Species/Region	Status	Primary Threats	Conservation Actions
Dugong: East and southeast Asia, including major archipelagos of Indonesia, Malaysia, Philippines	**Vulnerable** Both population declines of more than 30 percent over last 10 years or three generations and decline in area of occupancy and/or quality of habitat	Incidental capture in fishing gear; deliberate capture; coastal development; habitat destruction	Protective legislation throughout the region; Indonesian action plan for dugong conservation; Coral Reef Triangle Initiative on Coral Reefs; lack of resources/personnel for effective enforcement
Dugong: Japan and Palau	**Critically Endangered** Populations in both areas fewer than 250 mature individuals and decline of at least 20 percent within two generations	Coastal development and habitat destruction	Protective legislation in place
Dugong: Australia	**Critically Endangered** Urban coast of Queensland; **Vulnerable** Northern Great Barrier Reef and Torres Strait; **Data Deficient** Northern tip of Cape York west to Northwest Cape in Western Australia; **Least Concern** Northwest Cape to Shark Bay in Western Australia; almost 70,000 dugongs in coastal waters of northern Australia	Indigenous hunting is greatest source of mortality throughout much of northern Australia, otherwise low levels of human impact; along the more urban coast of Queensland illegal poaching and incidental capture in gillnets, threats to seagrass habitat from agricultural, urban, and industrial runoff; urban and port infrastructure development, dredging and fishing impacts	As a developed country Australia has implemented significant measures to protect dugongs at national, state/territory and local levels
Dugong: Western Pacific Islands, including Papua New Guinea waters of Torres Strait, Solomon Islands, Vanuatu, New Caledonia	**Data Deficient** Regional population in the thousands	Legal traditional hunting widespread and major source of mortality	Protective legislation in place, capacity to implement protection limited; regional action plan for dugongs developed by South Pacific Regional Environment Programme
Amazonian manatee	**Vulnerable** Population declines of more than 30 percent over last 10 years or three generations and decline in area of occupancy and/or quality of habitat	Illegal hunting for meat and other products; pollution; loss, alteration, and fragmentation of habitats; increasing droughts expected in Amazon basin with climate change	Protective legislation in place, protection not well enforced; captive rescue and rehabilitation programs in Brazil and Colombia

Species/Region	Status	Primary Threats	Conservation Actions
West Indian manatee	**Vulnerable** Less than 10,000 mature individuals and likely decline in population of 10 percent over three generations (60 years)	See subspecies	See subspecies
West Indian manatee: Florida manatee	**Vulnerable*** Small number of mature individuals (<10,000) and likely decline in population of 10 percent over two generations (40 years); almost certainly more than 2,500 mature individuals * A proposed change: 2008 IUCN Red List status is endangered	Watercraft collisions; loss of habitats, especially warm-water habitats; climate change; red tides; pathogens; contaminants	Protected by national legislation (U.S. Marine Mammal Protection Act, U.S. Endangered Species Act, and state of Florida Manatee Sanctuary Act; significant resources spent on research, management, enforcement, and education, including manatee protection plans, creation of regulatory zones, habitat acquisition, and rescue, rehabilitation and release programs
West Indian manatee: Antillean manatee	**Endangered** Fewer than 2,500 mature individuals and decline of at least 20 percent within two generations; paucity of effective conservation actions throughout range and effects of current and projected future anthropogenic threats	Poaching; habitat loss; chemical contamination; entanglement in nets; and, increasingly in some locations, collisions with watercraft	Protected regionally under the Specially Protected Areas and Wildlife (SPAW) Protocol and by protective legislation in most or all range states, lacking resources/personnel for effective enforcement and need for alternative sustainable livelihoods
West African Manatee	**Vulnerable** High probability of decline of 30 percent or greater within three generations (about 60 years); level of threats will increase throughout the range resulting in near extirpation in some regions; sirenian at greatest risk of extinction because of high levels of poverty throughout its range	Hunting a major problem across the range; incidental capture in fishing nets; vessel collision; death in turbines or intakes of hydro-electric generators; habitat loss; entrapment in channels; live-capture for exhibition; pest control	Protective legislation in all range states, but enforcement and control of hunting appears negligible; 16 West African countries signed a memorandum of understanding under the Convention on Migratory Species to conserve the small cetaceans and manatees of West Africa and Micronesia

The plan makes specific international, regional, and national recommendations for each country in the West Indian manatee's range. It gives high priority to continued assessment of manatee status and distribution conducted with standardized protocols and techniques for data collection in all range states. It emphasizes law enforcement and compliance, environmental education, and the development of national recovery plans throughout the manatee's range. Regional collaboration is especially important between

Central American countries (Mexico, Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama) where manatee populations straddle national borders. Joint enforcement, research, and education efforts (often at adjacent wildlife sanctuaries in different countries on the Caribbean Sea coast) can extend the reach and effectiveness of protective measures. At a larger scale the plan calls for the development of a regional manatee network for the wider Caribbean region to allow exchange of information among managers, researchers, and students.

Table V-2. Population estimates of West Indian manatees (UNEP 2010). Estimates in this table generally date from 2006 or earlier (see Florida manatee section in Chapter IV for more recent abundance estimates). Minimum population refers to minimum counts or estimates based on best available data. Note: Trend I = increasing, S = stable, D = declining, U = unknown

Country	Trend	Minimum population	Population estimate
Bahamas	I	3-5	10
Belize	S/D	400-700	1,000
Brazil	S/D	<500	500
Colombia	U/D	100-1000	500
Costa Rica	D	31-66	100
Cuba	U/D	U	100
Dominican Republic	D	30-45	100
French Guiana	S	10s?	100
Guatemala	U	53±44	150
Guyana	D	?	100
Haiti	U	8	100
Honduras	S	11	100
Jamaica	U/D	<50	50
Mexico	U	1,000-2,000	1,500
Nicaragua	D	71	500
Panama	U	10-100	100
Puerto Rico (U.S.)	S	128	300
Suriname	D	10s?	100
Trinidad and Tobago	D	25-30	100
United States (Florida)	I	3,276	3,400
Venezuela	D	?	100
Total			9,010

The Global Extent and Character of Marine Mammal Consumption by Humans

Global discourse on the taking and consumption of marine mammals is often centered on commercial whaling of large mysticete whales by a small number of countries. Robards and Reeves (2011) looked more broadly at human consumption of marine mammals since 1990 and found that it is widespread around the world, occurring at some level in 114 out of 194 countries and affecting at least 87 marine mammal species (i.e., pinnipeds, otters, polar bears, and cetaceans). In the Arctic and other remote areas marine mammal consumption can be integral to food security, economic viability, and cultural continuity. Nonetheless, Robards and Reeves (2011) conclude that marine mammal consumption is probably unsustainable or at least of uncertain sustainability in large areas of the world based on a combination of

increasing take of marine mammals, uncertainty in their status, and poor capacity to monitor and manage take levels.

Although commercial whaling and other taking of marine mammals have been and are being managed more carefully in some coastal areas and on the high seas over the past half century, socio-economic factors and changing fishing technology have led to increased pressure on marine mammal populations, especially small cetaceans, in many areas. According to Robards and Reeves (2011), human consumption of incidentally captured marine mammals has increased rapidly, in many cases resulting in a transition to intentional taking. This transition to intentional take is especially prevalent in areas of poverty and poor food security, and supports the exchange or sale of meat for consumption at local, regional, and even international scales.

Marine mammals are hunted in at least 87 countries. Indigenous subsistence hunts take species ranging from dugongs and manatees in the tropics to pinnipeds, polar bears, belugas, narwhals, and gray and bowhead whales in the Arctic regions. Traditional local hunting of marine mammals for food occurs in places as remote and separate as the Faroe Islands, Indonesia, Japan, the Philippines, the Solomon Islands, and the Amazon basin. Hunting of large whales for food is greatly reduced from mid-twentieth century levels; Japan, Norway, and Iceland are engaged in limited hunts and subsistence whalers are taking small numbers of large whales in Greenland, Russia, the United States, Saint Vincent and the Grenadines, and Indonesia. Small cetaceans are targeted for food in Japan with an average annual reported catch that exceeded 17,000 animals between 1995 and 2004. Large numbers of pinnipeds are taken for pelts and to reduce fishery competition in Scandinavia, Canada, and Namibia, with some use of the meat for human consumption.

Robards and Reeves (2011) suggest that local stewardship must be encouraged in those areas where consumption is an emergent threat to regional marine mammal populations. This requires knowledge of the socio-economic context of marine mammal harvesting and of the factors that lead people to use marine mammals as food. Management cannot be successful without addressing the underlying issues of food and economic security.

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Species of Special Concern in Foreign and International Waters

Many marine mammal species and populations face major conservation challenges. Some species are in danger of extinction in the immediate future and others are being extirpated in large parts of their range. This section of the Commission report highlights some of the non-U.S. species and populations at greatest risk and identifies issues that must be addressed to conserve them. No attempt has been made to treat the subject comprehensively. The species and populations described here are only a sample of those for which significant new information became available to the Commission during 2010 and 2011.

Vaquita (*Phocoena sinus*)

The vaquita (Figure V-2) is the world's smallest cetacean species. It is also thought to be the most endangered because it is being decimated by bycatch in gillnets used to catch blue shrimp (*Litopenaeus stylirostris*) and finfish from small fishing boats in the northern Gulf of California, Mexico. At its current rate of decline, it is rapidly approaching extinction. The shrimp from this fishery is mostly marketed in the United States. In 1993 the Mexican government created the Upper Gulf of California and Colorado River Delta Biosphere Reserve in an effort to ban gillnet fishing in a core area near the mouth of the Colorado River. In 2005 the government established an additional Vaquita Refuge, again, with the intent of banning gillnet fishing. In 2008, it adopted the Action Plan for the Conservation of Vaquita. The plan calls for (1) monitoring and assessment of vaquita abundance and trends, (2) closure of the Vaquita

Refuge to gillnetting and enforcement of that closure, (3) buyouts of gillnet permits from fishermen to reduce fishing effort and encouraging fishermen to switch to other livelihoods, and (4) development of alternative gear to replace gillnets. The Commission's 2008 and 2009 annual reports described in detail the implementation of this plan. The following describes advances in monitoring, assessment, and development of fishing gear that will not entangle and kill the few remaining vaquitas and, hopefully, allow the population to recover.

Figure V-2. Vaquita (Photo courtesy of Thomas Jefferson, NOAA, joint research project with the Coordinación de Investigación y Conservación de Mamíferos Marinos/Dr. Lorenzo Rojas Bracho of the Instituto Nacional de Ecología (INE) in Ensenada.)

Monitoring and assessment: In 2008 Mexico and the United States co-sponsored a survey that resulted in an estimated abundance of 245 vaquitas (95 percent confidence interval 68–884; Gerrodette et al. 2011).That estimate is 57 percent lower than the previous (1997) estimate (Jaramillo-Legorreta et al. 1999), indicating an average annual decline of 7.6 percent during that period, an 89 percent probability of decline in the whole range, and a 100 percent probability of decline in the core portion of the range (Gerrodette et al. 2011). At any given time about 50 percent of the population is likely within the Vaquita Refuge and the remaining vaquitas are outside the refuge where they are vulnerable to gillnet bycatch (assuming full enforcement of the gillnet ban within the refuge).

Gerrodette and Rojas-Bracho (2011) used the 2008 assessment results to model the efficacy of current conservation measures under the Action Plan for the Conservation of Vaquita. They estimated annual vaquita bycatch to develop trajectories of the species' abundance under three management scenarios. Final results indicated a less than 10 percent chance of increase if only the Vaquita Refuge is closed to gillnet fishing (the current state). If a larger area proposed in the Action Plan is closed to gillnetting, the probability of recovery increases to 35 percent. The probability of recovery is more than 99 percent if the entire known range of vaquitas is closed.

Vaquitas are now so rare that they cannot be monitored effectively by visual surveys. To overcome that problem, the Mexican government (through the Minister of Environment and Natural Resources and the National Institute of Ecology), the Pacific Life Foundation, the Ocean Foundation, and the Cousteau Society provided support for an international group of scientists to develop, test, and deploy a passive acoustic monitoring array that can detect a 5 percent decline per year within five years and a 4 percent increase per year within five years (Rojas-Bracho et al. 2009). A pilot study demonstrated that the acoustic array was effective at detecting vaquitas (Jaramillo-Legorreta et al. 2011), but 9 of the 15 listening devices used in the pilot study disappeared, possibly because they were removed by illegal fishing operations in the Vaquita Refuge. To address that concern, the scientists who developed the array shifted the planned period of deployment to coincide with the lowest fishing effort (summer months). They deployed their array in early June 2011 and retrieved parts of it in mid-September, just prior to the shrimp fishing season. They also left some parts in place to provide year-round monitoring near the edges of the Vaquita Refuge. Initial analyses of the 2011 data confirmed the detection of vaquitas in the refuge and additional analyses were under way at the end of 2011 (Jaramillo-Legorreta et al. 2011, Jaramillo-Legorreta pers. comm.).

Although the Vaquita Refuge is being monitored, more survey effort is needed outside the refuge to fully assess habitat use by vaquitas and to detect shifts in their overall distribution. Acoustic arrays are not considered feasible outside the refuge because they are likely to be removed by trawl nets. One of a number of options being explored involves working cooperatively with the fishermen by mounting

acoustic detectors on their nets when they are working outside the refuge (Jaramillo-Legorreta et al. 2011).

Alternative gear development: At the Commission's May 2011 annual meeting in New Orleans, Mexican officials described the implementation of the Action Plan for the Conservation of Vaquita and progress toward development of alternative fishing gear that is safe for use in vaquita habitat. They described their program to pay some fishermen to stop or limit the use of gillnets, their declaration of the Vaquita Refuge, and their prohibition of gillnet fishing within it. Unfortunately, as explained above, the Gerrodette and Rojas-Bracho (2011) study indicates that the refuge is too small and, even with perfect enforcement, cannot protect vaquitas from entanglement in gillnets deployed in surrounding areas. Given the species' low abundance and rate of decline, the situation is rightly considered urgent and the only feasible solution is to stop the use of gillnets throughout the vaquita's range. To do so, the fishing communities in the northern gulf require alternative fishing gear.

The action plan includes a program to develop alternative fishing gear that would pose no risk to vaquitas while still catching shrimp. The Instituto Nacional de Pesca (INAPESCA) is the lead agency for gear development in Mexico. The Southeast Fisheries Science Center (U.S. National Marine Fisheries Service) has been working with INAPESCA on fishing gear design, development, and testing. The Center's Harvesting and Engineering Division helped Mexico test its own experimental shrimp trawl known as the "Red Selectiva" and developed two alternative designs based on small artisanal trawls used for similar shrimp species in the Gulf of Mexico, the "scorpion" trawl and the "box" trawl. As discussed in the Commission's 2009 annual report, each net type has strengths and weaknesses. The Red Selectiva is a strong, light net designed to withstand damage while towing but expensive to replace. The scorpion and box designs are less durable but also less expensive to buy and replace if damaged.

In 2009 Mexico encouraged its fishermen to participate in alternative gear tests. The first tests were conducted in the northern Gulf of California but were hampered by a poor shrimp season. The effort produced limited data and relatively low profits for cooperating fishermen. As a result, fewer fishermen participated in gear testing efforts in 2010. The 2010 trials had to be conducted at night because the density of stationary gillnets was too high during the day to allow research vessels to maneuver with towed nets. Gear towed at night when gillnetters were not fishing caught brown shrimp (*Farfantepenaeus aztecus*), a species not exploited commercially in the northern Gulf of California, rather than blue shrimp, the primary commercial species in the area. The trials were considered incomplete because they were limited to nighttime.

In the summer of 2011 INAPESCA informed the Marine Mammal Commission that the Mexican government would not fund additional gear trials. Because the development of alternative gear is vital to vaquita conservation, the Commission provided funds through World Wildlife Fund–Mexico, which allowed INAPESCA's gear testing program to proceed. The funds were in addition to those already provided by the Commission to support the Southeast Fisheries Science Center's collaboration with INAPESCA on this work.

With that support the Center and INAPESCA conducted gear tests first in the Gulf of Mexico and then in the Gulf of California. The number of trials was limited, but once tuned for the conditions in the Gulf of California and tested in daylight, the trawls caught blue shrimp in quantities comparable—or even surpassing—amounts caught using gillnets. The results convinced INAPESCA officials and at least some fishermen that the trawls are a commercially viable means to catch shrimp. Furthermore, INAPESCA and Center experts believe that the fishermen can be trained quickly in their use. Reportedly, INAPESCA will recommend the use of trawls as an alternative to gillnets to reduce vaquita bycatch and intends to open and amend the fishery regulations to allow their use in the northern Gulf of California. At the present time, fishermen adopting these nets will have difficulty fishing in waters heavily fished with gillnets. The development of proven vaquita-safe shrimp fishing gear removes the primary obstacle that has prevented the Mexican government from imposing a mandatory phase-out of shrimp gillnets in the northern Gulf of California.

Enforcement: Illegal fishing continues to be a significant problem in the Vaquita Refuge and the Biosphere Reserve. Addressing this problem requires significantly more enforcement by fisheries and

environmental agencies of both area closures and gear requirements. However, enforcement will be much easier if gillnets are banned entirely in the northern Gulf, because this regulation can be enforced on the beach. At the Commission's 2011 annual meeting a gear development specialist from INAPESCA noted that, during the 2010 gear trials in the northern Gulf of California, the technicians observed fishermen deploying gillnets up to 10 times the legal length of 200 m and, instead of setting just one net—as legally allowed, they set two or even three. These observations indicate more gillnets in the water than expected or allowed and also point to the need for stronger enforcement of fisheries regulations.

Within the Mexican government the Federal Attorney for Environmental Protection (PROFEPA) coordinates the enforcement program for the Biosphere Reserve and Refuge. PROFEPA recorded 45 infringements in 2010 and 2011, and confiscated 169 fishing nets, 45 vessels, and 12,365 kg of fishery products in the two years. The Mexican Navy contributed 86 sailors to the enforcement effort in 2010, but only 14 in 2011.

On 17 August 2011 the Commission wrote to the Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs describing the vaquita situation and expressing concern regarding the Mexican government's apparent inability to support continued gear testing. Concerned that "time is running out to reverse the vaquita's path to extinction," the Commission recommended that the Department of State express to the government of Mexico the following points:

- The United States is very concerned about the conservation of the vaquita in the northern Gulf of California and strongly supports Mexico's implementation of all elements of the Action Plan for the Conservation of Vaquita.
- The vaquita population will decline to extinction if gillnets are not removed from its entire range.
- Development of alternative fishing gear is essential to ensure that Mexican fishermen can continue to make a living without employing gillnets.
- The United States seeks Mexico's assessment of its program to design and test alternative gear and the details and timetables of efforts to get fishermen to use gear other than gillnets.
- The United States seeks advice on how it can (1) further support Mexico in developing alternative fishing gear that is practical and economically viable in the northern Gulf of California and (2) foster a successful transition to that gear in the affected fisheries.

At the end of 2011 the Commission had not yet received a reply from the Department of State and, at that time, was unaware of any diplomatic communication on this matter between the Department of State and the government of Mexico.

At the end of 2011 a meeting of the International Committee for the Recovery of the Vaquita (CIRVA) was scheduled for February 2012. This committee was created by the Mexican government in 1996 and met in 1997, 1999, and 2004. The fourth CIRVA meeting was expected to review progress in implementing the action plan, discuss and make recommendations on alternative fishing gear, and consider new information on the status of the vaquita and the monitoring program. The proposed agenda also included a report on the development and implementation of an Environmental Impact Assessment for Responsible Small-Scale Fishing in the Upper Gulf of California and Colorado River Delta Biosphere Reserve.

Mediterranean monk seal (*Monachus monachus*)

Mediterranean monk seals were once distributed throughout the Mediterranean and Black Seas and along the coast of northwest Africa. They have since been reduced to small fragments of their former range (Figure V-3). They now occur principally in the Aegean Sea between Greece and Turkey, and along a short stretch of the North Atlantic coast near the border of Mauritania and Western Sahara 1,000 miles (1,600 km) southwest of the Strait of Gibraltar. About 30 to 35 inhabit the Madeira Archipelago southwest of Portugal (Hale et al. 2011), and an additional few also occur off the Adriatic coast of Croatia

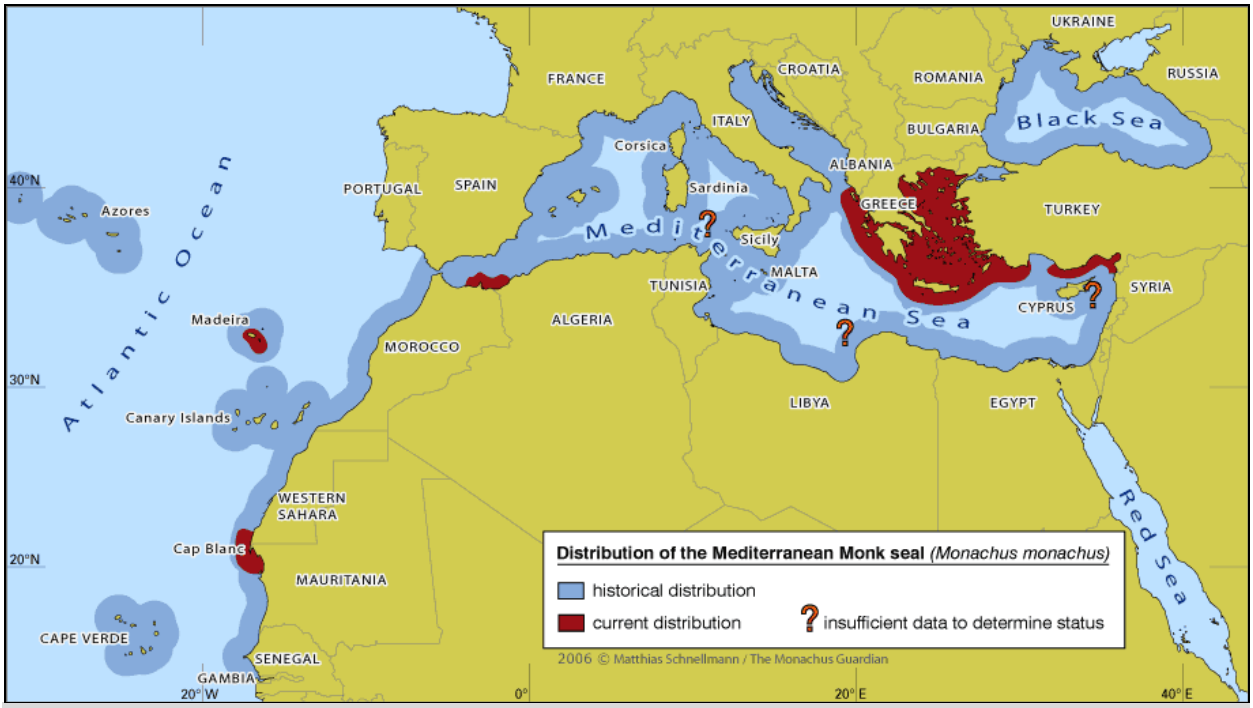

Figure V-3. Current and former range of the Mediterranean monk seal. (Johnson et al. 2006)

(Gomerčić 2011). Some may be found around the Italian islands of Sicily and Sardinia and the western Mediterranean coast near the Morocco-Algeria border (Mo et al. 2011).

Mediterranean monk seals tend to haul out in caves—a cryptic lifestyle likely adopted as a defense against centuries of human persecution. They are, therefore, difficult to study and surprisingly poorly known considering that they live in one of the world's most intensively used inland seas along shores of one of its most densely populated areas. Their abundance has been estimated to be from as low as 300 to 450 seals (IUCN 2007) up to 600 seals (Johnson 2006), making them one the world's most endangered marine mammals. They are listed as endangered under the U.S. Endangered Species Act and critically endangered by the IUCN.

Threats & Conservation actions: Principal threats to the Mediterranean monk seal are habitat destruction by coastal development; incidental drowning in gillnets; deliberate killing by fishermen who consider them competitors for fish; harassment by beach goers and recreational boaters; and random events, such as disease outbreaks and harmful algal blooms, that tend to accelerate the decline of very small populations. The largest cause of death observed in Greece is deliberate killing (Androukaki et al. 1999), which is a growing concern not only for Mediterranean monk seals but also Hawaiian monk seals in the Main Hawaiian Islands. In 2010 five Mediterranean monk seals were found dead of gunshot wounds in Greece and Turkey between January and June, and three Hawaiian monk seals were found dead of the same cause in the Main Hawaiian Islands in 2009 (NMFS 2011). The only other monk seal species occurred in the Caribbean region, and it was last observed in the early 1950s.

A small number of dedicated scientists and environmental groups have been trying to save the Mediterranean monk seal since the late 1970s, but progress has been slow and limited. The species' distribution in the waters of many nations is a major impediment because cooperation among nations has been poor. In addition, most national governments have been unwilling or unable to provide even minimal levels of funding for monk seal research or conservation programs. As a result, most research and conservation support to date has been provided by non-governmental conservation organizations, such as the World Wildlife Fund and The Hellenic Society for the Study and Protection of the Monk Seal

(known by the acronym MOm), a non-governmental conservation organization developed to promote monk seal research and management in Greece.

Perhaps the greatest threats and most intensive conservation efforts have been in the Aegean Sea. One of the first and most significant conservation actions in that area was the establishment of the National Marine Park of Alonissos by the government of Greece in 1992. Covering 2,200 km^2 (850 mi^2) of near shore waters around the North Sporades Islands in the northern Aegean, the park was designated in large part to protect one of the largest surviving colonies of monk seals, currently numbering about 50. Commercial fishing is restricted within a large portion of the park's waters and MOm has worked extensively with local residents and park visitors to promote human attitudes and behavior that will allow seals and people to coexist. The Greek government also adopted provisions to protect seals on the islands of Milos and North Karpathos, although enforcement has been weak in those areas. Similarly, to protect monk seals, the government of Turkey set aside an area closed to commercial fishing around the coastal village of Foça on the eastern Aegean coast.

In 2009 MOm completed a five-year "National Strategy Action Plan for the Conservation of the Mediterranean Monk Seal in Greece" (Notarbartolo di Sciara 2009). That plan updated a 1996 plan by emphasizing protection of seals in the wild. Previous proposals for actions such as captive breeding and translocations to start new colonies were tabled to emphasize conservation involvement and support, at national and local levels, development of a national network of protected areas and implementation of a broad framework of conservation measures to protect seals moving outside of and between protected areas.

The new plan calls for national legislation to improve seal protection and establish a National Monk Seal Conservation Commission. It also proposes a vigorous public awareness program targeting commercial fishermen and tourists, a national inventory of important habitat sites, involvement of local communities and user groups in management of designated protected areas, legally enforceable conservation measures that would be applicable throughout national waters, and more scientific research.

In 2010 the Marine Mammal Commission provided support for a cooperative research effort between scientists working on conservation of Mediterranean monk seals and Hawaiian monk seals. As part of the grant, a Greek scientist with MOm visited Hawaii to meet with National Marine Fisheries Service scientists and managers and other government and non-governmental personnel working on Hawaiian monk seal conservation. The meeting allowed participants to compare research and management strategies and results and discuss future collaboration between Greek and U.S. programs.

During the trip, the Greek Ambassador to the United States hosted a scientific round table at the Greek Embassy to review and identify priorities for Mediterranean monk seal conservation. The meeting was led by project leaders for the Greek monk seal program and the U.S. National Marine Fisheries Service, Hawaiian monk seal research program. Participants emphasized the importance of (1) identifying and protecting core monk seal habitat and (2) developing management initiatives that build local involvement and support among residents living near core seal habitat and stakeholder groups, particularly those involved in fisheries.

In November 2011 the Marine Mammal Commission co-sponsored a workshop on monk seal conservation at the Second International Conference on Marine Mammal Protected Areas held on Martinique. Researchers working on the Hawaiian monk seal and the Mediterranean monk seal populations in Turkey, Greece, Mauritania and Madeira gathered to review the status of both species and explore the use of marine protected areas for the conservation of these critically endangered marine mammals. The researchers agreed that monk seal protected areas are useful, but they espoused different views of their role in an overall conservation and management program. The workshop concluded with recommendations, foremost of which was that a group of scientists, managers, and advocates be established to (1) find common values, goals, and solutions among the communities that co-exist with monk seals; (2) raise awareness, understanding, and motivation by the public and governments to promote recovery of monk seal populations; (3) give greater attention to the social and economic components of protection and conservation strategies; and (4) develop and sustain international funding needed to support research and conservation efforts.

Research activities: Many of the research techniques developed and used to study Hawaiian monk seals have yet to be applied to Mediterranean monk seals because of limited funding and a lack of experience with those research methods by scientists working in the Mediterranean. To expand research capacity on Mediterranean monk seals, the Marine Mammal Commission's 2010 grant also supported efforts by U.S. and Greek scientists to develop a cooperative genetic research program. The program is intended to assess the Mediterranean monk seal's genetic diversity and the extent of interbreeding among seals in different parts of the species' range in Greece.

In 2010 and 2011 scientists defined protocols for collecting and storing genetic samples, assembled samples of seal tissue collected over the past 20 years for analysis, and conducted initial analyses to identify polymorphic microsatellite loci (i.e., those parts of the species genetic code useful for identifying breeding relationships between individual seals and groups of seals). Preliminary results confirm that the protocols are sufficient for identifying individual seals and their gender, which means that the scientists can also track the seals parental lineages. The results also indicate that seals in the Aegean and Ionian Seas may be reproductively isolated. All of this information will help scientists understand the movements and demography of seals in Greek waters and is therefore important for guiding recovery measures.

Western North Pacific population of gray whales (*Eschrichtius robustus*)

The western North Pacific population of gray whales is listed by the IUCN as critically endangered. In summer and fall many of the whales in this population forage off the northeastern coast of Sakhalin Island, Russia, but their migratory routes and winter/breeding habitat are poorly known. The 2009 population size (excluding calves), estimated from photo-identification data, was 134 animals (90 percent Bayesian confidence interval [CI] 120–142) with 33 (CI 29–38) reproductive females (Reeves et al. 2011). Until recently this population was thought to be entirely separate from the eastern population, which is found off the west coasts of Mexico, the United States, and Canada and the northeastern coast of Russia (mainly Chukotka, well to the north of Sakhalin). In 2010 and 2011 satellite telemetry, photo-identification, and genetic studies revealed new information on movements of gray whales between the western and eastern North Pacific. The extent of this interchange and its implications for the population structure of gray whales are uncertain. At the end of 2011, plans were underway to discuss this new information in the 2012 meeting of the International Whaling Commission's Scientific Committee.

Satellite tagging: As reported in the Commission's 2009 annual report, the International Whaling Commission, IUCN, and various U.S. and Russian scientists evaluated satellite tagging technology and techniques for a proposed 2010 gray whale tagging effort at Sakhalin. The tagging technology had been tested on 18 gray whales tagged off Oregon and California and, based on those results, the International Whaling Commission Scientific Committee developed safety protocols. The actual tagging project was initiated at Sakhalin Island in summer 2010 and was sponsored by Sakhalin Energy Investment Company and Exxon Neftegas Limited.[2] On 4 October 2010 the investigators tagged a 13-year old male gray whale in the feeding area off Piltun Lagoon along the northeastern Sakhalin coast. The whale, previously nicknamed "Flex" by photo-identification researchers, remained within 45 km of the tagging site for 68 days and left Sakhalin on 11 December. Over the next 55 days Flex migrated across the Okhotsk Sea, the Bering Sea, and the Gulf of Alaska. The tag stopped sending signals on 5 February 2011 when Flex was 20 km off the central Oregon coast (Mate et al. 2011a). He had traveled at least 7,546 km from Sakhalin to the U.S. west coast and, once there, his movements indicated that he had joined the late portion of the

[2] http://mmi.oregonstate.edu/Sakhalin2010. This research was conducted by the A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences (IEE RAS) and Oregon State University Marine Mammal Institute in collaboration with the University of Washington, Sakhalin Research Institute of Fisheries and Oceanography, and Kronotsky State Nature Biosphere Reserve. The research was contracted through the International Whaling Commission and International Union for Conservation of Nature with funding from Exxon Neftegas Ltd. and Sakhalin Energy Investment Company Ltd.

Figure V-4. A young gray whale breaching off Sakhalin Island, Russia. (Photo courtesy of David Weller, NOAA)

eastern population's southbound migration (Mate et al. 2011a, Mate et al. 2011b). He was not observed and identified south of Oregon, but was sighted again off Sakhalin in summer/fall 2011. Observers at Sakhalin reported that he appeared healthy and the area of tag attachment had healed, leaving a visible scar.[3]

In the 13 years since he was born, Flex had been identified only in the western North Pacific. His trans-ocean movement in 2010–2011 spurred a dedicated effort to compare eastern and western North Pacific photo-identification catalogs and the comparison revealed that, in fact, he had been observed before in the eastern North Pacific. A comparison of Sakhalin whales and gray whales photographed in April 2008 off southern Vancouver Island, British Columbia, Canada, revealed three individual matches (Weller et al. 2011a, and see below), including Flex. He had been photographed off Sakhalin in summer 2007, off Vancouver Island in April 2008, and again back at Sakhalin in summer 2008. The 2010–2011 round-trip migration across the North Pacific, documented by satellite telemetry and photo-identification, was not his first.

At its 2011 annual meeting, the International Whaling Commission Scientific Committee approved an expanded tagging program at Sakhalin coordinated by Valentin Ilyashenko (A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences) and Bruce Mate (Oregon State University

[3] http://mmi.oregonstate.edu/Sakhalin2011. This research was conducted by the A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences (IEE RAS) and Oregon State University Marine Mammal Institute in collaboration with the University of Washington, Sakhalin Research Institute of Fisheries and Oceanography, and Kronotsky State Nature Biosphere Reserve. The research was contracted through the International Whaling Commission and International Union for Conservation of Nature with funding from Exxon Neftegas Ltd. and Sakhalin Energy Investment Company Ltd.

Marine Mammal Institute). This called for tagging 12 animals "which are to the extent possible broadly representative of the non-calf, non-juvenile population of gray whales off Sakhalin…" (International Whaling Commission 2011a). The collaborative team deployed six tags in summer 2011. On 1 November 2011 tags continued to function on four females, including two multiparous adults (i.e., females known to have given birth to two or more calves) and two younger animals (ages 6.5 and 8.5 years), but no tagged animals had left the vicinity of Sakhalin Island.[4] By early December, signals were being received only from the tags on the two younger females that moved, on separate tracks, away from Sakhalin, southeast across the Okhotsk Sea to the Kamchatka Peninsula, around its southern tip, and then eastward across the Bering Sea toward Alaska. By the end of 2011, the whales were on separate tracks but both were southeast of the Aleutian Islands in the Gulf of Alaska.

Photo-identification: The photograph comparisons inspired by Flex's movements revealed that a number of whales have made or regularly make such movements. Reviews of gray whale catalogues from Sakhalin Island, Vancouver Island, and San Ignacio Lagoon (Baja California, Mexico) produced six matches (three males, two females, and one whale of unknown sex) between May 2004 and April 2008 off Vancouver Island and Sakhalin (including "Flex") (Weller et al. 2011a, Weller et al. 2011b), and four matches between the Russian feeding grounds and the wintering grounds in Baja California (two males and two females) (Weller et al. 2011a, Weller et al. 2011b, International Whaling Commission 2011). Five of the six whales photographed off Vancouver Island were photo-identified in Russia both before and after the Canadian sightings. Complete details on the movements of the four individuals matched between Sakhalin and San Ignacio lagoon from 2006 to 2010 were not yet available at the 2011 International Whaling Commission meeting.

Genetic identification and studies: Genetic matches of two gray whales (a female and a male) biopsied off southern California in March 1995 and off Sakhalin during the summer-fall feeding season in later years (1998 and 2004) also confirm movement of animals of both sexes between the western and eastern Pacific. Genetic evidence indicates that both of these whales have bred with whales that also feed off Sakhalin (Lang 2010, Lang et al. 2011a; see Table V-3).

Although this new information on individual movement indicates reproductive interchange between the eastern and western North Pacific gray whale populations, genetic studies still indicate significant differences between them. The extent of mtDNA differentiation and the distribution of haplotypes among individuals indicate strong matrilineal fidelity to Sakhalin, with a small number of females and their offspring returning repeatedly over time (Lang et al. 2011a). The extent of nuclear differentiation between eastern Pacific gray whales and gray whales feeding at Sakhalin is low but statistically significant, indicating some genetic interchange (Lang 2010, Lang et al. 2011a, Lang et al. 2011b). Based on the late fall conception dates (27 Nov – 13 Dec) estimated from whaling data in the eastern North Pacific (Rice and Wolman 1971), Lang et al. (2011a) surmised that if the fall migratory timing of Flex was any indication, western North Pacific gray whales would still be far west and not mixing with eastern Pacific gray whales at this time. On this point, in 2011 the two tagged females moved across the Pacific a month earlier than Flex did the year before. Rice and Wolman (1971) also indicated that gray whale females may enter a second estrus near the wintering grounds if they fail to conceive during the first period (Lang et al. 2011a).

Although some whales from Sakhalin move to the eastern North Pacific, others apparently remain in the western North Pacific in the winter months. There are 19 reports of gray whales in Japanese waters since 1955 and an animal previously photo-identified at Sakhalin died in a set net off Honshu, Japan, in January 2007 (Kato et al. 2010, Weller et al. 2008). On 5 November 2011, a 13.9 m female died in fishing gear off Baiqing Town in Pingtan County, Fujian Province, China (Anonymous 2011). At the end of 2011 scientists had not determined whether this individual had been previously identified off Sakhalin.

This new information shows that the migratory patterns and population structure of gray whales are more complex than previously thought. The International Whaling Commission Scientific Committee recommended additional genetic comparisons between Sakhalin and Baja California, further integration

[4] http://mmi.oregonstate.edu/Sakhalin2011

Table V-3. Recorded movements of individual gray whales between the western and eastern North Pacific Ocean as of 31 December 2011. NA = not available

Whale identifier	Sex	Years sighted in western North Pacific (Sakhalin)	Date identified in eastern North Pacific	Location in eastern North Pacific	Comments
Russia-U.S. 002/CRC 0817	M	1994-1995, 1997, 1999-2001, 2004-2009	02 May 2004	Vancouver Island	Photo match (Weller et al. 2011a)
Russia-U.S. 032/CRC 1045 "Flex"	M	1997-1998, 2001-2005, 2007-2011 Satellite tagged at Sakhalin fall 2010	25 April 2008 Signal lost off Oregon 5 February 2011	Vancouver Island Aleutians to Oregon (satellite track)	Photo match and satellite track (2010-2011) (Weller et al. 2011a, Mate et al. 2011a,b) http://mmi.oregonstate.edu/Sakhalin2011)
Russia-U.S. 035/CRC 0809	M	1995, 1997, 1998-2007, 2009-2010	02 May 2004	Vancouver Island	Photo match (Weller et al. 2011a)
Russia-U.S. 078/CRC 0825	U	1997, 1999, 2002-2004, 2006-2010	02 May 2004	Vancouver Island	Photo match (Weller et al. 2011a)
Russia-U.S. 119/CRC 1040	F	2003, 2010	25 April 2008	Vancouver Island	Photo match (Weller et al. 2011a)
Russia-U.S. 135/CRC 1042	F	2004	25 April 2008	Vancouver Island	Photo match (Weller et al. 2011a)
Labid:3950, 112186	M	First photo-identified off Sakhalin in 1994 or 1995. Genetically sampled in 1998	Genetically sampled 23 March 1995	Santa Barbara Channel, California	Genetic match Father of 2007 calf at Sakhalin (Lang et al. 2011a)
Labid:3947, 50728	F	Seen in 2003, 2004, 2007. Genetically sampled in 2004	Genetically sampled 20 March 1995	Santa Barbara Channel, California	Genetic match Reproductive female: three calves at Sakhalin between 2003 and 2007. At least one of calves fathered by Sakhalin male (Lang et al. 2011a)
NA	F	Dates NA	Identified in 2006-2010 photo catalog	Laguna San Ignacio, Mexico	Photo match (International Whaling Commission 2011a)
NA	F	Dates NA	Identified in 2006-2010 photo catalog	Laguna San Ignacio, Mexico	Photo match (International Whaling Commission 2011a)
NA	M	Dates NA	Identified in 2006-2010 photo catalog	Laguna San Ignacio, Mexico	Photo match (International Whaling Commission 2011a)
NA	M	Dates NA	Identified in 2006-2010 photo catalog	Laguna San Ignacio, Mexico	Photo match (International Whaling Commission 2011a)

Whale identifier	Sex	Years sighted in western North Pacific (Sakhalin)	Date identified in eastern North Pacific	Location in eastern North Pacific	Comments
Varvara	F	Satellite-tagged at Sakhalin summer 2011		In Gulf of Alaska 31 December 2011	Satellite track (http://mmi.oregonstate.edu/Sakhalin2011)
Agent	F	Satellite-tagged at Sakhalin summer 2011		In Gulf of Alaska 31 December 2011	Satellite track (http://mmi.oregonstate.edu/Sakhalin2011)

of existing photo-identification and genetic data, and collection of new data to clarify the stock structure of gray whales (International Whaling Commission 2011a).

Gray whale off Israel and Spain: On 8 May 2010 a gray whale was observed off the Mediterranean Sea coast of Israel (Sheinin et al. 2011). There is no historical evidence to suggest that gray whales have ever occurred in the Mediterranean. The confirmed sighting was preceded by a few reports of a whale near shore during the prior two weeks. On 30 May 2010 the same whale was spotted off the coast of Barcelona, Spain (confirmed by photographs, Scheinin et al. 2011). The population that this animal came from is not clear. No other gray whales have been documented in the North Atlantic for the past 300 years, which argues against the idea of a remnant population. Scheinin et al. (2011) concluded that the whale was most likely from the larger eastern North Pacific population that uses feeding grounds well north of the Bering Strait. They suggested the whale had moved either west across the top of Eurasia or east over North America, before entering the Atlantic. Until recently both of these routes would have been blocked by ice. Scheinin et al. (2011) also indicated that this anomalous sighting, far outside the gray whale's modern range, could be an example of the sort of mixing between the North Pacific and North Atlantic biota predicted to occur with global climate change and reduced summer sea ice (see also Heide-Jørgensen et al. 2011). Observations of gray whales in the Laptev Sea in the central Eurasian Arctic and near Franz Josef Land in the far northeastern Barents Sea in summer/fall 2011 provide support for the idea of immigration via the Northern Sea Route across Eurasia (unpublished information provided to R. Reeves by O. Shpak and A. Yablokov).

Oil and gas activities: In 2010 and 2011 IUCN's Western Gray Whale Advisory Panel continued to review and comment on gray whale field research off Sakhalin and advising the oil and gas industry and government regulators on mitigation. Recently, the panel collaborated with Sakhalin Energy to develop a stringent monitoring and mitigation program for the company's Astokh 4-D seismic survey that took place in June and July 2010. The program involved the collection of data on acoustics and whale distribution and behavior and the operator took steps to minimize disturbance. Despite the history of cooperation and success in working with the industry on this survey, other seismic surveys were conducted in the vicinity of the nearshore Sakhalin feeding area during the open-water seasons of 2010 and 2011without such cooperation or transparent evaluation of mitigation and monitoring measures. The panel wrote to Russian government officials in advance of one of these (at Lebedenskoie field) to request the survey be postponed until such measures were established, but received no response. The panel also commented on a proposed major new project to install a third oil and gas platform in the Piltun-Astokh field near the gray whale feeding area off the entrance of Piltun lagoon (Western Gray Whale Advisory Panel 2011).

Irrawaddy Dolphins (*Orcaella brevirostris*) in the Mekong River

Four cetacean species with freshwater populations occur in Asia and the IUCN lists all Asian freshwater cetacean populations as endangered or critically endangered. The four freshwater populations

of Irrawaddy dolphins (*Orcaella brevirostris*) are all considered critically endangered (Jefferson et al. 2008, Smith 2004, Smith and Beasley 2004). The Commission's 2009 report described the overall status of Asian freshwater cetaceans and the proceedings of an October 2009 workshop involving Cambodian officials, World Wildlife Fund personnel, and international experts to evaluate threats to the Mekong River population of Irrawaddy dolphins (Figure V-5).

Figure V-5. An Irrawaddy dolphin from the critically endangered Mekong River population. (Photo courtesy of Isabel Beasley, Wildlife Conservation Society)

The most recent abundance estimate for the Mekong River population is 85 individuals, excluding young calves (95 percent confidence interval 78–91). The estimate was based on photo-identification surveys from April 2007 to April 2010 (Ryan et al. 2011). Although the population is still producing calves, few survive and recruitment to reproductive age is close to zero. Without replacement of reproductive females, the population is declining by a few percent each year. Scientists from the World Wildlife Fund and an independent scientist (Isabel Beasley) have been collecting photographic records of the population (Beasley 2007) and in 2010 they exchanged their photo catalogues to cross-check their work and develop a better assessment of the population and its trend. They all met in June 2011 to review unresolved matches and complete the integration of the two catalogues. They then turned their attention to the question of how best to use the combined catalogue to guide future studies and conservation efforts.

Fishing is a significant threat to Irrawaddy dolphins in the Mekong River and greater enforcement of fishery regulations is necessary to protect them. Fishermen use gillnets throughout the year in all areas where the dolphins occur. They are aware of attempts to curb gillnet use and, in some cases, have responded by fishing at night to avoid detection. Some fishermen also use illegal fishing methods, including the use of electricity, poisons, and explosives (Chheng and So 2011). The Commission for Conservation and Development of the Mekong River Dolphin Ecotourism Zone (Dolphin Commission) is attempting to reduce the use of gillnets in some of the pools inhabited by the dolphins, but the legal authority for them to do so is not clearly established and recognized. To remedy this, the Dolphin Commission and the Fisheries Administration have drafted a sub-decree that creates core dolphin conservation zones where gillnet use is not permitted and buffer areas where use of gillnets is strictly regulated along a 190-km stretch of the Mekong between Kratie and the Lao PDR border. The sub-decree must be approved by the Council of Ministers.

While entanglement in fishing gear is the primary cause of adult mortality, the main cause of death for calves is not clear. Following recommendations from the 2009 workshop, investigators from current and past research teams compiled photographs of Mekong dolphin carcasses encountered from 2001–2010 to be examined more closely for evidence of fishery interactions. Three-quarters of the adult carcasses showed signs of fishery interactions, whereas only one calf carcass showed such signs. Instead, nearly half of the dead calves exhibited a similar pattern of conditions including compression of the ventral neck tissues and other signs not indicative of fisheries interaction or entanglement and their cause of death remains undetermined.

Given these findings, necropsies of dolphin carcasses are essential to diagnose the underlying problem. In 2010 the World Wildlife Fund's Mekong conservation and research team consulted with marine mammal veterinarians to learn how to best handle, examine, and preserve carcasses for later necropsy by experienced veterinarians and pathologists. However, these preparations were fruitless in 2010 because Cambodian officials failed to make available seven carcasses suitable for necropsy.

Inbreeding is a concern with such small populations and the unexplained calf mortality raises questions about inbreeding depression—that is, a reduction in an inbred animal's ability to survive and reproduce. The World Wildlife Fund is funding genetic analyses of these dolphins, but the results indicate inbreeding is probably not the problem—the level of genetic variability is relatively high for such a small population. Chemical contaminants also may be affecting the health of the dolphins, although the persistent organic pollutants tested to date are not at levels significantly higher than observed in many other cetacean populations in coastal and riverine areas of Asia. Tests have not yet been conducted to assess the levels of DDT and its chemical congeners or of highly toxic methyl-mercury (Siebert and Das 2011).

South American river dolphins

Two species of freshwater cetaceans inhabit the major river systems of South America, the boto (*Inia geoffrensis*) and the tucuxi, (*Sotalia fluviatilis*). The boto is a true river dolphin (Reeves and Martin 2009) and the tucuxi is the only exclusively freshwater member of the cetacean family Delphinidae. Both species are widely distributed in the Amazon and Orinoco River Basins, occurring in Venezuela, Colombia, Peru, Ecuador, and Brazil. A subspecies of the boto (*I.g. boliviensis*) in Bolivia may soon be recognized as a separate species (*I. boliviensis*) based on evidence of its complete isolation and substantial divergence from other forms (Da Silva 2009, Perrin et al. 2009, Ruiz-García et al. 2008).

The Action Plan for South American River Dolphins 2010–2020, completed in 2010, reviews the status and conservation of the two species in each country in which they occur and recommends improvements in scientific research and conservation, legislation and policy, communications, administrative and institutional practices, and education and community participation (Trujillo et al. 2010). Lack of information on the status of these species is a significant issue—the IUCN lists both as data deficient. The Amazon and Orinoco river systems are less developed, human populations are less dense, and larger areas of habitat remain relative to river systems in Asia where all freshwater cetacean populations are reduced to very low numbers and listed as either endangered or critically endangered.[5] Nevertheless, freshwater dolphins in South America still face a variety of threats, including conflict with fisheries (especially bycatch), direct taking for bait and body parts, habitat destruction and landscape change through dam and channel construction and deforestation, water pollution (including mercury from gold mining), oil exploration and production, and increasing human populations. All of these threats are exacerbated by inadequate legal protection.

In recent years fishermen in Brazil, Colombia, Peru, and Venezuela have killed increasing numbers of botos to use their flesh as bait in a catfish fishery (Da Silva 2009). The Brazil fishery has expanded and exports much of its catch to Colombia, where catfish have been overfished. Those exports increased from 884 tons in 2007 to 2,153 tons in 2009. From 1994-2007 fishermen killed an estimated 600 botos per year in one limited area around the Mamiraua sustainable use reserve in the central Brazilian Amazon (Da Silva and Martin 2007). More recent press reports from this reserve put the current take at 1,500 dolphins per year.[6]

The killing of dolphins for bait is illegal, but the number of natural resource enforcement officers is insufficient and they give other enforcement needs higher priority (e.g., illegal logging). Researchers report that obtaining quantitative information on the scale of the hunt is difficult and dangerous because of its clandestine nature. The fishermen involved know the killing is illegal and leave little evidence (e.g., an occasional boto head or carcass, or a harpoon-wounded animal).

The Action Plan for South American River Dolphins 2010–2020 gives high priority to regulating or banning the catfish fishery in Colombia, Brazil, Venezuela, and Peru. The plan also calls for development of alternative fishing methods and baits, and assessment of the interactions between river dolphins and fisheries. In 2011 the Scientific Committee of the International Whaling Commission expressed its

[5] http://www.theglobaleducationproject.org/earth/human-conditions.php
[6] http://www.aolnews.com/2010/07/11/amazon-river-dolphins-being-slaughtered-for-bait

"ongoing concern with the conservation status of botos given the continuation and apparent acceleration of directed killing" and asked that "scientists in the region cooperate by providing information to [its 2012] meeting on the extent of the use of botos as bait, the implications of this practice for international trade, and progress in addressing the problem" (International Whaling Commission 2011a).

Southern right whales *(Eubalaena australis)*

Since 2003 southern right whales (*Eubalaena australis*), especially calves, have been dying in unusually large numbers at the calving/nursery grounds at Península Valdés, Argentina (Uhart et al. 2008, 2009, Chirife et al. 2010). As discussed in the Commission's 2009 annual report, the Southern Right Whale Health Monitoring Program documented 366 right whale deaths from 2003 to 2009, the majority (91 percent) calves less than four months of age. Whale deaths continued during the 2010 and 2011 calving and nursery seasons, bringing the total to 431 calves and 482 stranded animals in total.

In 2010 the International Whaling Commission convened a workshop to discuss possible causes. In 2010 and 2011 the Southern Right Whale Health Monitoring Program, with support from the Marine Mammal Commission, continued to monitor and investigate right whale strandings. Fewer right whale deaths—55— were recorded in the 2010 calving and nursery season than in 2007 to 2009, but that number exceeded the number of stranded whales each year from 2003 to 2006 (Table V-4). In 2011 the number of stranded whales increased to 61, and in both years the size classes of the stranded whales was heavily skewed toward calves. In 2010, the number of stranded juveniles was greater than expected based on previous years. As in previous years, the majority of deaths occurred in Golfo Nuevo, although all the stranded juveniles were found in Golfo San José—three on neighboring beaches along the west coast and four along the east coast very close to each other (M. Uhart, pers. comm.). The causes of death were not apparent except for one adult female with a large, deep, linear cut on her back almost certainly caused by a ship strike.

Southern right whale die-off workshop: The International Whaling Commission's workshop was held from 15 to 18 March 2010 to review the possible causes of the southern right whale die-off, consider its impact on the population, and identify research needs. The workshop was hosted by Centro Nacional Patagónico, in Puerto Madryn, Chubut, Argentina, and was chaired by a member of the Marine Mammal Commission's Committee of Scientific Advisors on Marine Mammals. The participants included researchers studying southern right whales at Península Valdés, experts on the marine ecology and environment of the region, and internationally renowned veterinarians with expertise on the potential causes of such mortality. The workshop report was presented to the 62nd annual meeting of the Scientific Committee of the International Whaling Commission in May–June 2010 (International Whaling Commission 2011b). The Marine Mammal Commission supported the workshop by sponsoring participation by two members of its Committee of Scientific Advisors on Marine Mammals as well as its International and Policy Program Director.

Table V-4. Southern right whales stranded at Península Valdés by size class from 2003 to 2011

	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total	Percent
Calves	29	13	36	16	77	89	73	40	58	431	89
Juveniles	1	0	4	1	1	0	0	7	3	17	4
Adults	1	0	7	1	5	3	5	8	0	30	6
Unknown	0	0	0	0	0	3	1	0	0	4	1
Total	31	13	47	18	83	95	79	55	61	482	100

Source: Southern Right Whale Health Monitoring Program

After considering the patterns of mortality observed and the available information on behavior, stranding, and pathology, the workshop participants were unable to confirm the cause(s) of right whale mortality at Península Valdés. They developed three main hypotheses to explain the die-off:

1) the mortality of calves is a consequence of the poor nutritional state of the mothers,
2) the mortality of calves is a consequence of exposure to algal or bacterial biotoxins in (a) the feeding ground resulting in *in utero* exposure of the calf, or (b) the calving/nursery ground, and
3) the mortality of calves is a consequence of infectious disease (viral, bacterial, protozoal etc.).

The workshop participants also considered a fourth hypothesis that the calf mortality is a consequence of exposure to chemical pollutants from industry in Golfo Nuevo or abandoned whaling stations at South Georgia. They concluded that this hypothesis is unlikely but cannot be ruled out. They ruled out five other possible causes—some unknown demographic factors, killer whale predation, disturbance from whale watching, fishery interactions, and ship strikes (International Whaling Commission 2011b).

Nutritional stress: Nutritional stress is a documented source of breeding failure and offspring mortality in marine mammals. For example, female pinnipeds are known to abort or abandon pups in the face of food shortage. Whether and to what extent this occurs with cetaceans is not known. At least hypothetically, large whales may forego breeding, not carry pregnancies through to term, or wean calves early when under nutritional stress. In this situation, calves die sometime during the first four months after birth. Workshop participants were not aware of other examples of cetaceans carrying calves to term and giving birth without adequate energy reserves to sustain them in the critical post-partum months. The current information from the stranded whales is insufficient to determine if either mothers or the calves they lose are malnourished, and none of the participants reported observations of emaciated individuals.

The participants also were unable to describe in detail the movements and feeding locations of southern right whales outside the calving and nursery grounds. Whaling records and isotope data from biopsies indicate that the whales may feed near South Georgia Island, well to the southeast of Península Valdés, and on the Patagonian shelf offshore and north of the peninsula. Research on other species suggests prey abundance, particularly krill, is changing near South Georgia. Those studies involved krill-eating penguins and fur seals that also forage in the vicinity of South Georgia, and they support the idea of recent ecosystem changes and corresponding shifts in the abundance and predictability of krill.

The participants recommended studies to better identify right whale feeding grounds, document trends in the quantity and quality of right whale prey, and investigate the consequences of such changes on calving intervals and loss of calves. A satellite tracking program could identify the movements and feeding areas of this population. Broad-scale isotopic and genetic sampling could be used to identify remote feeding areas, characterize the food consumed, and determine whether certain related individuals or feeding cohorts are more susceptible to losing their calves at the peninsula. Biopsy sampling and genetic analysis also could be used to gather information on mothers that have lost their calves, document life history patterns of the affected individuals, and relate them to overall population structure and demography.

Algal or bacterial biotoxins: Algal biotoxins such as saxitoxin and domoic acid are known to cause death in marine mammals and humans. The workshop report noted that some toxins can cross the placenta, resulting in fetal death, spontaneous abortion, poor neonatal survival, expression of post-natal developmental abnormalities, and abnormal behavior. The incidence of harmful algal blooms has been increasing worldwide and they and bacterial biotoxin epizootics have been recorded at Península Valdés and at the Falkland Islands/Islas Malvinas, which are closer to the right whale feeding grounds.

To date, neither the timing/extent of known harmful algal blooms nor the evidence from necropsies has linked the deaths of these southern right whales to biotoxins. Research is needed to determine whether females are exposed on the feeding grounds and somehow pass toxins to the calves or whether calves (and mothers) are directly encountering such toxins in the calving/nursery area, and, if so, how they ingest or otherwise become exposed to them.

Infectious disease: A number of infectious diseases, such as morbillivirus, leptospirosis, brucellosis, toxoplasmosis, and chlamydia, are known to sicken and kill cetaceans. Some diseases (e.g., brucellosis) can cause spontaneous abortions and stillborn or weak neonates and calves. Poor nutritional state, immunosuppression, parasites, and trauma are all factors that can increase susceptibility to disease. In addition, diseases may not be expressed in the same manner for different age-classes—adults, for example, may not be affected by some diseases that affect calves.

Despite extensive necropsy sampling and analysis by the Southern Right Whale Health Monitoring Program, no evidence points to infectious disease as the cause of right whale deaths at Península Valdés. That does not mean that the possibility of disease can be dismissed. Important questions need to be resolved first, such as what infectious diseases may be present, when are calves exposed to disease (pre- or post-natal), what vectors transmit disease, and are diseases acting alone or in concert with other factors to produce the observed mortality pattern.

The kelp gull (*Larus dominicanus*) is one possible vector of infectious diseases or toxins. In the Península Valdés area kelp gulls feed on right whale skin and tissues and create deep "gull-peck lesions" on the backs of adults and calves. These open wounds are sites for the potential transmission of disease from the beaks of the gulls to the whales. In addition to feeding on whale flesh, the gulls eat garbage at local open dumps and fishery discards from the local port, making them possible vectors for disease. Interactions between the gulls and whales have increased substantially in the 30 to 40 years since they were first described for whales in Golfo San José. Right whale mothers used to lie for hours with their backs exposed above the water surface. Now they have changed their behavior to avoid gull attacks; they swim and rest with their backs completely submerged. In contrast, their young calves do not change, or may not be able to change, their behavior to avoid gull attacks. They continue to swim with their backs exposed and have become the primary targets of gull attacks. Many living calves display numerous gull-peck lesions up and down their backs. Workshop participants emphasized the need to collect samples from gulls observed pecking at whales and from the broader gull population, as well as from gull-peck lesions on living and dead whales. In addition, the workshop recommended "closure and/or improved management of dumps, better control of fish offal (on land and at sea), and direct gull control measures," reasoning that such actions should lead to improved whale health.

Research Strategy: The workshop report outlines a strategy to investigate the three major hypotheses for southern right whale deaths and to guide the allocation of research effort. In general, the strategy maintains support for the Southern Right Whale Health Monitoring Program; includes measures to decrease the response time for reaching stranded whales and collecting and analyzing necropsy data and biological samples from stranded whales; sampling identified individual living whales; and monitoring environmental conditions to detect harmful algal blooms, diseases, and possible disease vectors.

The strategy also focused on seven more specific tasks, paraphrased as follows.

(1) Continue as a top priority efforts to detect and investigate strandings and analyze the patterns of mortality and the samples from necropsies to evaluate body condition and presence or absence of diseases, toxins, or other possible causes of mortality;
(2) Continue and expand investigations of environmental factors that may be affecting the whales in the calving/nursery area;
(3) Continue and expand the long-term research on live whales in the Península Valdés region to obtain demographic and behavioral information and establish, as a top priority, a reporting network to alert the research community whenever abnormal behavior is observed that could be related to a cause of mortality;
(4) Investigate the feeding ground(s) of the Península Valdés right whales and environmental factors that affect the whales' survival and reproduction;
(5) Continue the long-term aerial photo-identification program and the stranding network, maintain and expand the 40-year dataset of the whales at Península Valdés to assess population trends, determine the significance of the recent die-offs, and assess causes;

(6) Facilitate research cooperation and collaboration; and
(7) Where possible, implement precautionary measures to minimize the influence of potential causes, including the interactions between the whales and kelp gulls.

The organizers of the 2010 workshop presented their report to the 62nd meeting of the Scientific Committee of the International Whaling Commission. The committee endorsed the report and welcomed the statement of intentions by the Argentine authorities to introduce a pilot program for controlling nuisance gulls. It recognized the value of the long-term photo-identification study of right whales at Península Valdés and the role of that program in helping to assess the significance of the recent die-offs and to test causation hypotheses. The workshop and the Scientific Committee strongly recommended continuation of the 40-year photo-identification catalog. They also acknowledged the Marine Mammal Commission for providing emergency funding to enable the necropsy program to take place in 2010, and strongly recommended continuation of the Southern Right Whale Health Monitoring Program (International Whaling Commission 2011c).

Southern right whale assessment workshop: An International Whaling Commission workshop to assess the status of southern hemisphere right whales was held in Buenos Aires, Argentina, from 13 to 16 September 2011. Participants reviewed the current understanding of the distribution and population structure of right whales in the southern hemisphere, estimates of current stock size, and recent population trends. The report of the workshop will be presented to the Scientific Committee in 2012.

New Zealand sea lion *(Phocarctos hookeri)*

The New Zealand sea lion (*Phocarctos hookeri*) is the second largest of the sea lions (Otariidae). The IUCN classifies the species as vulnerable, and the New Zealand threat classification system lists it as nationally critical. Robertson and Chilvers (2009) estimated its 2008-2009 abundance as 9,800 (95 percent confidence interval 8,604–11,297).

New Zealand sea lions breed on three small islands in the Auckland Islands and at a few sites on Campbell Island, 250 km south of New Zealand's South Island. Europeans discovered the Auckland Islands and Campbell Island in 1806 and 1810, respectively, and almost immediately began killing the two fur seal species (*Arctocephalus* spp.) and New Zealand sea lions on those islands for their skins. All three populations were nearly extirpated within 20 to 25 years and the killing came to a halt.

Status: Today, scientists monitor the New Zealand sea lion population using pup production as an index of overall abundance and population status (Robertson and Chilvers 2011). Pup surveys in 2010 revealed that about 70 percent of the population use the Auckland Islands (1,814 pups; 95 percent confidence interval 1,775–1,853) and about 30 percent use Campbell Island (726 pups). From 1995 to 2010 the number of pups at the Auckland Islands declined by about 40 percent, with particularly large drops in 2001-2002 and 2008-2009 (Chilvers and Wilkinson 2011) (Figure V-6). At Campbell Island population size and pup production appear to have been increasing slowly since the 1940s, although the increase may be an artifact of improved survey methods (Maloney et al. 2009). Despite the trend at Campbell Island, the total number of New Zealand sea lions has been declining.

Possible causes of the decline: Robertson and Chilvers (2011) analyzed the differences in pup production and population trends between the two island groups and considered a number of hypotheses for the opposing trends at the Auckland Islands and Campbell Island. They ruled out environmental change because any change in the New Zealand Southern Plateau ecosystem should have affected both breeding areas similarly. They also ruled out low genetic diversity based on microsatellite genetic data. Those data also did not reveal evidence of genetic drift or inbreeding. Epizootics have affected sea lions at both the Auckland Islands and Campbell Island, but those events would not be expected to result in a prolonged decline as has been observed at the Auckland Islands. Contaminant levels are low in New Zealand sea lions and not likely to play a role in reduced pup production or increased mortality. The main predator for New Zealand sea lions is the great white shark, which is not known to have increased in abundance in recent years, especially just around the Auckland Islands. Male sea lions disperse and

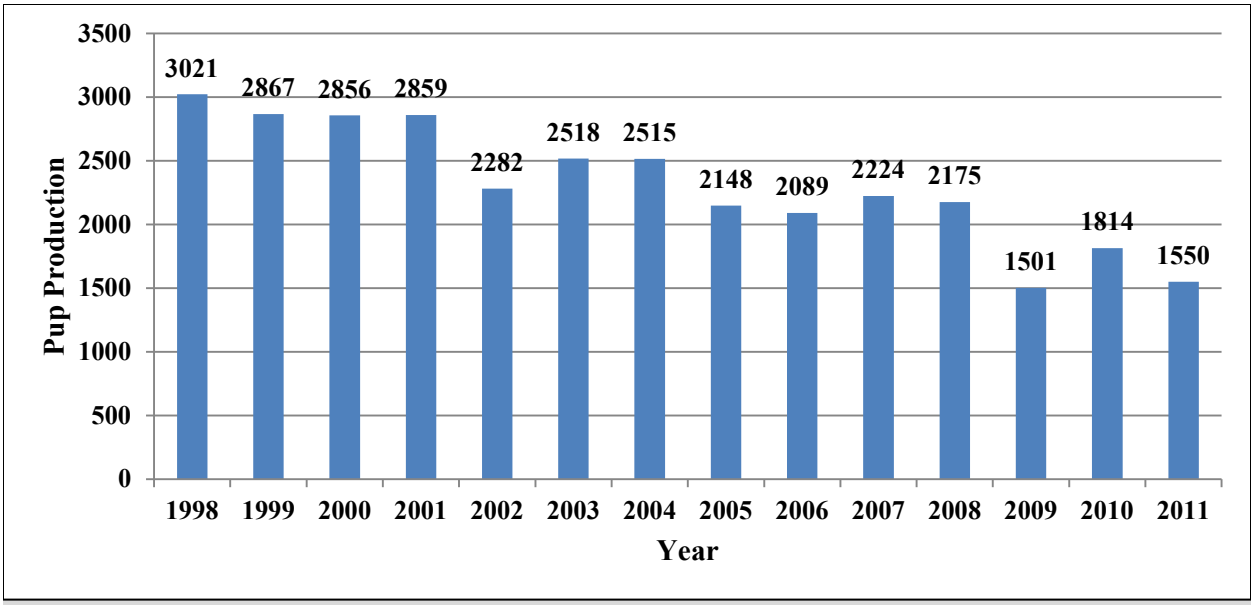

Figure V-6. Annual pup production for the Auckland Islands 1998 to 2011. (Data source: Chilvers and Wilkinson 2011)

migrate away from their birth islands, but females are considered highly philopatric (i.e., they remain at their breeding locations). In fact, the evidence suggests that females do not move between the Auckland Islands and Campbell Island. Except for one female that began to breed on the South Island in 1993, New Zealand sea lions have not been seen elsewhere. Finally, scientists have found no evidence to indicate that recovering New Zealand sea lion populations have overshot their environmental carrying capacity and are now declining because of reduced resources.

Fishery interactions: Direct and indirect fishery interactions may explain the decline at the Auckland Islands. Trawl fisheries for sub-Antarctic arrow squid and for New Zealand scampi operate around the Auckland Islands but not normally around Campbell Island. The arrow squid fishery overlaps directly in time, location, and depth with the foraging patterns of female New Zealand sea lions during their four- to seven-month lactation period (Chilvers et al. 2010; Figure V-7). The females alternate between foraging at sea and returning to their rookeries to nurse their young.

Low reproductive rates and low rates of pup growth in the Auckland Island sea lion population are consistent with, and may be linked to, resource competition with this fishery. The energetic needs of females are greatest during lactation and the distance and time they can forage must be balanced by the need to return to nourish their offspring. Energetic models indicate that competition between New Zealand sea lions and the squid fishery is especially likely in years of low squid recruitment. Because the fishery does not operate around Campbell Island, that population would not be constrained by such competition (Robertson and Chilvers 2011).

New Zealand sea lions also are caught and drown in trawl nets used in the arrow squid fishery. Such bycatch has been recorded since 1978 and is the largest known human-related source of sea lion mortality. Fishery managers first placed observers onboard the squid fleet in 1992 and they implemented fishery closures in 1996, 1997, 1998, 2000, and 2002 when the New Zealand sea lion bycatch exceeded maximum allowable fishery mortality levels (ranging between 63 and 79 animals). Closures proposed for 2003 and 2004 were overturned by court order. In 2004 managers set a new fishery-related mortality limit using an adaptive rule derived from a Bayesian model. The rule allowed a higher bycatch limit for New Zealand sea lions. In the same year managers required all vessels to use sea lion exclusion devices. Since 2004 the estimated number of sea lion deaths reached the catch limit on one occasion (2005) and, in that year, the fishermen voluntarily suspended the fishery. In 2006 the mortality limit was increased from 96

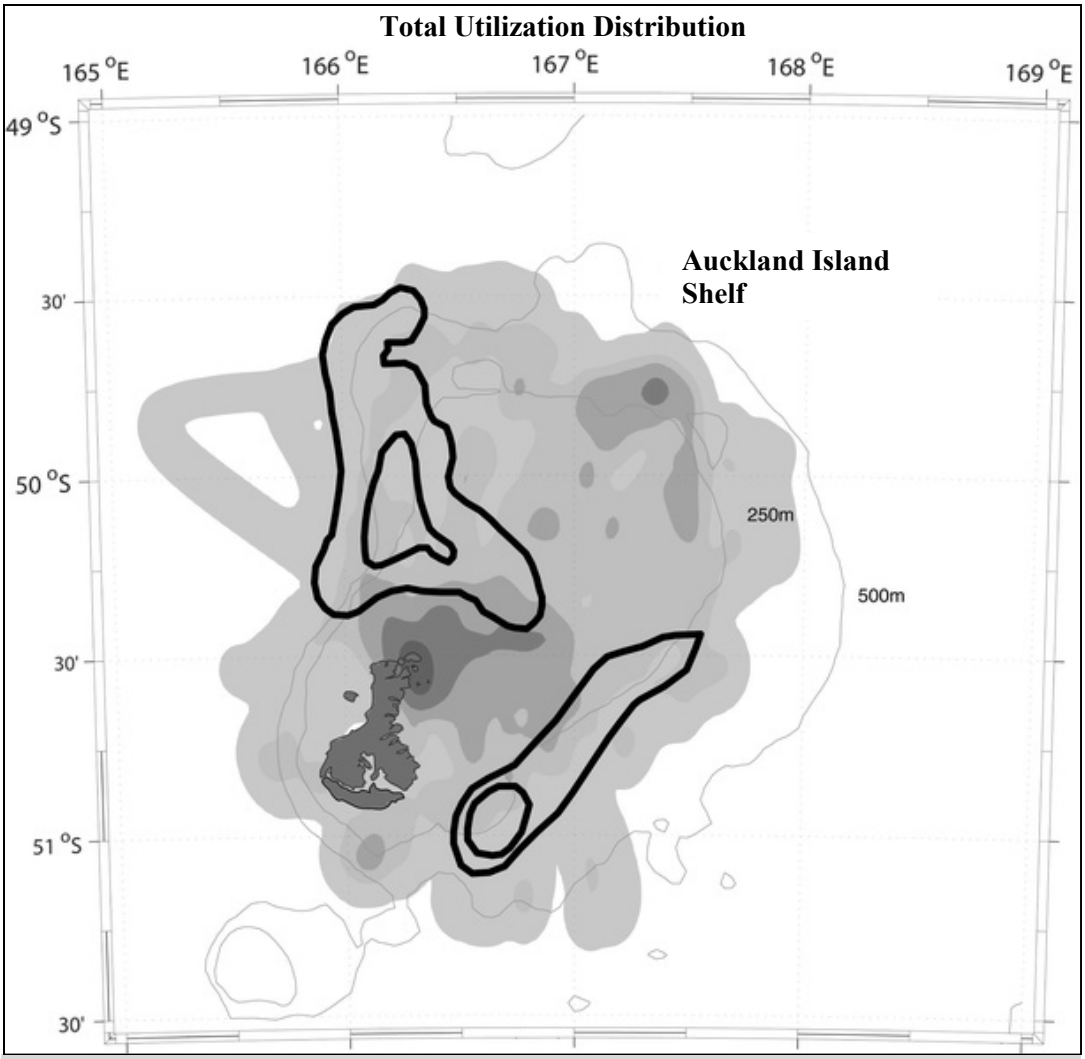

Figure V-7. Overlap of New Zealand sea lion feeding areas and squid trawl fishery effort near Enderby and Dundas Islands. Shading illustrates sea lion foraging areas, with 25 percent of all satellite-based locations in darkest areas and decreasing concentrations in progressively lighter areas. Trawl fishery effort is illustrated with the thick black lines, which indicate 50 percent and 95 percent kernel ranges (2001 to 2007). Bathymetric contours are shown as thin gray lines. (Illustration from Chilvers et al. 2010)

to 150 in the middle of the season as the estimated number of sea lion deaths exceeded the originally established limit. In 2009 the limit was reduced in mid-season after scientists detected a 30 percent drop in pup production.

The majority of sea lions caught in trawl nets are thought to escape through the exclusion devices, but some of them may be seriously injured. In addition, observer reports indicate that, despite the exclusion devices, the majority of the sea lions killed are females. The death of a breeding-aged female almost certainly means that her nursing pup will die as will the fetus she likely is carrying. At present adult females have lower survival rates than adult males, a clear deviation from the expected otariid pattern of higher female survival in this polygamous species. Robertson and Chilvers (2011) concluded that fisheries bycatch is "a major contributing factor toward the observed decline" and must be the highest priority of New Zealand sea lion management. New Zealand's Department of Conservation highlighted this problem in its 2009-2014 sea lion management plan (Department of Conservation 2009).

New Zealand's Ministry of Fisheries also discussed the bycatch problem in a December 2011 position paper on management of the squid trawl fishery off the Auckland Islands (New Zealand Ministry of Fisheries 2011). This paper, which was open for comment until 23 December 2011, concluded that with strict adherence to the required use of sea lion exclusion devices, "the direct effect of fishing-related mortality on the New Zealand sea lion population is minimal" and that no fishing-related mortality limit is required. Rather than setting seasonal bycatch limits the Ministry proposed to increase observer coverage to ensure compliance with the required use of sea-lion exclusion devices and to move to a five-year cycle of review of the management approach. An earlier review would be required if pup counts drop below 1,501 pups, observed bycatch (with 50 percent observer coverage) exceeds 15 sea lions in a season (since 2004 observed bycatch has ranged from three to nine sea lions), or fishermen are not complying with the required use of sea lion exclusion devices. No final decision on management of bycatch in the squid trawl fishery had been published by the end of 2011.

Caspian seals (*Pusa caspica*)

Caspian seals (*Pusa caspica*) are endemic to the temperate Caspian Sea, the world's largest inland water body (371,000 square kilometers).[7] The seals' natural history is tuned to the annual cycle of ice formation in the winter and open water in the summer (Figure V-8). In the early winter, females aggregate on the ice forming in the shallow northern portion of the sea. They give birth to white-coated pups in late January to mid-February and nurse them for 4-5 weeks (Härkönen 2008). Mating takes place about the time the mothers wean (abandon) their pups. The adult females then remain on the ice and begin their annual molt. By early to mid-April the ice has broken up and the seals congregate in high densities at a

Figure V-8. A seal hauled out on winter ice in the Caspian Sea. (Photo courtesy of Sue Wilson, Caspian Seal International Survey)

[7] http://www.earthobservatory.nasa.gov/IOTD/view.php?id=44253

small number of northern locations, including Maly Zhemchuzhny Island (45.05ºN latitude, 48.30ºE longitude) in Russia, and Komsomoletz Bay (45.53ºN latitude, 52.65ºE longitude) in Kazakhstan. In late April or early May they begin to disperse around the Caspian basin. During the summer and fall they spend little time hauled out and devote most of their time to foraging.

The threats to Caspian seals emanate from the five countries surrounding the Caspian Sea—Russia, Kazakhstan, Turkmenistan, Iran, and Azerbaijan. Those threats have reduced the population substantially and the IUCN lists the Caspian seal as endangered (Härkönen 2008).

Commercial hunting: Intensive commercial hunting caused most of the Caspian seal decline until the early 1990s. They were hunted commercially for blubber and pelts dating back to the 1740s with averages of 129,000 killed per year from 1800 to 1867 and 115,000 per year from 1867 to 1915 (Badamshin 1960). The population is thought to have been approximately a million at the end of the 19th century (Curry 2003). Hunting continued in the first half of the 20th century with disproportionate killing of females and young. Between 1933 and 1937 annual kills ranged from 137,000 to 227,000 seals with more than 200,000 females and nearly 550,000 pups killed in that short period (Badamshan 1960, Curry 2003). After 1937, the Soviet Union imposed measures to monitor the population, limit the hunt to certain seasons, and reduce the total number of seals that could be killed. In 1966, 86,000 pups were killed—a number thought to include most of the pups born that year. Thereafter, the Soviet Union limited the number of pups that could be killed and prohibited the hunting of adult seals (Curry 2003, Härkönen 2008). The new measures limited the killing of pups to the winter period (i.e., pups could be taken only on ice) and expressly forbade the killing of an entire pup cohort. The Soviet Union enforced the quotas in the 1970s and 1980s and about 50,000 seals were killed per year. Commercial hunting was closed temporarily in 1996 after a take of 14,000 seals (Härkönen 2008) and continued at low levels thereafter.

Commercial hunting declined in recent years as the market for seal products decreased (Caspian Environment Program 2007). The Caspian Commission on Aquatic Bioresources, composed of representatives from the fisheries/environment ministries of the Caspian governments, sets quotas for all Caspian Sea fisheries, including a total allowable catch of Caspian seals to be allocated among the five countries of the region. However, the basis for the quotas has not been provided to the public and the quotas are not consistent with the population assessments. Beginning in 2006 the quotas have allowed annual catches of 18,000 to 20,000 seals, which exceeds the estimated total annual recruitment to the population (Härkönen 2008), but actual takes have been much lower. Russia is the only country still taking seals under this quota. Hunters from the Russian Republic of Dagestan kill about 4,600 animals a year and sturgeon fishermen also engage in a small illegal hunt. Reports indicate that the pelts from the illegal hunt and from bycaught seals are sold to the same factories that process seals from the legal hunt (S. Goodman pers. comm.).

During the 20th century, hunting reduced the Caspian seal population by more than 90 percent (Caspian Seal Project 2011, Härkönen et al. 2010). Since the late 1950s and early 1960s, when it was estimated at about 500,000, the population has declined by 3 to 4 percent annually (Härkönen 2008). Pup production appears to have declined by more than 50 percent since the late 1980s (Härkönen et al. 2008a) and annual pup counts have fluctuated widely between 2005 and 2010 (Härkönen et al. 2010) (Table V-5). First-year mortality from all causes is estimated to be about 50 percent and juvenile mortality is considered to be the primary factor driving the decline (Härkönen 2008). Härkönen et al. (2010) concluded that pup production rates are not sufficient to maintain the population given the ongoing human-caused mortality rate and they predicted further decline. In 2005 the total population numbered about 102,000 seals (Härkönen 2008, Härkönen et al. 2008b).

Table V-5. Annual pup production of Caspian seals since 2005 (Härkönen et al. 2010).

Year	2005	2006	2007	2008	2009	2010
Number of pups	21,045	16,981	5,700	8,000	15,000	7,000
95 percent confidence Interval	18, 941-23,149	11,447-22,389	NA	NA	NA	NA

Other threats: In addition to commercial hunting, Caspian seals are subject to various other growing threats from human activities, including fisheries bycatch and prey depletion, disease, exposure to invasive species (e.g., the comb jellyfish, *Mnemiopsis leidyi*), disturbance and fragmentation of winter pupping grounds from icebreaking, and exposure to contaminants. The significance of each of these threats, individually and cumulatively, has not yet been determined.

Bycatch: Bycatch has long been a suspected source of mortality for Caspian seals (Härkönen 2008). Recent events and research indicate that bycatch in illegal and unreported fisheries is the most significant current threat to the species and may exceed annual pup production. Seal die-offs in 2000 and 2001 were attributed to canine distemper virus (see below), but about half (62 out of 127) of the dead seals collected along a 40-km stretch of the Iranian coast appear to have died from interactions with fisheries, either through entanglement or clubbing or shooting (World Bank 2002). Dmitrieva et al. (2011) interviewed a sample of fishermen and enforcement officers in northern Caspian fishing communities in Dagestan, Kazakhstan, and Turkmenistan and found that cases of up to 100 seals caught per fishing trip were common. The interviewed fishermen represented around 8 percent of a thriving illegal sturgeon fishery (S. Goodman pers. comm.). Extrapolation of bycatch numbers to the entire northern Caspian Sea indicates a minimum of 12,000 seals die from fishery interactions every year—about 10 percent of the total population. Bycatch also occurs in the southern Caspian Sea outside the study area, along the coasts of Azerbaijan, Iran, and the southern portions of Kazakhstan. The authors suggest that this level of bycatch has been occurring since the collapse of the Soviet Union, and is likely a major driver of the ongoing population decline.

The Dmitrieva et al. (2011) study indicates that Caspian seal bycatch is directly linked to the widespread and lucrative illegal fishery for sturgeon (Figure V-9). The fishery presents a major conservation and enforcement challenge for the Caspian Sea countries (Pourkazimi 2006) because of the high value of caviar and the scale of the caviar trade. Efforts to manage the legal fishery for sturgeon have resulted in large-scale poaching and illegal catches vastly exceeding legal takes (Strukova and Guchgeldiyev 2010). Seals and sturgeon, particularly the most sought after beluga sturgeon (*Huso huso*), have similar diets and seal habitat and sturgeon fishing areas overlap. At present none of the Caspian countries have made a concerted effort to address the issue of bycatch of Caspian seals.

Figure V-9. Caspian seal carcasses entangled in a sturgeon net. (Photo courtesy of Brian Deacon, KBR-I&M, Leatherhead, UK)

Disease: Recent seal die-offs, including those in 1997 and 2000, have been attributed to the highly contagious canine distemper virus. More than 10,000 seals died between April and August 2000 along the coasts of Kazakhstan and Turkmenistan (Kennedy et al. 2000). Earlier die-offs, including one of 30,000 seals in 1955 and 1956, were attributed to other infections, but also may have been caused by canine distemper virus (Curry 2003). In addition, the seals may be predisposed to such events if contaminants have compromised their immune systems or if their health and condition have been compromised by other risk factors, such as environmental degradation or insufficient prey.

Environmental degradation and decline of prey species: The high inter-annual variability in pup production observed from 2005 to 2010 may reflect fluctuations in food availability, which affects the ability of females to achieve breeding condition (Härkönen et al. 2010). The invasive comb jellyfish (*Mnemiopsis leidyi*) was introduced to the Caspian Sea by ship ballast water in 1999 and caused a major ecosystem collapse. *M. leidyi* eats zooplankton, including the eggs and larvae of small fish, and competes for the same food sources as commercial fish. Following this invasion, zooplankton abundance declined by 75 percent and commercial landings of three species of kilka (*Clupeonella spp.*), the primary

commercial fish species in the Caspian Sea and the primary prey of Caspian seals, also declined by 70 percent (Härkönen 2008, Mamadov 2006). The impact of this invader on the overall productivity of the Caspian Sea, combined with continued overfishing by commercial fisheries on some seal prey species, may explain observations of poor female condition and reduced reproduction (Härkönen et al. 2010, Caspian Environment Program 2007). However, the available data are not sufficient to confirm this hypothesis.

Icebreaker disturbance of sea-ice pupping ground: The Caspian seal's sea-ice pupping ground in the northeastern Caspian Sea overlaps one of the world's largest oil fields, which is being developed by a consortium of international and Kazakh oil companies.[8] In the winter, the developers use icebreakers to maintain access to offshore drilling islands and onshore facilities. The icebreakers regularly move through the pupping areas, frightening seals into the water, displacing mother-pup pairs and causing them to separate, and posing a risk of injury by the ice-breaker, related ships or barges, or by the moving ice itself (Härkönen et al. 2008b, Wilson et al. 2008). Winter surveys have found that seals use the open water channels created by icebreaking to gain access to the breeding ground and that they congregate along the channel edges, increasing the chance of further local disturbance (Wilson et al. 2008, Härkönen 2008a). The population-level consequences of such disturbance have not been determined.

Environmental contaminants: Contaminant concentrations in Caspian Seals were highest from the 1960s to the early 1990s. Long-term exposure to persistent organic pollutants may have led to high tissue concentrations and the reduced fertility observed in older females (World Bank 2002, Kajiwara et al. 2008). More recent studies especially during the 2000–2001 mass mortality event (subsequently attributed to canine distemper virus), found high organochlorine levels, especially of DDT (Kajiwara et al. 2008). However, the levels found were not as high as in other seal populations and the existing evidence does not confirm the concern regarding reproductive effects in younger females.

Predation: Recent aerial surveys of the pupping ice in the northern Caspian Sea documented the presence of wolves and several species of eagles. Eagles, especially white-tailed sea eagles (*Haliaeetus albicilla*), are a major source of pup deaths in some years. The level of predation is not known, but eagle abundance estimates for 2005 and 2006 (more than 2,200 eagles on the ice each year) and calculations of their energy requirements indicate that they could be killing 2,000 pups a year, or more than 10 percent of the total pup production (Härkönen et al. 2008b). Wolf predation is not thought to be as significant now as it was in the recent past. In 1974-1976, for example, 17 to 40 percent of pups were killed by wolves in some portions of the pupping ground (Härkönen 2008). Fewer wolves and eagles have been observed in recent years.

Climate disruption: Winter ice cover has been declining in the Caspian Sea (Kouraev et al. 2004, Rekacewicz 2007a). Little ice formed in 2007, breeding seals were restricted to a narrow band of ice along the northeast coast, and few pups were born (Härkönen 2008). Poor weather and diminished annual ice extent may have contributed to the low pup production, but more ice formed in 2008 and the pup count remained low (Härkönen et al. 2008b). Projections indicate that the ice will continue to retreat (Rekacewicz 2007a), which will reduce suitable pupping habitat and increase the density of mother-pup pairs on the remaining breeding grounds. Such conditions may increase competition for suitable breeding space, increase susceptibility to disturbance and predation, and increase the probability of an infectious disease outbreak (Härkönen 2008). Human activity around the Caspian Sea has limited the number of terrestrial sites that might be used for breeding as ice cover diminishes, and it is not clear whether, and to what extent, the seals will use such areas.

Industry, agriculture, and coastal development: As just noted, one of the world's major oil fields occurs under the waters and along the coast of the northeastern Caspian Sea, with onshore drilling and offshore platforms, artificial islands, associated shipping, and networks of pipelines. This development and the noise, disturbance, and air and water pollution it brings overlap with the winter breeding area of the Caspian seal. In addition, much of the Caspian Sea coastline is being developed for other forms of industry, human habitation, and recreation. Several hazardous industrial waste sites are located around the

[8] Available at http://www.ncoc.kz/en/default.aspx

basin, and pollution from heavy industry and agricultural runoff is carried into the sea from half a dozen major rivers (Rekacewicz 2007b) (Figure V-10). An event like the 2010 Deepwater Horizon spill in the Gulf of Mexico could have a devastating impact on the northern Caspian ecosystem. Indeed, the consequences could be far more serious since the oil facilities are closer to shore, in much shallower water, and the northern Caspian ecosystem is essentially closed, allowing no possibility for dispersal or dilution of spilled oil.

Conservation efforts: The Caspian seal project is a conservation initiative involving scientists from Iran, Azerbaijan, Russia, Kazakhstan, and Turkmenistan, as well as scientists from the United Kingdom, Sweden, Estonia, and Russia.[9] Since 2000 the project has been funded by grants from the World Bank/Japanese Government Trust Fund, the United Nations Development Programme/Global Environment Fund, and Agip KCO (the company responsible for the first phase of the Kashagan oil and gas development in the North Caspian Sea). Since July 2006 the project also has been supported by the UK government's Darwin Initiative (darwin.defra.gov.uk) and the Kazakh Fisheries Research and Production Centre. The project works with Caspian government bodies and other stakeholders in the region to disseminate research findings and develop conservation policy.

In 2007 the Caspian Environment Program adopted the Caspian Seal Conservation Action Plan (Caspian Environment Program 2007). The plan lists national and international actions needed to conserve Caspian seals. It proposes a regional seal center to lead and coordinate monitoring and research on Caspian seals and develop recommendations concerning seal hunting. It calls for protected areas and other measures to safeguard the seals' main birth, nursery, resting, and foraging areas, reductions in bycatch, reductions in disturbance by ice-breakers and other vessels, and restoration of degraded or abandoned haulout sites and foraging areas. The plan gives high priority to studies of all sources of mortality and ecological decline—that is, all factors contributing to population decline. It encourages the countries of the region to reduce or eliminate seal hunting and build a regional enforcement effort against illegal seal hunting. Currently, the Caspian Environment Program is promoting a series of protected areas for seals around the Caspian.

To date, none of the Caspian governments have implemented any practical conservation measures as specified in the action plan. The capacities and legal frameworks of the Caspian governments are not adequate for managing the many complex environmental issues affecting the Caspian Sea. Conservation efforts also are undermined by the lack of financial resources.

With regard to specific types of research, the action plan calls for winter surveys of both breeding seals on the ice of the northern Caspian Sea and non-breeding seals hauled out elsewhere to improve estimates of population size. For the past decade the Caspian International Seal Survey and Caspian Seal Project have conducted aerial surveys and other research for this purpose. In 2005 the Caspian Seal Project organized a team to conduct aerial winter seal surveys in the Kazakhstan part of the northern Caspian and the team has conducted annual surveys since then (Caspian Seal Project 2011).

Franciscana (*Pontoporia blainvillei*)

The franciscana (*Pontoporia blainvillei*) is the sole living member of the family Pontoporiidae. It lives in the marine environment, but is most closely related to two freshwater species—the Amazon River dolphin or boto (*Inia geoffrensis*) and the extinct Yangtze River dolphin (*Lipotes vexillifer*) (Fordyce 2009). Franciscanas are similar to those river dolphins in both their size (adult females are only 137 to 177 cm in length and males are 121 to 158 cm) and appearance (long beak and large head). They live in the nutrient-rich coastal waters of the western South Atlantic Ocean, from the shoreline out to about 30 meters deep, and often are found in areas of high turbidity from continental runoff. They can be found from the coast of Golfo San Matías (41°10'S) near Rio Negro, Argentina, in the south, northeastward to Itaúnas in Espírito Santo, Brazil (18°25'S, 39° 42'W) (Crespo 2009). In Brazil they occur in a few large

[9] See http://www.caspianseal.org

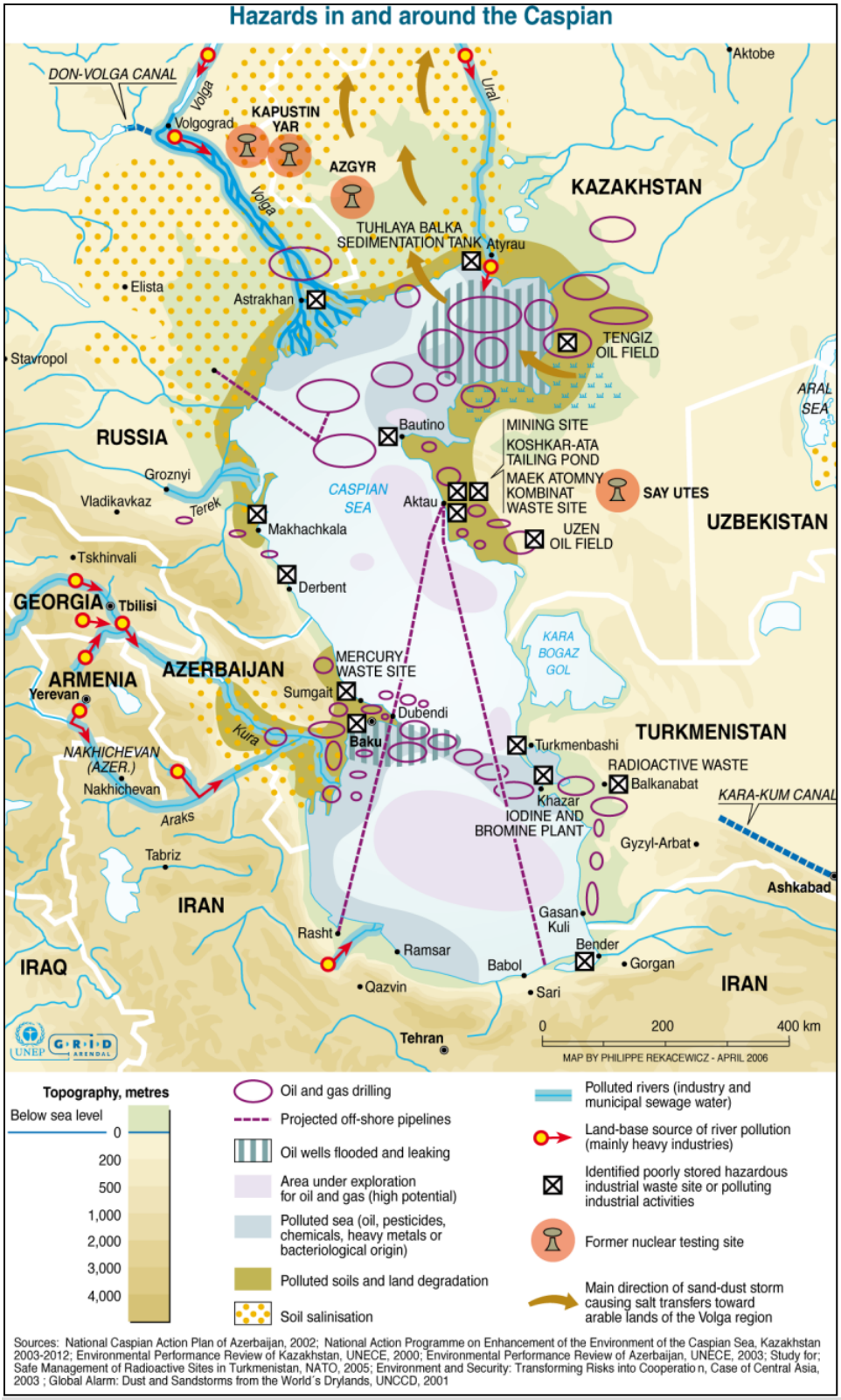

Figure V-10. Potential environmental hazards in the Caspian sea region. (Source: Phillippe Rekacewicz, UNEP/GRID-Arendal)

estuaries along the coast (Cremer and Simões-Lopes 2008, Santos et al. 2009) and are known there as toninhas.

Scientists and conservationists consider the franciscana to be the most endangered small cetacean on the east coast of South America (Reeves et al. 2008). The major known threat to the species throughout its range is bycatch in small to medium-scale shallow-water gillnet fisheries. Bycatch has been documented as a problem for more than four decades, but the population-level consequences are not yet fully understood. Nonetheless, bycatch rates are considered particularly high in the waters off the Argentine province of Buenos Aires and the state of Rio Grande do Sul in Brazil (Table V-6, Reeves et al. 2008, ICMBio 2010).

In 2005 the Scientific Committee of the International Whaling Commission reviewed the status of the Franciscana dolphin (International Whaling Commission 2005). It identified four Franciscana management areas (FMA I, II, III, IV) based on the geographic distribution of the species along the coasts of Brazil, Uruguay, and Argentina (Figure V-11) and intended to promote effective management on a regional scale. The committee highlighted the need for assessment of population structure, regional abundance, and bycatch levels. Researchers studying the regional populations have made some progress as recommended, but the picture remains incomplete (Table V-6).

Stock structure: Recent genetic studies support the coarse division of the franciscana's range into four management areas but also point to the possile need for finer-scale population management. For example, Mendez et al. (2008) found finer genetic structure within management area IV (northern Buenos Aires Province in Argentina), where small neighboring populations apparently use distinct portions of the

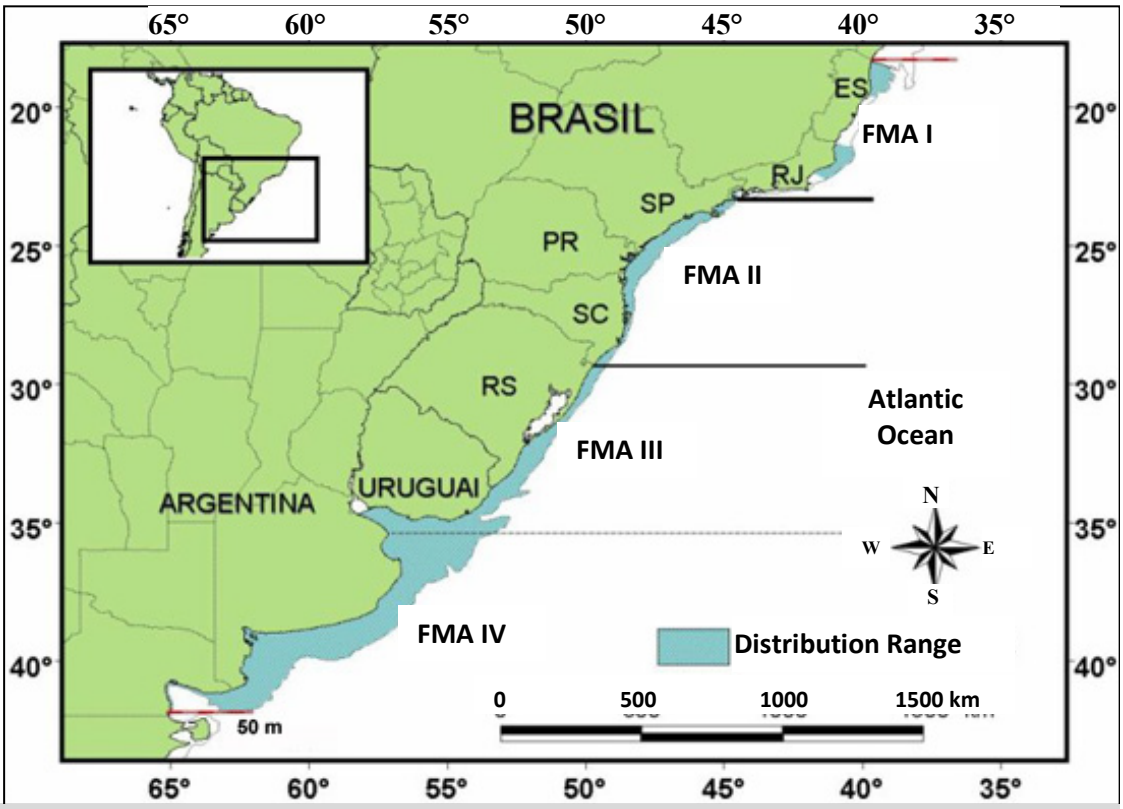

Figure V-11. The Franciscana dolphin management areas used to guide research on abundance and stock delineation. Recent research indicates significant stock structure and locally adapted small populations within each of these larger areas. (Source: ICMBio 2010)

local environment. However, the extent of population separation remains uncertain as subsequent studies (Mendez et al. 2010) indicate that the observed genetic differences do not appear to be consistent with habitat use patterns.

Although not conclusive, the findings of Mendez et al. (2008, 2010) raise questions as to whether the franciscana management areas are properly scaled for this species. They highlight the importance of integrating data on habitat use and genetics to pinpoint "biologically and ecologically relevant areas for protection and management," not only for franciscanas but also for other coastal cetaceans. They also raise additional concern regarding the potential effects of bycatch on what may be smaller, more vulnerable populations adapted to local environmental conditions. The vulnerability of those populations may be heightened if, as suggested by Mendez et al. (2010), bycatch selectively removes dolphins from certain age/sex groups.

Abundance and bycatch: Scientists have estimated the abundance of franciscanas in all or parts of management areas II, III, and IV and bycatch in parts of these areas. They have no estimates of franciscana abundance in area I (along the states of Rio de Janeiro and Espírito Santo, Brazil). Reports of bycatch and stranding are fewer there than in the areas to the south (ICMBio 2010), but the population in this area is genetically distinct from the populations to the south, patchily distributed, and therefore considered more vulnerable to the effects of bycatch (International Whaling Commission 2005).

Zerbini et al. (2010) conducted aerial surveys in December 2008 and January 2009 (with partial support from the Marine Mammal Commission) and estimated 8,000 to 9,000 franciscanas inhabit management area II (Zerbini et al. 2010). This area encompasses the coasts of the Brazilian states of São Paulo, Paraná, and Santa Catarina. In 2002 Zerbini et al. (2010) documented 100 fishing villages in São Paulo with an estimated annual bycatch of 350–500 franciscanas just in this northern portion of area II (Zerbini et al. 2010). The amount of bycatch in all of area II is not known, but Zerbini et al. (2010) estimated that 3.3 to 6.2 percent of the population was being killed by fishing nets each year. Area II is the most populated and industrial portion of the Brazilian coastline and the dolphins in this area face additional threats from habitat degradation, pollution, oil and gas activities, and vessel traffic.

Table V-6. Estimated abundance and bycatch of franciscanas in each management area

Management area	Estimated abundance (95 percent confidence interval)	Estimated annual bycatch (95 percent confidence interval)	Percent population
I	NA	100 (44–176)[1]	NA
II	8,000—9,000[2]	279 (63–497)[1]	3.3–6.2
III - all		1245 (526–1,778)[1]	
III - Brazil	6,839[3] (3,709–12,594)	1,149 and 1,379[3]	
III - Uruguay	NA	160[1] (mean from 1972 to 1994)	
IV - all	14,175[4]	405 (241–557)[1] 500–800[4]	3.5–5.6
IV - north	8,279[4] (4,904–13,960)		Up to 9.7[5]
IV - south	5,996 (1,928–17,999)[4]		

[1] ICMBio 2010
[2] Zerbini et al. 2010
[3] Danilewicz et al. 2009; two independent bycatch estimates
[4] Crespo 2010
[5] Bordino (unpublished, in Crespo 2010)

Area III encompasses the entire coast of Uruguay and the southernmost parts of Brazil. Danilewicz et al. (2009) conducted aerial surveys of the Brazilian portion of this area in 2004 and estimated an abundance of 6,839 dolphins (95 percent confidence interval 3,709–12,594). Danilewicz et al. (2009) also cited annual bycatch estimates of 1,149 and 1,379 animals for the same period from Rio Grande do Sul. They used logbooks of local fishing vessels to generate those bycatch estimates, but they did not have logbooks from other regions of this management area where fishermen use gillnets (which are known to take franciscanas). In addition, the estimates were not corrected for underreporting or for dead dolphins lost while nets were being retrieved. Population modeling indicates that current levels of bycatch are not sustainable in the Brazilian portion of management area III and that the population is in decline (Danilewicz et al. 2009).

In the Uruguayan portion of area III, 1,500 to 2,000 franciscanas were killed annually in gillnet shark fisheries in the late 1960s (Brownell 1975). Praderi (1997; cited in ICMBio 2010) estimated that a total of 3,683 franciscanas were killed in Uruguayan waters between 1974 and 1994. Praderi (1997) attributed the decline in the dolphin bycatch rate to a decline in populations of the target shark species and a shift in the shark fishery away from the area. The reduction in bycatch during that period presumably allowed some franciscana population recovery, but a recent increase in local coastal gillnet fisheries in southern Brazil and Uruguay is now thought to be impeding further recovery (ICMBio 2010).

In 2003 and 2004 Crespo et al. (2010) conducted aerial surveys of the southern and northern portions of area IV. The results indicated an abundance of 14,175 franciscanas in Argentine waters. Of that total, 5,896 dolphins (95 percent confidence interval 1,928–17,999) were in the southern portion and 8,279 (95 percent confidence interval 4,904–13, 960) in the northern portion. Crespo et al. (2010) also suggested that a few thousand additional franciscanas inhabit deeper waters out to the 50 m contour. They also estimated annual bycatch estimates for the whole of area IV to range from 500 to 800, or about 3.5 to 5.6 percent of the total population, a level of take that is not considered sustainable. They suggested that bycatch may be as high as 9.7 percent in northern Argentina.

Efforts to reduce bycatch: The high level of bycatch mortality for this species has been well known for more than 40 years. Rates of incidental take in gillnets still exceed levels thought to be sustainable in all areas where take rates have been estimated. Clearly, the need for bycatch prevention measures has been and continues to be urgent (International Whaling Commission 2010, Reeves et al. 2008, Bordino et al. 2002). Despite that need, no significant bycatch reduction measures have been implemented in any part of Argentina, Uruguay, or Brazil. The lack of action over the past four decades has been especially discouraging because it involves a regionally endemic species that, like the baiji, is the sole living representative of an entire family of mammals.

In 2010 Brazil published the National Plan of Action for the Conservation of the Small Cetacean, Toninha, *Pontoporia blainvillei* (ICMBio 2010). The conservation goals in this five-year plan include evaluating the population viability of franciscana populations throughout their Brazilian range, implementing measures to control fishing with gillnets, controlling the environmental impacts of activities other than fishing, and strengthening regional and international cooperation to conserve the species.

The plan makes a number of recommendations to reduce gillnet bycatch, beginning with the immediate establishment of a high-level interagency gillnet working group (including the Brazilian Ministry of Environment, Ministry of Fisheries and Aquaculture, and Institute of Environment and Renewable Natural Resources). This group is expected to develop a proposal for gillnet fisheries management in each of the three management areas wholly or partly in Brazil. Management agencies would then be responsible for reviewing and acting on the measures in the proposal. Indeed, the plan already calls for immediate measures to reduce bycatch, including limiting gillnet length in area III to no more than 4.5 km and limiting fishing effort to no more than 120 gillnetters. It also calls for 30 percent observer coverage for all gillnet vessels longer than 15 m, issuance of new fishing licenses to limit the type of fishing gear that can be used, and establishment of gillnet exclusion zones in vulnerable areas.

International Whaling Commission

The International Whaling Commission (IWC) was established under the International Convention for the Regulation of Whaling of 1946. Its purpose is to provide for the proper conservation of the world's whale stocks and thus make possible the orderly development of the whaling industry. In doing so, the IWC conducts a continuing review of the status of those stocks and adopts and modifies conservation measures as appropriate. No new parties joined the IWC in 2010. Colombia joined the IWC in 2011, bringing the total number of member nations to 89 at the year's end. The 2010 meeting of the IWC was held in Agadir, Morocco, on 21–25 June. The IWC held its 2011 meeting in St. Helier, Jersey, on 11–14 July. In addition, the IWC convened an intersessional meeting in St. Pete Beach, Florida, on 4 March 2010. The issues considered at these meetings and related issues are discussed in this section.

Future of the IWC

Over the past several years, the ability of the IWC to function effectively has been undermined by a rift between two factions. On one side are those countries that favor a return to commercial whaling and the member countries that are sympathetic to their concerns. On the other side are countries favoring a more protectionist approach that, aside from aboriginal subsistence whaling, emphasizes non-lethal uses of whales. These factions are fairly evenly split and, on many critical issues, neither side is able to garner the three-quarters majority needed to pass amendments to the IWC schedule of management and conservation measures, including the establishment of commercial catch limits.

In 1982 the IWC established a moratorium on commercial whaling that entered into effect during the 1985–1986 whaling season. The purpose of the moratorium was to promote the recovery of a number of whale stocks that had been depleted by whaling. The schedule amendment that established the moratorium indicated that the provision would be kept under review and specified that, by 1990 at the latest, the IWC would undertake a comprehensive assessment of the effects of the moratorium on whale stocks and consider the establishment of new catch limits. In the early 1990s the IWC adopted by resolution a Revised Management Procedure, which establishes the framework for setting catch limits, should the moratorium on commercial whaling be lifted. The procedure is one element of a Revised Management Scheme that, if adopted, would guide the overall conservation of whales and the management of commercial whale harvests. The scheme would establish not only the mechanisms for setting harvest limits but identify other measures and practices needed to ensure that those limits are not exceeded. Although the IWC had been working on the scheme since the early 1990s, its Working Group on the Revised Management Scheme concluded at its 2006 meeting that discussions were at an impasse and recommended that further work on the scheme be suspended.

Despite the moratorium, commercial whaling has continued. Norway filed a timely objection to the moratorium, thus exempting its whaling operations. In addition, Iceland, which withdrew from the IWC in 1992, was allowed to rejoin in 2002 subject to a reservation allowing it to resume commercial whaling beginning in 2006. Iceland agreed, however, not to engage in commercial whaling under that reservation if it determined that sufficient progress was being made to conclude the Revised Management Scheme. Japan withdrew an initial objection to the commercial whaling moratorium effective in 1988, but that same year began a scientific whaling program targeting hundreds of Antarctic minke whales (*Balaenoptera bonaerensis*). Article VIII of the International Convention for the Regulation of Whaling allows member countries to issue special permits authorizing its nationals to take whales for purposes of scientific research and to process and sell the whale meat if it decides to do so. Scientific whaling under this provision is outside the control of the IWC. Since it ceased commercial whaling, Japan gradually increased the number of whales killed under its scientific whaling program, expanded the number of species being taken, and established a separate program targeting whales in the western North Pacific. In addition, Japan has been advocating for several years for the recognition of a new category of whaling—small-type coastal whaling—to authorize whaling by four of its coastal communities with a history of

whaling. Japan contends that such whaling is akin to aboriginal subsistence whaling, which is sanctioned by the IWC. Several other countries, including the United States, believe that Japan's small-type coastal whaling is merely a form of commercial whaling and oppose authorizing such whaling while the commercial whaling moratorium remains in place. Despite repeated consideration by the IWC, proposals to authorize small-type coastal whaling have never achieved the three-quarters majority necessary for adoption.

Another area of contention within the IWC is the establishment and recognition of whale sanctuaries. The IWC established an Indian Ocean Sanctuary in 1979 and a Southern Ocean Sanctuary in 1994. These sanctuaries are areas in which commercial whaling is prohibited. Nevertheless, Japan filed an objection to the schedule amendment that created the Southern Ocean Sanctuary, exempting itself from that provision as it pertains to minke whales. In addition, Japan continues to conduct research whaling in the Southern Ocean Sanctuary despite opposition from many IWC members. On the other side of this issue, some member countries continue to press for an amendment to establish additional whale sanctuaries in the South Atlantic and the South Pacific but have been unable to garner the votes needed for adoption.

The United States remains concerned about the potential for pro-whaling countries to block the adoption of aboriginal subsistence catch limits, particularly the one authorizing the taking of bowhead whales (*Balaena mysticetus*) by Alaska Native hunters, as a way of seeking concessions from the United States on other unrelated issues. These countries successfully blocked adoption of a renewal of the bowhead whale catch limit in 2002, although a five-year catch limit was ultimately approved at a special IWC meeting later that year. When the five-year authorization next came up for review in 2007, countries in favor of commercial whaling again threatened to block the adoption of a harvest limit for the aboriginal subsistence whaling of bowhead whales. In light of then emerging efforts to improve the operation of the IWC and find ways to resolve the significant issues it faces, the nations favoring commercial whaling acquiesced in approving new bowhead whale catch limits, which were adopted by consensus. Nevertheless, the United States recognizes that, if these countries are not satisfied with the progress made within the IWC to address other issues of concern, they almost certainly will have the votes necessary to block the adoption of new harvest limits when the current authorization expires in 2012.

At its 2007 meeting, the IWC began to address the problem of a polarized and ineffective commission. After considerable discussion, the IWC members agreed in general that the IWC needed to try to resolve the impasse. At the IWC's 2008 meeting, members agreed to make every effort to resolve issues by consensus and put issues to a vote only as a last resort. To maximize the prospects for reaching consensus, members agreed that the full text of all proposals for action by the IWC should be circulated at least 60 days before annual meetings. To reduce the uncertainty surrounding voting, the parties agreed that new members be required to wait 30 days after adherence to the whaling convention before being allowed to vote. The parties also agreed to continue to attempt to resolve the substantive differences among their members and established a Small Working Group on the Future of the IWC. The working group was tasked with submitting a final report on possible compromises at least five weeks before the IWC's June 2009 annual meeting.

The working group met three times in 2008 and 2009. The United States participated in all of those meetings and was a key participant in trying to forge a compromise solution to the issues facing the IWC. The working group submitted its report to the IWC on 18 May 2009, identifying 33 issues that require resolution within the IWC. However, only 13 of those were identified as being controversial and requiring immediate attention. Three were highlighted as the most pressing issues to resolve if a compromise is to be reached—research whaling, the creation of and compliance with sanctuaries, and Japan's proposal for small-type coastal whaling. The report noted that, although the working group had fallen short of its goal of developing a proposal for consideration at the 2009 IWC meeting, considerable progress had been made.

The working group therefore recommended that the ongoing efforts be continued for an additional year, with the goal of reaching a decision at the 2010 meeting. At its 2009 annual meeting the IWC adopted a resolution to continue and expand its work on the future of the IWC to develop a package of proposals for consideration no later than the 2010 commission meeting. The working group was

reconstituted for an additional year and supplemented by the formation of a smaller support group that could meet more frequently and advise the working group on possible solutions to the key issues. The United States was among the 12 nations selected to participate as part of the support group.

The Small Working Group met in St. Pete Beach, Florida, on 2–4 March 2010 to consider a set of proposals developed by the chair of the IWC based on the discussions of the support group. Representatives of 27 parties, including the United States, attended that meeting.

The chair's proposal set forth a two-phase process. A substitute management regime would be established for a 10-year period to give the parties time to consider longer-term solutions, some of which might require amending the International Convention for the Regulation of Whaling. A review of that interim regime would be conducted after five years. The proposal included measures to address whale conservation, management issues, science, and governance of the IWC. Proposed conservation measures included the establishment of a Conservation Programme Committee that would focus on issues such as reducing ship strikes and bycatch of whales in fisheries, environmental threats (e.g., pollution and habitat loss), and climate change.

The key management issue considered in the proposal was the establishment of catch limits that would bring all whaling under the control of the IWC, including scientific whaling and whaling being conducted under objection or reservation to the otherwise applicable requirements of the Convention and its Schedule. Aboriginal subsistence whaling would continue to be managed as it had been. The chair's proposal did not suggest what the interim catch limits should be, but specified that they would be below current levels and would limit whaling operations to those countries currently taking whales. In addition, the proposal sought to strengthen the monitoring and control of the whaling that would be authorized by requiring both national and international observers, the use of vessel monitoring systems, and tracking of whale products through DNA registration and market sampling. Although some whaling would be allowed, the IWC's moratorium on commercial whaling would remain in place. The proposal also recognized whale watching as a non-lethal management option for coastal nations and would commit the IWC to address scientific, conservation, and management issues related to whale watching. All whaling would continue to be reviewed by the IWC's scientific committee with downward adjustments in catch limits made based on its advice.

The proposal suggested that the IWC switch from annual to biennial meetings and establish a new bureau to review administrative and financial matters between meetings and to assist in coordinating the work of the commission. Under the proposal, the IWC also would establish two new committees, the aforementioned Conservation Programme Committee, which would replace the existing Conservation Committee, and the Management and Compliance Committee, which would take on responsibilities now retained by existing subcommittees (e.g., those related to infractions and aboriginal subsistence whaling) as well as taking on new responsibilities such as developing guidelines for whale watching.

The chair noted that the proposal sought to provide an interim, compromise solution to allow the IWC to move forward, while improving whale conservation and reducing the number of whales being killed. As the pieces of the proposal were considered, the understanding that "nothing is agreed until everything is agreed" was key to these negotiations. Several members of the small working group expressed general comfort with the chair's proposal, cautioning however, that the acceptability of the overall proposal hinged on the catch levels that would be specified. Other members expressed concern that the proposal did not do enough to conserve and protect whales. Although the working group recognized that there was not sufficient time before the IWC's 2010 annual meeting to revise the proposal, it developed a list of those issues identified as warranting further consideration in the commission's deliberations. Participants also requested that the scientific aspects of the proposal be reviewed by the Scientific Committee, including an assessment of whether any of the proposed catch levels would have negative effects on the long-term status of whale stocks.

Further consideration of the future of the IWC was the central issue considered at the commission's 2010 meeting. The chair's proposal[10] was vetted in a two-day session held during the week preceding the

[10] The full text of the proposal is available at http://iwc.int/index.php?cID=49&cType=document.

plenary session of the meeting. To promote discussion, the chair had expanded the proposal to include "example" catch limits for whaling being conducted by Japan, Norway, and Iceland. Under that proposal, Japan would have been allowed to take 400 minke whales and 10 fin whales per year in Antarctic waters during the first five seasons, with those numbers dropping to 200 minke whales and 5 fin whales during the last five years covered by the proposal. Japan also would be allowed to take 160 minke whales and 50 sei whales per year in the North Pacific Ocean. The chair proposed a catch limit of up to 600 minke whales per year to be allocated between Norway and Iceland, with Iceland also being authorized to take 80 fin whales per year. Another contentious issue flagged by the chair was whether to allow international trade in the products from whales taken under the agreement or whether to restrict use to domestic markets.

Based on the discussions prior to the IWC meeting, it became clear that the parties needed additional time to consider the full range of issues covered by the proposal. To enable further discussion, the chair adjourned the plenary session shortly after it convened, so that the parties could continue to have private structured negotiations among smaller groups of countries. Nearly 30 negotiating sessions among nine countries or groups of countries were held over the next two days. When the plenary session resumed on the third scheduled day of the meeting, it had become clear that the parties could not reach consensus on a compromise proposal. Key issues that remained unresolved were (1) whether allowing commercial whaling to occur despite the IWC's moratorium legitimized that whaling, (2) what catch limits, if any, would be acceptable, (3) whether to retain the moratorium on commercial whaling, (4) whether to create new whale sanctuaries and whether countries should be allowed to whale in sanctuaries under reservation, (5) whether to allow any international trade in whale products, and (6) whether the proposed monitoring and tracking provisions were appropriate or stricter than necessary. Korea, which did not object to the commercial whaling moratorium when it was adopted, expressed interest in resuming whaling at some point, and thought that the compromise under consideration unduly penalized those countries that currently were not engaged in whaling.

Absent consensus on the chair's proposal or an acceptable alternative, the parties agreed that a period of pause and reflection, during which further negotiations on the future of the IWC would be suspended, was needed prior to the IWC's 2011 meeting. Rather than trying to work past the rift between countries that support commercial whaling and those that do not, the chair suggested that the IWC concentrate on less controversial initiatives including efforts to prevent whale entanglement, expanding cooperative research, capacity building in developing countries, and improving killing methods used in subsistence hunts.

The debate over the IWC's future arose again at its 2011 annual meeting. The United States and New Zealand proposed a resolution noting the progress that had been made and calling on the parties to continue to work to resolve their differences. Ultimately that resolution was withdrawn. Rather, the member countries agreed less formally to continue their dialogue regarding the future of the commission, continue to build trust by circulating and coordinating proposals prior to their submission to the IWC, and cooperate in moving the work of the commission forward, notwithstanding the differences of views.

The future of the IWC was not expected to be a major topic of discussion at the commission's 2012 meeting.

Quorum

The discussions regarding the future of the IWC have had at least a short-term benefit by improving the level of cooperation among the parties and strengthening efforts to resolve matters by consensus whenever possible. That benefit dissipated somewhat at the 2011 IWC meeting when the parties considered a proposed schedule amendment to create a South Atlantic Whale Sanctuary. Such a proposal had been considered at several previous IWC meetings beginning in 2001 and had been included as one of the elements of the chair's proposal on the future of the IWC considered at the 2010 meeting. After discussing the matter, it was clear that a majority of the IWC parties supported creation of the sanctuary, but that the proposal could not be adopted by consensus. As such, some parties recommended that the

proposal be withdrawn, noting that reverting to voting on controversial issues could harm the constructive dialogue and atmosphere achieved within the IWC in recent years. Others supported the right of the proposal's sponsors to call for a vote if consensus could not be reached. When the sponsors of the sanctuary proposal asked for a vote, the delegations from 21 nations that believed that such a vote would be harmful rose and left the meeting room, calling into question whether the IWC retained the quorum necessary to proceed with the vote or to conduct other business.

This halt in the plenary session prompted a private commissioners meeting and extensive discussion among the member countries as to how the IWC's quorum rule should be interpreted and how to resolve the procedural impasse facing the commission. Ultimately, the parties worked past the issue by (1) establishing a working group to consider the possible interpretations of the IWC's quorum rules and to recommend any necessary clarifying amendments for consideration at the 2012 IWC meeting and (2) agreeing that the proposal to establish a South Atlantic Whale Sanctuary would not be addressed further at the 2011 meeting, but would be the first substantive issue considered at the 2012 meeting. However, because of the time needed to resolve this matter, the IWC did not fully consider the remaining agenda items, including reports from the commission's Conservation Committee and its Infractions Sub-committee and did not complete its review of several issues arising in the Scientific Committee.

Aboriginal subsistence whaling

The moratorium on commercial whaling does not apply to aboriginal subsistence whaling, which is managed under separate provisions of the whaling convention. Four countries currently engage in aboriginal subsistence whaling under the auspices of the IWC—the United States, Russia, Greenland/Denmark, and St. Vincent and the Grenadines. At its 2007 meeting the IWC authorized subsistence whaling from the following stocks for a five-year period: (1) the Bering/Chukchi/Beaufort Seas stock of bowhead whales, (2) the eastern North Pacific stock of gray whales (*Eschrichtius robustus*), (3) common minke (*Balaenoptera acutorostrata*), fin (*Balaenoptera physalus*), and bowhead whale stocks off Greenland, and (4) North Atlantic humpback whales (*Megaptera novaeangliae*) off St. Vincent and the Grenadines. In addition, as discussed below, the IWC subsequently authorized subsistence whaling of humpback whales off West Greenland beginning in 2010. The number of whales taken during 2010 and 2011 for subsistence purposes is shown in Table V-7.

Bowhead whales are an important food source for inhabitants of remote Alaskan areas and hunting whales is central to the culture of 11 coastal Native villages. Members of the Alaska Eskimo Whaling Commission are the primary hunters of bowhead whales, with a limited number of the available strikes reserved for Native hunters in Russia. The IWC authorized for the period from 2008 to 2012, subsistence hunters may land up to a total of 280 bowhead whales, with no more than 67 whales to be struck in any year, except that up to 15 unused strikes from previous years may be carried over into subsequent years.

Table V-7. Alaska whales taken for subsistence purposes, 2010-2011

Species/Stock	United States		Russia		Greenland		St. Vincent	
	2010	2011	2010	2011	2010	2011	2010	2011
Bowhead Whale	71	51	2		3	1		
Gray Whale			118	128				
Fin Whale					5	5		
Minke Whale								
West Greenland Stock					186	179		
East Greenland Stock					9	10		
Humpback Whale							3	2

On 5 March 2010 the National Marine Fisheries Service published a notice (75 Fed. Reg. 10223) announcing that the strike limit of bowhead whales for 2010 would be 82 whales, which included a carryover of 15 unused strikes from 2009. Of these, 75 strikes had been allocated to Alaska Native hunters, with 7 strikes reserved for Russian Natives. As indicated in Table V-7, in 2010 Alaska Natives struck 71 bowhead whales, successfully landing 45. The overall efficiency of the hunt in 2010 dropped to about 63 percent, well off the nearly 80 percent hunting success rate achieved between 2002 and 2009. Successful landing of whales proved especially difficult during the spring hunt, likely as a result of sub-optimal ice and weather conditions.

In both 2010 and 2011, 15 unused strikes were available from the previous year. The National Marine Fisheries Service therefore announced on 23 March 2010 (76 Fed. Reg. 16388) that the strike limit of bowhead whales for 2011 would be the same as in 2010, 82 whales, with 75 strikes allocated to Alaska Native hunters and 7 strikes to Natives in Russia. In 2011, Alaska Native hunters struck 51 bowhead whales, landing 38, a success rate of nearly 75 percent.

The other whale stock subject to subsistence hunting in the United States is the eastern North Pacific stock of gray whales. The IWC adopted a strike limit of 620 gray whales for the five-year period from 2008 to 2012, with a maximum of 140 to be taken in any one year. Russian Natives are the primary subsistence hunters of gray whales, but a small number of the allowable strikes is allocated to hunters from the Makah Tribe, which resides on the Olympic Peninsula in Washington. However, under a 2004 ruling by the Ninth Circuit Court of Appeals (*Anderson* v. *Evans*), the Makah Tribe is precluded from whaling unless and until it obtains authorization to hunt whales through a waiver of the taking moratorium under the Marine Mammal Protection Act.

As discussed in previous annual reports, the Makah Tribe submitted a request for such a waiver to the National Marine Fisheries Service in February 2005. The Service issued a draft environmental impact statement in May 2008, analyzing the potential effects of authorizing the requested hunt and various alternatives. Several substantive scientific issues arose following publication of the draft statement that had a bearing on the Service's analyses. First, the Service identified potential biases in its population estimates for the eastern North Pacific stock of gray whales that prompted it to review those estimates. Second, researchers studying the genetics of gray whales that migrate along the West Coast of the United States found evidence of substructure within the population, suggesting that the Pacific Coast Feeding Group (an aggregation of whales that remains in the area between northern California northern British Columbia during the summer, rather than migrating northward to Alaska) might warrant consideration as a separate management unit. Lastly, as discussed elsewhere in this chapter, evidence from satellite telemetry, photo-identification, and genetic studies indicated some movement of gray whales from the endangered western North Pacific stock to the U.S. West Coast and breeding grounds in Baja California. At the end of 2011, the Service was considering how best to incorporate this new information into its analyses and address these issues in any subsequent rulemaking to waive the Marine Mammal Protection Act's taking moratorium. Among the options being considered by the Service was the preparation of a new draft environmental impact statement.

At the 2007 IWC meeting, Denmark requested authorization for an aboriginal subsistence take on behalf of Greenland. The request proved to be controversial because it sought to increase the number of West Greenland common minke whales that could be taken from 175 to 200 per year and to expand the species covered by the authorization to include 10 humpback whales and 2 bowhead whales per year. Denmark also requested the renewal of previous authorizations for the annual take of 19 fin whales and 12 minke whales off East Greenland. Several countries, including the United States, thought that the science underlying the proposal, particularly with respect to the requests concerning humpback and bowhead whales, needed to be strengthened before they could support its adoption. The United States initially recommended that consideration of the requested takes of these two species be deferred until the IWC Scientific Committee could provide further advice. Based on the initial reaction from several nations, Greenland revised its proposal, dropping the request for a humpback whale quota, adding a requirement that the catch limit for minke whales off West Greenland be subject to annual review by the Scientific Committee, and conditioning the taking of bowhead whales in a given year on a determination

by the Scientific Committee that the take would be unlikely to endanger the stock. The IWC adopted the revised proposal by consensus.

At its 2008 meeting, the IWC Scientific Committee provided interim advice that the taking of minke, fin, and bowhead whales under the catch limits adopted the previous year would not harm the affected stocks. Denmark also indicated that it would again seek authorization of an aboriginal subsistence quota of 10 humpback whales from the West Greenland stock and sought the advice of the Scientific Committee before presenting the proposal to the IWC. The Scientific Committee's interim management advice indicated that striking up to 10 humpback whales per year would not harm the stock. When the proposal was presented to the IWC for its consideration, Denmark indicated its willingness to reduce its take of fin whales voluntarily from 19 to 8 per year if the humpback proposal were adopted. Despite this advice, and the proposed reduction in the number of fin whales that would be taken, the proposal again met with opposition. Several countries expressed the view that, although the science indicated that the proposed humpback quota would not be detrimental, Denmark had not made a convincing case that taking the additional whales was necessary to meet the subsistence needs of Greenlanders. Ultimately, the proposal was put to a vote and failed to pass, not even garnering a simple majority.

At the 2009 IWC meeting, Denmark again sought approval of its proposal to add humpback whales to the species authorized to be taken for subsistence purposes in Greenland. The IWC's Scientific Committee reviewed that request and again concluded that the annual catch of 10 humpback whales would not harm the affected stock. Therefore, as at the 2008 meeting, the discussion focused on whether Greenland had sufficiently demonstrated a need for these whales. The statement submitted by Greenland had expressed its need for whales in terms of tons of whale meat rather than the number of animals being requested. This necessitated the use of conversion factors to assess the amount of meat obtained from an individual taken from among the various whale species and prompted questions from several countries concerning those factors. Noting that there was a lack of consensus on this proposal, the chair of the IWC encouraged the interested members to pursue discussions outside the Commission meeting. Following such discussions, Denmark introduced a revised proposal that would limit its request for 10 humpback whales to the 2010 hunting season. However, concerns over the conversion factors remained. In response, the chair of the IWC suggested, and the parties agreed, that a scientific working group be established to address issues related to the conversion factors and that the Commission, with the benefit of the advice from the working group, hold an intersessional meeting to consider the humpback whale proposal prior to the next hunting season.

The IWC held the planned intersessional meeting on 4 March 2010 in St. Beach, Florida, in conjunction with the small working group meeting on the future of the IWC. However, because only 35 of the member governments attended the meeting, the IWC lacked a quorum to take any action. Nevertheless, the meeting participants took that opportunity to listen to Greenland's proposal and to review the work done to develop conversion factors.

The scientific working group reported on its efforts to develop conversion factors for the amount of edible products expected from a typical humpback whale and from each of the three whale species hunted for subsistence in Greenland. The working group noted certain weaknesses in the data used to derive those estimates. The lengths of animals had been measured along the curve of the body rather than parallel to the animals, resulting in overestimates of those lengths as compared to other length-weight relationship studies. Also, data on the amounts of edible products obtained from whales were obtained from reports by hunters rather than as part of a scientific study. In addition, few data on local use of humpback and bowhead whales are available, so external data were used to derive estimates for these species. Because of these shortcomings, the working group recommended that a focused effort be initiated to collect data on species other than minke whales for review in 2012 when the catch limits would next be reviewed.

Denmark believed that the working group report showed that Greenland had not been using conversion factors that inflated its hunting requests. In fact, if the newly derived conversion factors were used, the catch limits would need to be increased to provide West Greenland's stated need for 670 metric tons of whale meat per year. Other countries, however, expressed concern that the proposed correction

factors had taken into account struck-and-lost whales in estimating the yield of whale meat, thereby leading to an overestimate of subsistence need.

Noting that in 1991 the IWC had recognized West Greenland's annual need for 670 metric tons of meat from large whales and the report from the working group that indicated that current catch limits were insufficient to provide that amount of meat, Greenland introduced its proposed schedule amendment to establish an annual catch limit of 10 humpback whales for the period from 2010 to 2012. The proponents indicated that this level of take would be consistent with the advice of the IWC Scientific Committee and would be offset by a reduction in West Greenland's catch limit for minke whales from 200 to 178 per year, which had been recommended by the Scientific Committee because of concerns over the sustainability of the higher quota. Because of the absence of a quorum, however, little discussion of the proposal ensued.

The IWC next considered Greenland's proposal for authorization to take humpback whales at its 2010 annual meeting. Once again, Denmark, on behalf of Greenland, promoted a schedule agreement that would allow for the taking of 10 humpback whales per year while reducing the number of West Greenland minke whales that could be taken from 200 to 178, to conform to advice from the Scientific Committee. Spain, speaking on behalf of the European Union, expressed its general support for aboriginal subsistence whaling, provided that the catches are sustainable and do not exceed demonstrated need. However, Spain suggested amending Greenland's proposal to reduce the proposed catch limit for humpback whales to 9 per year and the authorized catch limit for fin whales from 19 to 10 per year. It believed that this would satisfy Greenland's requirements while addressing the European Union's concern that the authorized take level for large whales not be increased.

Although willing to acquiesce to the European Union proposal, Denmark preferred a somewhat different formulation. Denmark suggested that the allowable take of fin whales in the schedule be reduced from 19 to 16, but subject to a footnote specifying that it and Greenland agreed voluntarily to reduce the fin whale catch from 16 to 10 for each year from 2010 to 2012. After considerable discussion, that proposal was adopted by consensus. No additional action on Greenland's aboriginal subsistence strike limits was taken at the 2011 IWC meeting.

In conjunction with the IWC's 2011 meeting the United States began to lay the groundwork for seeking new catch limits for bowhead and gray whales in 2012. The United States introduced proposals to (1) replace the IWC's use of the term "aboriginal" with "indigenous" because of negative connotations associated with the former term, (2) improve the exchange of information among countries that engage in subsistence whaling, (3) develop guidelines to govern the contents of needs statements submitted in support of subsistence whaling proposals, and (4) establish a process for addressing aboriginal subsistence whaling issues within the IWC, including the creation of an ad hoc working group on the topic. Other IWC members generally supported these proposals, but, in an effort to achieve consensus, the United States believed that it was best to withdraw the first three proposals to resolve minor concerns that had arisen during their review by the Aboriginal Subsistence Whaling Subcommittee. The proposal to establish the working group was adopted by consensus. The IWC identified eight countries to serve on the working group, including all four that engage in subsistence whaling.

On 22 September 2011 the National Marine Fisheries Service published a notice (76 Fed. Reg. 58781) that it intended to prepare an environmental impact statement to assess the effects of authorizing the taking of bowhead whales by Alaska Natives for subsistence from 2013 through 2017. The Service identified three alternatives that it was planning to include—a no action alternative (no hunt), continuing hunting at existing levels (255 whales landed over five years, with up to 67 strikes per year), and continuing hunting at existing levels subject to a provision that allows up to 15 unused strikes to be carried forward into the next year.

The Marine Mammal Commission submitted comments on that notice on 31 October 2011. The Commission noted that the hunting limits allocated by the Service traditionally reflect the catch limits established by the IWC and the division of the allowable catch between the United States and Russia. The Commission noted that it was possible that the IWC could adopt catch limits different than those in place during 2008–2012 and that such a possibility should be reflected in the alternatives considered in the

environmental impact statement. The Commission also recommended that the statement consider the cumulative impacts from other sources that might affect bowhead whales and their availability to hunting villages. Such sources include climate disruption, oil and gas activities, commercial fisheries, military operations, and coastal development.

Commercial whaling

Despite the moratorium on commercial whaling, two countries still engage in the practice: Norway, which lodged an objection to the moratorium when it was adopted, and Iceland, which left the IWC in 1992 but was allowed to rejoin in 2002 with a reservation to the moratorium. Under its reservation, Norway authorized the take of up to 885 common minke whales in 2009. Despite not having taken that many whales in any of the past 20 years, Norway increased its quotas for 2010 and 2011 to 1286 minke whales per year, based on its review of the available scientific information on the status of the affected stocks. Iceland has established annual whaling quotas of 100 common minke whales and 150 fin whales for each year from 2009 through 2014.The numbers of whales taken by Norway and Iceland during their 2010 and 2011 commercial hunts are provided in Table V-8.

As discussed later in this section, in July 2011 the Secretary of Commerce certified Iceland under the Pelly Amendment to the Fishermen's Protective Act for its commercial whaling activities. Also, as discussed elsewhere in this chapter, the Secretary of the Interior is reviewing whether Iceland's international trade in fin whale products merits certification under the Pelly amendment for diminishing the effectiveness of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Scientific whaling

The International Convention for the Regulation of Whaling allows scientific whaling (whaling undertaken for the purpose of collecting scientific information) to be conducted outside the management regime of the IWC. Japan is the only country currently engaged in such whaling, with ongoing research programs in Antarctic waters and in the North Pacific. Iceland began a scientific whaling program in 2003, but that program ended in 2007.

Japan issued special permits for scientific whaling in Antarctic waters during the 2009–2010 and 2010–2011 seasons that authorized for each season the lethal take of 850 Antarctic minke whales (with permission to take up to 935 if required to achieve the research goals), 50 fin whales, and 50 humpback whales. These lethal take levels remained unchanged from other recent whaling seasons. Japan's scientific whaling catches in Antarctic waters for 2009–2010 and 2010–2011 are shown in Table V-8. The

Table V-8. Whales taken for scientific research and in commercial whaling operations, 2010-2011

	Minke Whale		Fin Whale		Bryde's Whale		Sei Whale		Sperm Whale	
	2010	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**
Scientific Research Whaling										
Japan										
North Pacific	119	126			50	50	100	96	3	1
Southern Ocean	171	266	3	1						
Commercial Whaling										
Iceland	60	58	148							
Norway	468	533								

number of whales taken during the 2010–2011 season declined markedly from recent years, ostensibly because of interference with Japan's whaling activities by Sea Shepherd Conservation Society, which prompted Japan to abandon its hunt one month earlier than usual.

Japan's 2007 decision to expand its scientific whaling to include humpback whales, some of which may belong to depleted breeding populations, was particularly troubling to the United States and some other countries. Following the 2007 IWC meeting, the IWC chairman pursued negotiations with Japan, asking it to reconsider this aspect of its scientific whaling program. In response, Japan announced in December 2007 that it would postpone the hunting of humpback whales, at least until after the 2008 IWC meeting. Japan has continued to refrain from taking humpback whales since then, repeatedly informing the IWC that it will do so, provided that discussions on reforming the commission continue.

At recent IWC meetings members have focused considerable attention on the issue of safety at sea, particularly as it relates to interference by the Sea Shepherd Conservation Society with Japan's research whaling activities in the Southern Ocean. Although member nations supported the right of whaling opponents to engage in legitimate and peaceful forms of protest, they have expressed deep concern over the escalation of the types of confrontations that are occurring. At the 2011 meeting, the IWC adopted a resolution reiterating its condemnation of dangerous behavior that could endanger human life and pose environmental risks to sensitive Antarctic ecosystems. That resolution noted a similar resolution adopted by the International Maritime Organization in 2010 and urged member nations to take actions, in accordance with applicable international and national laws, necessary to prevent and suppress activities that place human life and property at risk.

Japan's special permits for scientific whaling in the North Pacific during 2010 and 2011 authorized the lethal take of 100 sei whales (*Balaenoptera borealis*), 220 common minke whales, 50 Bryde's whales (*Balaenoptera edeni*), and 10 sperm whales (*Physeter macrocephalus*). The taking of common minke whales has prompted conservation concerns because some of the whales being taken are from a stock (the J stock) that has been severely reduced in numbers by whaling and bycatch in Japanese and Korean fisheries. The catch of common minke whales from the J stock is also part of Japan's proposed coastal whaling and is an additional concern. The numbers of whales caught in the North Pacific by Japan under its special permit during 2010 and 2011 are provided in Table V-8.

The issue of scientific whaling remains controversial within the IWC. Several nations, including the United States, believe that much of the current research could be accomplished using nonlethal alternatives. Over the years this has prompted the IWC to adopt several resolutions calling on members to refrain from scientific whaling in the Southern Ocean Sanctuary and to permit scientific research involving the killing of whales only when it involves critically important research needs that cannot be addressed using other means. Noting that Japan had more than doubled its authorized take of Antarctic minke whales and added fin whales and humpback whales to its list of targeted species, the IWC, at its 2007 meeting, passed a resolution calling on Japan to suspend indefinitely the lethal aspects of its research program in the Southern Ocean Sanctuary. At its 2008 and 2009 meetings, several countries on both sides of the issue reiterated their positions with respect to the need for and value of lethal scientific whaling. As discussed previously, this was one of the key issues of concern discussed as part of the negotiations on the future of the IWC.

Australia, one of the countries opposing lethal research whaling, announced at the 2009 IWC meeting the creation of the Southern Ocean Research Partnership, an initiative to pursue non-lethal research on whale stocks in this area. In support of this program, Australia made an initial voluntary contribution of 500,000 AUD (Australian dollars) to the IWC, which the United States supplemented with a $25,000 contribution at the 2011 meeting. The primary focus of the research under this program is the species of large whales managed by the IWC, but the program is designed to investigate other species that occur in Antarctic waters, including killer whales.

In 2010 Australia instituted proceedings within the International Court of Justice alleging that Japan's whaling activities in the Southern Ocean violate international law. At the end of 2011 it was anticipated that the court would not hear the case until 2013.

Coastal whaling

Japan considers small-type coastal whaling to be similar to aboriginal subsistence whaling and, for more than two decades, has sought IWC approval of such whaling. Several other countries, including the United States, consider small-type whaling in Japan to be essentially commercial whaling that should not be authorized unless and until the moratorium on commercial whaling is lifted.

At the 2007 IWC meeting, Japan proposed a schedule amendment that sought authorization for a catch of common minke whales from the Okhotsk Sea/West Pacific stock. Japan did not include stock-specific numbers in its proposal, but expressed its willingness to negotiate numbers that would be acceptable to the IWC. Further, Japan indicated that it was willing to reduce its scientific whaling program quota by the number of minke whales being taken from this stock, such that the total take would remain unchanged. Subsequent discussion indicated a lack of support for the proposal and no vote was taken.

Japan again raised the issue of small-type coastal whaling at the 2008 and 2009 IWC meetings, noting the economic hardship faced by its former whaling communities. At each of these meetings, Japan indicated its willingness to pursue this issue in the context of the discussions of the future of the IWC rather than to seek a vote on a specific proposal. As with several other controversial matters, coastal whaling was addressed by the chair's proposal on the future of the IWC, but remains unresolved. Japan again raised the issue at the 2011 IWC meeting, but recognizing that consensus could not be reached, refrained from seeking action by the commission.

Whale sanctuaries

The IWC currently has in place two whale sanctuaries, areas in which commercial whaling is prohibited. The Indian Ocean Sanctuary, established in 1979, covers the entirety of the Indian Ocean, extending southward to 55° S latitude. The Southern Ocean Sanctuary, established in 1994, covers waters surrounding Antarctica north to 40° S latitude, except where it abuts the Indian Ocean Sanctuary, and in the area around and west of the tip of South America, where it extends only to 60° S latitude. In the late 1990s Brazil, Argentina, and others began to push for the creation of a South Atlantic Sanctuary, a matter that has been considered at the past several IWC meetings. The sanctuary would include the portion of the Atlantic Ocean stretching from the equator to the boundary of the Southern Ocean Sanctuary. Although favored by a majority of parties, including the United States, the proposal failed to garner the required three-quarters majority vote.

The proposed creation of a South Atlantic Sanctuary was one element of the chair's proposal concerning the future of the IWC. This was the context in which IWC considered the issue at its 2010 meeting. At the 2011 meeting, the proponents again introduced a proposal to create the sanctuary and pressed for a vote on the matter. As discussed in the quorum section above, this prompted several members to leave the meeting room, raising doubts as to whether the commission retained a quorum necessary to proceed. The parties agreed to consider the proposal as the first substantive agenda item at the 2012 IWC meeting.

Conservation Issues

The United States has played a leading role in global whale conservation and science since the early 1970s, when, through enactment of the Marine Mammal Protection Act, it stopped its commercial whaling operations. The United States currently is spearheading the development and implementation of several conservation initiatives within the IWC. These relate to climate change, bycatch, marine debris, ship strikes, disentanglement, pollution, and ocean noise. Additionally, the United States remains extremely active in the IWC's Scientific Committee. Since 1970, seven U.S. members have served as chair of the Scientific Committee, spanning some 20 years.

In 2011 the United States further demonstrated its dedication to the conservation efforts of the IWC by establishing a detail for an employee of the Hawaiian Islands Humpback Whale National Marine Sanctuary to work with the IWC to advance initiatives on humpback whale research, disentangling large whales, reducing the incidence and severity of ship strikes, and marine mammal protected areas. That employee's work with the IWC has included leading seminars and training sessions in Mexico, Samoa, Canada, Australia, New Zealand, and Korea on how to respond to large whale entanglements and has garnered goodwill and promoted cooperation between the United States and other IWC members.

Status of whale stocks

The IWC and its Scientific Committee routinely review the status of whale stocks. At its 2010 and 2011 meetings, the Scientific Committee gave special attention to revising the abundance estimate for Antarctic minke whales, assessing the status of the humpback whale stock found off the western coast of Africa, addressing threats faced by the western North Pacific stock of gray whales from oil and gas activities and entanglement in fishing gear, and reviewing the status of Southern Hemisphere right whale stocks. The committee reviewed satellite tracking data that unexpectedly showed movements of a western North Pacific gray whale to waters off central Oregon and endorsed further tagging in 2011. It also examined the results of genetic analyses that revealed significant differences between gray whales from the western and eastern North Pacific.

Small cetaceans

Although parties to the IWC have differing views as to the organization's legal authority to manage small cetaceans, many countries continue to cooperate to address issues involving these species, particularly within the IWC Scientific Committee. At its 2010 meeting, the Scientific Committee undertook a review of small cetacean species found in northwestern African and eastern tropical Atlantic waters. A scarcity of information prevented reliable evaluations of any of the species in this region. However, the Committee expressed concern that nearly all of these species are subject to directed hunting or are taken as bycatch in fisheries. The Clymene dolphin was singled out for special concern because of a number of observed landings in Ghana.

At its 2011 meeting the Scientific Committee reviewed the taxonomy, population structure, and status of beaked and bottlenose whales of the family Ziphiidae that inhabit the North Atlantic and Mediterranean Sea. The review was intended to compile information on small cetacean stocks that are subject to directed and incidental taking. Threats to those species include directed taking, exposure to noise (and possible gas embolism from rapid ascents associated with responses to noise), ingestion of plastic, and climate change.

At both the 2010 and 2011 meetings, the Scientific Committee also reviewed progress on its past recommendations concerning several endangered small cetacean species. These include the vaquita in the Gulf of California, the Baltic Sea harbor porpoise population, the franciscana (a species endemic to the coasts of Brazil, Uruguay, and Argentina), and the Irrawaddy dolphin in the Mekong River.

Climate disruption

In 1980 the IWC adopted its first resolution regarding the impact of environmental changes on whales. Since then, it has continued to focus attention on the issue. As discussed in the Marine Mammal Commission's previous annual report, the IWC convened a workshop on Cetaceans and Climate Change in February 2009. That workshop prompted the IWC to adopt a resolution at its 2009 meeting calling for expanded international efforts to address this issue, exhorting member governments to take urgent action to reduce the rate and extent of climate change, prompting parties to incorporate climate change into their

conservation and management plans and directing the IWC Scientific Committee to continue to assess the impact of environmental change on cetaceans.

The IWC has continued its efforts to address this issue. In November 2010 it convened a workshop on Small Cetaceans and Climate Change, focusing on the restricted habitats of many of these species, range shifts, and the effects in Arctic regions. At its 2010 meeting the IWC directed the Scientific Committee to prepare for a workshop to examine the impacts of increasing human uses of the Arctic Ocean.

Pelly Amendment Certification

The Pelly Amendment to the Fishermen's Protective Act of 1967 (22 U.S.C. § 1978) directs the Secretary of Commerce to certify to the President when nationals of a foreign country are conducting fishing operations that diminish the effectiveness of an international fishery conservation program. For purposes of implementing the Act, whaling is considered to be a fishing operation and the International Convention for the Regulation of Whaling is considered to be an international fishery conservation program. Several countries, including Iceland, have been certified by the Secretary for their whaling activities. The Secretary initially certified Iceland in 2004 when it began a lethal scientific whaling program. When Iceland resumed commercial whaling in 2006, the Secretary again certified Iceland.

On 21 December 2010, 19 conservation and animal rights groups petitioned the Secretary of Commerce to certify Iceland once again for its 2009 decision to authorize the taking of 150 fin whales annually and allow more than 800 metric tons of whale meat to be exported to Japan. As discussed elsewhere in this chapter, these groups also petitioned the Secretary of the Interior to certify Iceland under a separate provision of the Pelly Amendment for diminishing the effectiveness of the Convention on International Trade in Endangered Species of Wild Fauna and Flora by allowing exports of fin whale meat.

The Secretary of Commerce agreed that Iceland's expansion of whaling activities to increase significantly its take of fin whales—it had taken only seven fin whales between 1987 and 2007—undermined the effectiveness of the IWC's conservation program under the ICRW. The Secretary sent a letter to the President on 19 July 2011 certifying Iceland for its fin whaling and proposing a number of non-trade responsive actions. The Secretary also noted that Japan already is subject to three Pelly Amendment certifications and believed that an additional certification was not necessary.

Once a country is certified under the Pelly Amendment, the President has the option to impose sanctions against the offending country, including trade sanctions that are consistent with the requirements of the World Trade Organization. On 15 September 2011 the President notified Congress that he had directed Administration officials to take several actions, including (1) relevant U.S. delegations and senior officials to raise concerns with respect to Iceland's commercial whaling, when meeting with Icelandic officials, (2) Cabinet secretaries to evaluate the appropriateness of visits to Iceland depending on continuation of the current suspension of fin whaling, (3) the Department of State to examine Arctic cooperative projects, and where appropriate, to link U.S. cooperation with Iceland to changes in its whaling policies, and (4) relevant agencies to continue to examine other possible options for responding to continued whaling by Iceland.

CITES/Pelly Review of a Non-Detriment Finding for the Commercial Harvest of North Atlantic Fin Whales

In 2011 the Department of Interior, U.S. Fish and Wildlife Service, asked the Commission to assist in the review of a petition under the Pelly Amendment to the Fishermen's Protective Act of 1967 (22 U.S.C. § 1978) (Pelly Amendment) to determine whether Iceland was diminishing the effectiveness of the Convention on International Trade in Endangered Species of Wild Fauna and Flora through its

international trade in whale meat. The Commission's report, which was provided to the Service in November 2011, was intended to inform Interior's review, which was not complete at the end of 2011.

The Pelly Amendment requires certification of foreign countries whose nationals, either directly or indirectly, are "(1) conducting fishing operations in a manner or under circumstances which diminish the effectiveness of an international fishery conservation program…or (2) engaging in trade or taking which diminishes the effectiveness of any international program for endangered or threatened species…." As discussed in the preceding section of this chapter, in December 2010, a group of 19 conservation organizations petitioned the Secretary of Commerce to certify that Iceland's take of fin whales (*Balaenoptera physalus*) and minke whales (*Balaenoptera acutorostrata*) is diminishing the effectiveness of the International Convention for the Regulation of Whaling, which is considered to be an international fishery conservation program. The organizations also petitioned the Secretary of the Interior to certify that Iceland's international trade in fin and minke whale meat and products is diminishing the effectiveness of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), an international program to regulate trade involving protected species.

On 19 July 2011, the Secretary of Commerce certified to the President that Iceland's fin whale hunt was contrary to the commercial whaling moratorium on commercial whaling adopted by the International Whaling Commission and undermining the effectiveness of the International Convention for the Regulation of Whaling. On 15 September 2011, the President notified Congress of the steps the Administration was taking in response.

The Department of the Interior (U.S. Fish and Wildlife Service) undertook a separate review of whether Iceland's actions also are undermining the effectiveness of CITES. The Department requested assistance from the Marine Mammal Commission in reviewing the information pertaining to Iceland's take and subsequent export of fin whales. In particular, the Service asked for the Commission's views as to whether the trade in fin whale meat from Iceland to Japan is being conducted in compliance with CITES.

CITES and the International Whaling Commission (IWC)

CITES was established to regulate trade in endangered species. It defines the term "species" to mean "any species, subspecies, or geographically separate population thereof." Species are listed in one of three Appendices based on their conservation status and the risk of extinction posed by trade. The fin whale is listed as an endangered species under the U.S. Endangered Species Act and by the International Union for Conservation of Nature (Red List). It also is included in Appendix I of CITES, which means that trade in fin whale specimens, including parts and products, is not allowed for "primarily commercial purposes." As reflected in the applicable CITES resolution (Resolution Conf. 5.10, Rev CoP15), trade in specimens of Appendix I species "must be subject to particularly strict regulation and only authorized in exceptional circumstances."

Iceland and Japan have filed reservations with regard to the CITES Appendix I listing of fin whales and, as a result, they are not treated as parties to CITES with respect to trade involving this species. However, under another CITES resolution (Resolution Conf. 4.25, Rev. CoP 14) they are expected to manage any trade involving fin whales in accordance with the requirements pertaining to a species included on Appendix II. Article IV of CITES allows trade of Appendix II species if, among other things, "a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species." Iceland believes that its harvest of and trade involving fin whales meets the applicable standards and, as the State of export, has made such a "non-detriment" finding.

The IWC is the international body established under the International Convention for the Regulation of Whaling to implement the Convention—that is, it is the recognized international scientific and management body for regulating commercial whaling. The question before the Department of the Interior pertains to CITES, but cannot be answered without considering the work of the IWC related to fin whales. CITES and the IWC work closely together as described in CITES Resolution Conf. 11.4 (Rev. CoP 12). CITES recognizes the IWC as "the major source of information on whale stocks around the world."

CITES also recognizes that "international cooperation is essential for the protection of certain species of wild fauna and flora against over-exploitation through international trade." Finally, CITES notes that "the IWC has established regulations that protect certain species and stocks from all commercial whaling by nationals of its member nations in order to provide them with protection and the opportunity to recover from over-exploitation." The IWC has improved the basis for the conservation and management of whales since the implementation of the commercial moratorium 25 years ago and its work is certainly germane, if not central, to evaluating whether Iceland has a sound basis for its non-detriment finding.

In recent decades the IWC has been developing a comprehensive Revised Management Scheme that integrates both the scientific and policy-related elements needed for effective management should it decide to allow commercial whaling to resume. As part of that scheme, the IWC Scientific Committee has developed the Revised Management Procedure (RMP). The RMP sets standards for data and analyses, incorporates the best available science, and addresses important scientific uncertainties to establish suitably precautionary (i.e., risk-averse) catch levels that ensure the conservation of the hunted species and stocks in a manner consistent with the conservation and use objectives of the International Convention for the Regulation of Whaling.

In its analyses the Marine Mammal Commission reviewed the basis for the IWC's Revised Management Procedure and how it has been applied to fin whale stocks subject to Icelandic whaling (using the Catch Limit Algorithm devised by the IWC's Scientific Committee) to assess whether Iceland had a reasonable basis to make a non-detriment finding for the export of fin whale meat under Appendix II of CITES.

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Chapter VI

THE CHANGING ARCTIC

Over the past decade the Arctic marine environment has received increasing attention, in large part because it is changing rapidly due to climate disruption and the concomitant increase in human activities. The most obvious indicator of such change is the annual reduction of sea ice, but many aspects of Arctic marine ecosystems will be profoundly altered or lost. This chapter is included in the Commission's report to highlight some areas of environmental change and activities that are being undertaken to monitor the losses, especially with regard to marine mammals and their habitats.

Arctic Report Card

The Arctic Report Card[1] is published annually by the Arctic Research Program of the National Oceanic and Atmospheric Administration and the Arctic Council's Conservation of Arctic Flora and Fauna Working Group to provide the most concise environmental information on the current state of the Arctic atmosphere, sea ice and ocean, marine ecosystems, terrestrial ecosystems, and hydrology and terrestrial cryosphere (Richter-Menge et al. 2011). Since the first 2006 State of the Arctic Report, these annual report cards are providing concise scientific assessments of the measurable elements of Arctic change (see Arctic Report Card Highlights for 2011).

With regard to marine mammals, three of the more conspicuous species being monitored include the North Pacific walrus, bowhead whale, and polar bear. The 2011 Arctic Report Card chapter on Biodiversity – Cetaceans and Pinnipeds (Whales and Seals) (Thomas and Laidre 2011) reviewed walrus responses to recent declines in seasonal sea ice in the northern Chukchi Sea and the emerging pattern of walruses hauling out by the tens of thousands along the northwest coast of Alaska in late summer. Radio-tagging studies conducted since 2007 indicate that tagged walruses in the Chukchi Sea remain offshore over shallow continental shelf feeding grounds as long as they can find sea ice to haul out and rest. When the ice recedes north of their continental shelf feeding areas the majority of them move to land haul-outs on the Alaska coast (Garlich-Miller et al. 2011, Jay et al. 2010). Bayesian network models predict a clear decline in walrus status as sea ice continues to recede (Jay et al. 2011).

The Arctic Report Card also reviewed new information on bowhead whale movements. Quakenbush et al. (2010) showed that, in the spring, the whales in the Bering/Chukchi/Beaufort Seas population migrate from the northern Bering Sea northward along the Alaskan Chukchi Sea coast and eastward into the Beaufort Sea, easily swimming through 80 to 100 percent ice cover. After summer feeding in the Canadian eastern Beaufort Sea they begin to move westward in late summer/early fall, often feeding along the way, especially near Barrow, Alaska. They cross the Chukchi Sea in fall and migrate southward along the Russian Chukotka coast. In the first documented example of possible overlap between eastern and western bowhead populations, which heretofore have been assumed to be separated by sea ice, two satellite tagged whales—one from the Bering-Chukchi-Beaufort Sea population and one from the Eastern Canada-West Greenland population—entered the Northwest Passage from different directions and spent approximately ten days of August 2010 in the same area (Heide-Jørgensen et al. 2011).

The Arctic Report Card also summarized the Polar Bear Specialist Group's latest estimates of polar bear subpopulation size. The global population includes between 20,000 and 25,000 bears in 19 largely discrete subpopulations around the Arctic (Obbard et al. 2010, Vongraven and Richardson 2011). Of

[1] http://www.arctic.noaa/report card/

Arctic Report Card Highlights for 2011

Sea ice and ocean observations over the past decade (2001-2011) suggest that the Arctic Ocean climate has reached a new state, with characteristics different than those observed previously. The new ocean climate has less sea ice (both thickness and summer extent) and, as a result, a warmer and fresher upper ocean. A clockwise ocean circulation regime has dominated the Arctic Ocean for at least 14 years (1997-2011), in contrast to the typical duration of a 5-8 year pattern of circulation shifts observed from 1948-1996. In the Bering Sea, aragonite undersaturation, i.e., ocean acidification, throughout the water column is causing seasonal calcium carbonate mineral suppression in some areas.

The September 2011 Arctic sea ice extent was the second lowest of the past 30 years. The five lowest September ice extents having occurred in the past five years, suggesting that a shift to a new sea ice state continues. The amount of older, thicker multiyear ice continues to decrease and both the Northern Sea Route and the Northwest Passage were ice-free in September.

Observations of the Arctic marine ecosystems provide a glimpse of what can only be described as profound and continuing changes. For example, primary production by phytoplankton in the Arctic Ocean increased ~20% between 1998 and 2009, mainly as a result of increasing open water extent and duration of the open water season. Changes in Arctic Ocean bottom communities include shifts in composition, geographical ranges, and biomass. While polar bears and walrus are experiencing negative impacts due to loss of habitat, whales now have greater access to the Northwest Passage and other northern feeding areas.

In 2011 there was continued widespread warming in the Arctic, where deviations from historical air temperatures are amplified by a factor of two or more relative to lower latitudes. This phenomenon, called Arctic Amplification, is primarily a consequence of increased summer sea ice loss and northward transport of heat by the atmosphere and ocean. December 2010 to January 2011, and summer 2011, repeated the shift in wind patterns observed in December 2009 and February 2010 that resulted in relatively warm Arctic temperatures and severe cold weather in eastern North America, northern Europe and eastern Asia. Related to these shifts, the western slope of the Greenland ice sheet in particular experienced an increase in surface melting in summer 2011, amplified by albedo feedback and below-normal summer snowfall. Satellite gravity measurements show that the mass loss from the entire Greenland ice sheet during 2010-2011 was the largest annual loss in the satellite record of 2002-present. Lake ice cover duration, largely influenced by air temperature changes, was shorter by as much as 4-5 weeks in 2010-2011 compared to the 1997-2010 average in the eastern Canadian Arctic." (From Richter-Menge et al. 2011)

those 19 subpopulations, the best available data indicates one is increasing, four are stable, and seven are decreasing. The best available information is not sufficient to determine the trend of the other seven subpopulations. Two polar bear populations occur in U.S. territory (i.e., southern Beaufort Sea and Chukchi Sea) and both are thought to be reduced and declining further. Those two populations are discussed further in Chapter IV of this report.

Arctic Council

Ministers representing the eight Arctic states convened in Nuuk, Greenland, on 12 May 2011 for the Seventh Ministerial Meeting of the Arctic Council. The ministers recognized that Arctic shipping and other maritime activities are increasing as seasonal sea ice diminishes, and commissioned work on oil spill preparedness, prevention, and response; approved an agreement on Arctic search and rescue; called for development of a mandatory Polar Code on ship safety and pollution prevention; and evaluated progress on the ongoing Arctic Biodiversity Assessment.

The Arctic ministers commissioned a task force to develop, by 2013, an international agreement on Arctic marine oil pollution preparedness and response. They asked other standing Arctic Council groups, especially the Working Group on Emergency Prevention, Preparedness, and Response, to develop recommendations and/or best practices in the prevention of marine oil pollution. The Arctic Council Task Force for Arctic Marine Oil Pollution Preparedness and Response held its first meeting in Oslo, Norway, on 17 and 18 October 2011 and the second in Saint Petersburg, Russia, on 13 and 14 December 2011. Meeting participants discussed the scope and nature of the proposed agreement. The task force scheduled additional meetings for 2012 and also planned to meet in 2013 if necessary.

In Arctic shipping-related developments, the Arctic Council ministers welcomed the completion of an Agreement on Aeronautical and Maritime Search and Rescue in the Arctic, the first binding agreement ever developed under the Arctic Council. In response to recommendations of the Arctic Council's 2009 Arctic Marine Shipping Assessment, the International Maritime Organization approved *Guidelines for Ships Operating in Polar Waters* and is now developing a legally binding Polar Code on ship safety and pollution prevention with requirements for ship construction, design, equipment, crews, training, and operations.

In 2009 and 2010 Congressman Young of Alaska introduced bills to implement the Arctic Marine Shipping Assessment, with particular focus on vessel safety in the Arctic and construction of two ice-breaking vessels to promote safety. Neither bill was passed to the floor of the House.

In May 2011 the Arctic Council published a report on the "Status on Implementation of the AMSA 2009 Report Recommendations," prepared by the Council's working group entitled "Protection of Arctic Marine Environment" or PAME. With regard to potential impacts on marine mammals, the report indicated that the United States is chairing a correspondence group established by the International Maritime Organization on "Noise from commercial shipping and its adverse impacts on marine life." The group is seeking to "identify and address ways to minimize the introduction of incidental noise into the marine environment from commercial shipping and to pursue development of non-mandatory technical guidelines for quieting technologies as well as potential navigation and operational practices." The report also noted that a working group of the International Whaling Commission's Scientific Committee endorsed the noise reduction goal advanced by the International Maritime Organization's Marine Environmental Protection Committee in 2008, which aims to reduce noise by 3 dB in 10 years and 10 dB in 30 years. With regard to protection of Arctic people and the environment, the report cited a survey conducted by the Bureau of Ocean Energy Management to assess subsistence uses and areas, as well as culturally sensitive areas, all of which warrant special protection.

In 2006 the Arctic Council initiated the Arctic Biodiversity Assessment, which is to be finalized in 2013. The assessment will inventory and update the status and trends of biological diversity in the Arctic, including all stocks of Arctic marine mammals. At its 2011 Nuuk meeting, the Arctic Council welcomed an initial report on Arctic biodiversity trends by its Working Group on Conservation of Arctic Flora and

Fauna. The Arctic Biodiversity Trends – 2010 report (Conservation of Arctic Flora and Fauna 2010) presented the following 7 key findings based on an evaluation of 22 indicators of change in the Arctic:

1. Unique Arctic habitats for flora and fauna, including sea ice, tundra, thermokarst ponds and lakes, and permafrost peatlands have been disappearing over recent decades.
2. Although the majority of Arctic species are not currently declining, some harvested species of importance to Arctic people or species of global significance are declining.
3. Climate change is emerging as the most far reaching and significant stressor on Arctic biodiversity. However, contaminants, habitat fragmentation, industrial development, and unsustainable harvest levels continue to have impacts. Complex interactions between climate change and other factors have the potential to magnify impacts on biodiversity.
4. Since 1991, the extent of protected areas in the Arctic has increased, although marine areas remain poorly represented.
5. Changes in Arctic biodiversity are creating both challenges and opportunities for Arctic peoples.
6. Long-term observations based on the best available traditional and scientific knowledge are required to identify changes in biodiversity, assess the implications of observed changes, and develop adaptation strategies.
7. Changes in Arctic biodiversity have global repercussions.

The final assessment report will describe the current state of Arctic ecosystems and biodiversity; establish baselines for use in future global and regional biodiversity assessments and in the Circumpolar Biodiversity Monitoring Program; inform future Arctic Council work; identify gaps in the data record; identify key mechanisms driving change; and recommend scientific research and policy matters for future consideration by the Arctic Council.

The Arctic Council's Circumpolar Biodiversity Monitoring Program consists of an "international network of scientists, government agencies, indigenous organizations, and conservation groups working together to harmonize and integrate efforts to monitor the Arctic's living resources." In 2010 and 2011 the Circumpolar Biodiversity Monitoring Program developed a detailed Arctic Marine Biodiversity Monitoring Plan (Marine Plan) with the overall goal of improving "our ability to detect and understand the causes of long-term change in the composition, structure and function of Arctic marine ecosystems, as well as to develop authoritative assessments of key elements of Arctic marine biodiversity (e.g., key indicators, ecologically pivotal and/or other important taxa)" (Gill et al. 2011).

The Marine Plan recommends monitoring of major ecosystem components (from microbes and phytoplankton to ice flora and fauna, fish, seabirds, and marine mammals) and key groups, species, and parameters of interest within those broad components. It details both biological and abiotic parameters relevant to marine biodiversity. Monitoring foci for marine mammals were based, in part, on the work of a March 2007 international workshop sponsored by the Marine Mammal Commission and U.S. Fish and Wildlife Service to develop a proposed Framework for Monitoring Arctic Marine Mammals (Simpkins et al. 2009).

On completion of the Marine Plan in April 2011, the Circumpolar Biodiversity Monitoring Program began to assemble Marine Expert Networks for each major ecosystem component, as a foundation to the implementation phase of the program. The first meeting of the Marine Mammal Expert Network was in September 2011. It included participants from several Arctic countries and focused on developing a five-year implementation plan for the marine mammal portion of the Marine Plan. In the first year of implementation (2012) the experts will identify historical datasets that provide baseline information for assessing changes in marine mammal abundance and will prepare data portals and database structures needed to accommodate these and future monitoring data. The abundance and trends information presented in the completed Arctic Biodiversity Assessment will be incorporated into the monitoring datasets in 2013.

NOAA's Arctic Vision and Strategy

The National Oceanic and Atmospheric Administration (NOAA) published its "NOAA Arctic Vision and Strategy" in February 2011 to provide a framework to address its highest priorities in the region. The agency's vision is of an Arctic where "conservation, management, and use are based on sound science and support healthy, productive, and resilient communities and ecosystems; and, the global implications of Arctic change are better understood and predicted." To realize this vision the agency pledged to focus its efforts on six priority goals:

(1) Forecast sea ice,
(2) Strengthen foundational science to understand and detect Arctic climate and ecosystem changes,
(3) Improve weather and water forecasts and warnings,
(4) Enhance international and national partnerships,
(5) Improve stewardship and management of ocean and coastal resources in the Arctic, and
(6) Advance resilient and healthy arctic communities and economies.

Each of these goals is relevant to the conservation of marine mammals in the Arctic. The most relevant to marine mammals are the second and fifth goals: (2) to strengthen foundational science to understand and detect Arctic climate change and ecosystem changes, and (5) to improve stewardship and management of coastal resources in the Arctic. In support of the 2nd goal, NOAA proposed "an enhanced and integrated set of environmental observations…to track the new trajectory of Arctic change across land, in the atmosphere, and in the ocean, including physical indicators, biological responses, and social and economic impacts." Among other things, NOAA also proposed the development of a distributed biological observatory "in the U.S. Arctic for consistent monitoring of biophysical responses in four pivotal oceanographic areas along a north-south latitudinal gradient," as described in the next section. In support of the 5th goal, NOAA seeks to continually improve upon the stewardship and management of Arctic marine mammal populations via stock assessments, the development of environmental assessment documents, and co-management-related activities.

In the first phase of its Arctic strategy NOAA planned to develop and execute a five-year Arctic Action Plan, to appoint a senior executive as the point of contact for accomplishing NOAA Arctic goals, and to invest an initial $10 million toward plan implementation.

Distributed biological observatory

In response to rising seawater temperatures, seasonal retreat and thinning of sea ice, and many biological changes in the Bering, Chukchi and Beaufort Seas, in May 2009 NOAA convened a Biology-Sea Ice Workshop. The workshop brought together physical, geochemical and biological field researchers and modelers to evaluate ecosystem responses to changes in the Arctic climate. The workshop report proposed a distributed biological observatory to identify and consistently monitor biophysical responses in four pivotal geographic areas that exhibit high productivity, biodiversity, and rates of change (Figure VI-1, Grebmeier et al. 2010).

The distributed biological observatory has been endorsed by several U.S. government agencies and more broadly in Administration policy. The draft National Ocean Policy Arctic Strategic Action Plan proposes development of the observatory as one of five major actions needed to meet the priority objective of "addressing environmental stewardship needs in the Arctic Ocean and adjacent coastal areas in the face of climate-induced and other environmental changes" (National Ocean Council 2011). The observatory was endorsed in a U.S. Geological Survey gap analysis on "Needs to Inform Decisions on Outer Continental Shelf Energy Development in the Chukchi and Beaufort Seas Alaska" (Holland-Bartels and Pierce 2011). And, as noted above, NOAA highlighted the observatory as contributing to its goal of

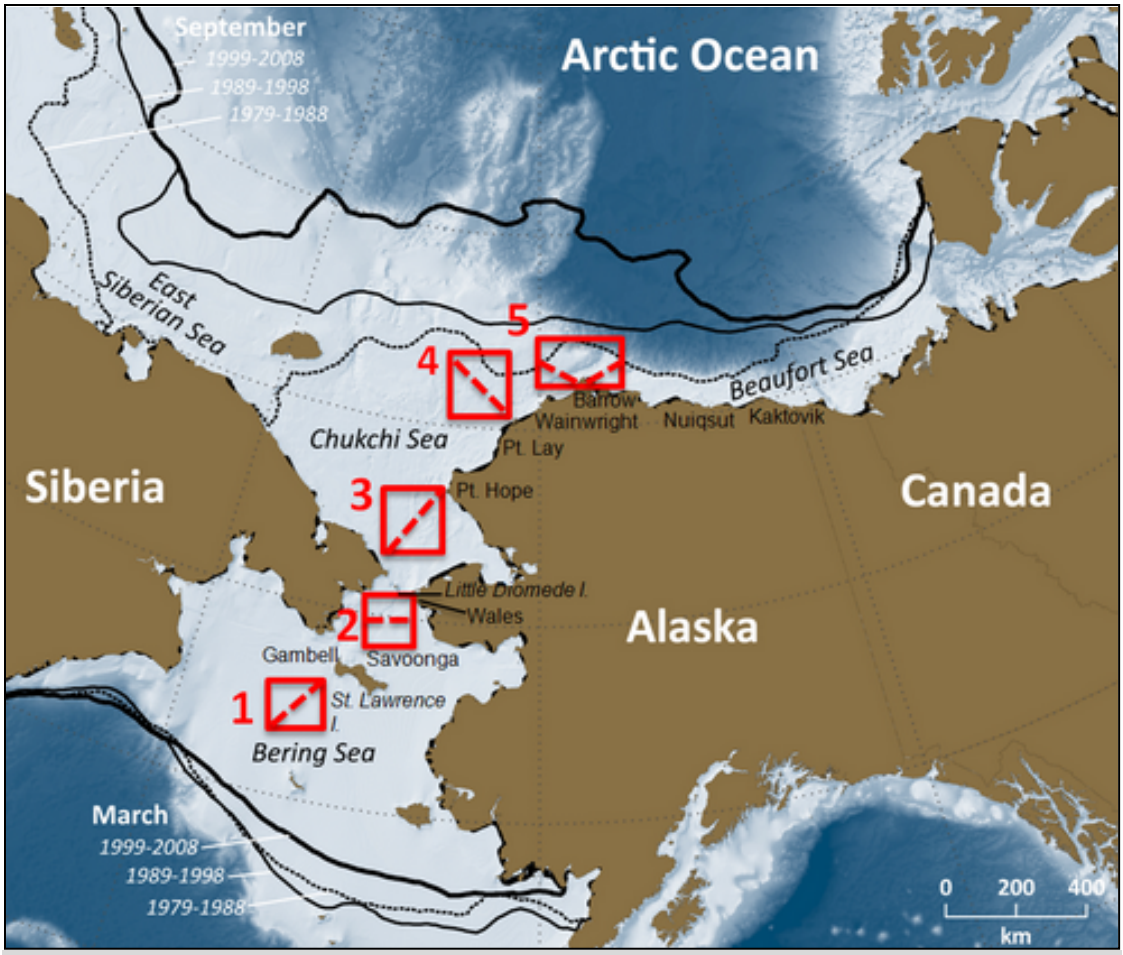

Figure VI-1. Distributed biological observatory sites (red boxes) are regional hotspots along a latitudinal gradient and considered to exhibit high productivity, biodiversity, and overall rates of change. Studies at the sites will be used to detect biophysical responses to climate disruption. The sites will be studied by U.S. and foreign or international research entities with shared data plans. (Source: http://www.arctic.noaa.gov/dbo/images/dbo_map.png)

"strengthening foundational science to understand and detect arctic climate and ecosystem changes" (National Oceanic and Atmospheric Administration 2011).

The distributed biological observatory is now being developed through an international pilot research program.[2] In 2010 and 2011, those studies included core ship-based biophysical sampling, marine mammal and seabird visual observations, and marine mammal passive acoustic sampling in conjunction with biophysical measurements from established moorings.

The Joint Russian-American Long-term Census of the Arctic (RUSALCA) is one of the programs participating in research at the distributed biological observatory sites. This program began in 2004 with a 45-day U.S.-Russian research cruise in the Arctic. It is focused on "understanding the causes and consequences of the reduction of sea-ice cover in the northern Bering Sea and Chukchi Sea in the Arctic Ocean" through sampling and instrument deployment in both U.S. and Russian territorial waters. It recognizes the Bering Straits region as particularly dynamic and sensitive to global climate disruption because the region's steep thermohaline and nutrient gradients coincide with steep thermal gradients in the atmosphere. The Bering Strait is the only Pacific marine gateway into and out of the Arctic Ocean and

[2] http://www.arctic.noaa.gov/dbo/index.html

therefore is a critical factor influencing the flow of water and heat through the Arctic and the rest of the world's oceans. The program intends to monitor the flux of fresh and salt water through the region and assess change in the distribution and migration patterns of the region's marine life.[3]

Arctic Research Commission and the Interagency Arctic Research Policy Committee

The Arctic Research and Policy Act of 1984 established the United States Arctic Research Commission to promote Arctic research and recommend Arctic research policy. The Commissioners are appointed by the President and supported by a small staff in Washington, D.C., and Anchorage, Alaska. The Commission fosters cooperation in Arctic research within the federal government, with the state of Alaska, with international partners, and with other interested parties. The Arctic Research and Policy Act requires the Commission to report to Congress on the Administration's progress in reaching the Commission's goals. The Commission also plays an active role in the work of several interagency committees, is a statutory member of the North Pacific Research Board and the North Slope Science Initiative, and is a member, a participant, or an observer on various committees, including the National Ocean Council, and the Extended Continental Shelf Task Force. The Arctic Research Commission has worked closely with the President's National Ocean Council in developing a draft strategic action plan on "Changing Conditions in the Arctic," for implementation in 2012 (National Ocean Council 2011). This work addresses one of the nine national priority objectives of the President's Interagency Ocean Policy Task Force: "Address environmental stewardship needs in the Arctic Ocean and adjacent coastal areas in the face of climate-induced and other environmental changes" (see Chapter II). One of the elements of this action plan is to develop a list of research priorities to improve understanding of the Arctic marine environment and better prepare for the future in the face of climate and environmental change and increased human development.

The Arctic Research and Policy Act also created the Interagency Arctic Research and Policy Committee to develop national Arctic research policy and five-year federal Arctic research plans to implement that policy. The Committee is chaired by the Director of the National Science Foundation and comprised of representatives from 10 U.S. federal agencies. In 2010 President Obama placed the Committee under the guidance of the National Science and Technology Committee. In 2011 the Committee was engaged in drafting the Interagency Arctic Research Policy Committee Research Plan for Fiscal Years 2014 – 2018. The draft plan will be released for public review in early 2012 and published in the second half of 2012. Among other things, it will describe the need for developing an Arctic observing system; developing tools to promote adaptation and sustainability of Arctic communities; modeling and projecting regional climate patterns; and conducting studies of human health, sea ice, marine ecosystem dynamics, terrestrial ecosystem dynamics, atmospheric conditions, and atmospheric energy flux. The draft plan lists the distributed biological observatory, discussed above, as an Arctic observing initiative that will support a growing understanding of marine ecosystem dynamics.

Mapping the United States' extended continental shelf in the Arctic

The U.S. Extended Continental Shelf Project seeks to establish the full extent of the U.S. extended continental shelf consistent with international law. In both 2010 and 2011 the Marine Mammal Commission commented on applications from the U.S. Geological Survey to take small numbers of marine mammals by harassment incidental to marine geophysical and bathymetric surveys in the Bering Sea, the Beaufort Sea, and the Arctic Ocean (see Appendix A (8 July 2011) and B (2 August 2010)). The surveys mapped both bathymetry and the thickness of subfloor sediment layers in areas beyond the 200 miles of the continental shelf that are automatically U.S. territory under customary international law. Article 76 of the Convention on the Law of the Sea allows member countries to make determinations and declarations to other nations on the extent of the "extended continental shelf" beyond those 200 miles. As

[3] http://www.arctic.noaa.gov/aro/russian-american/

stated on the website for the Extended Continental Shelf Project, "The U.S., like other countries, has an inherent interest in knowing, and declaring to others, the exact extent of our sovereign rights in the ocean." Specifically, a nation has sovereign rights over the resources on and under the seabed, including petroleum resources (oil, gas, gas hydrates); sedentary creatures such as clams, crabs, and corals; and mineral resources, such as manganese nodules, ferromanganese crusts, and polymetallic sulfides" (United States Extended Continental Shelf Project Task Force 2011).

Co-management

In 2008 the Marine Mammal Commission held a meeting in Alaska to review progress toward co-management of Alaskan marine mammals under section 119 of the Marine Mammal Protection Act. The review considered various measures of progress including the development of an "umbrella" memorandum of agreement setting forth a general framework for co-management agreements and the completion of about a dozen species- or region-specific agreements between various Alaska Native organizations and either the National Marine Fisheries Service or Fish and Wildlife Service.[4] The workshop also reviewed other measures of progress, including growing collaborations between researchers and Alaska Natives in Arctic and subarctic regions. Finally, the workshop considered areas requiring further attention, including the need to secure adequate funding and develop corresponding measures of accountability, as well as the need to enhance the capacity of Alaska Native organizations to participate in such arrangements.

In 2009 members of the Alaska Congressional delegation wrote to the National Marine Fisheries Service urging it to develop an adequate funding strategy for co-management of marine mammal species under the Service's purview. The Service responded by developing a competitive grant system that provides annual funding to various Alaska Native organizations based on proposals to conduct specific projects or take specific actions needed to accomplish or support the Service's research and management responsibilities. Despite a combined request from Alaska Native organizations to the National Marine Fisheries Service for increased funding (about $6.0 million), the Service has maintained its annual funding for co-management at about $1.7 million annually. The Fish and Wildlife Service has routinely provided about $0.5 million annually, which has been divided among Alaska Native organizations working on matters pertaining to the polar bear, walrus, or sea otter. The Services have determined that they are not able to increase their co-management funding based, in large part, on limitations in their own budgets.

In November 2009 President Obama sent a memorandum to the heads of executive departments and agencies affirming his Administration's commitment to government-to-government relationships and regular and meaningful consultation and collaboration with tribal officials on policy matters that have tribal implications. The memorandum reinforced Executive Order 13175 and required each federal agency to submit (within 90 days) to the Office of Management and Budget a detailed plan of actions that it would take to implement the Order's policies and directives. The plan was to be developed after consultation by the agency with Indian tribes and tribal officials. The memorandum also directed agencies to submit (within 270 days and annually thereafter) a progress report on the status of the plan. The Office of Management and Budget was required to submit a report to the President on each agency's implementation of the Order and recommendations for improving the tribal consultation process.

In July 2010 the Office of Management and Budget issued a memorandum with guidance for implementing Executive Order 13175. It clarified the key provisions and requirements of the order, described how agencies were to document compliance with the Order, and identified points of contact for questions. Subsequent to this guidance, the Departments of the Interior and the Department of Commerce initiated efforts to revise their tribal consultation policies.

At the end of 2011 the Marine Mammal Commission began planning for a review of consultation practices between federal agencies and Alaska Native tribes and organizations involved in subsistence

[4] http://www.mmc.gov/pdf/mmc_comgmt.pdf

harvesting of marine mammals. As conceived in 2011, the review would assess consultation practices to date to identify ways to improve them in the future. A review was deemed timely because of the marked increase in federal agency activities in the Arctic in recent years.

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Chapter VII

MARINE MAMMAL – FISHERY INTERACTIONS

The Marine Mammal Protection Act and the Magnuson-Stevens Fishery Conservation and Management Act contain provisions intended to minimize the interactions between fisheries and marine mammals. The Endangered Species Act also applies in cases involving threatened or endangered marine mammals. Most marine mammal species suffer serious injury and mortality from fishery interactions. Direct or operational interactions include unintended or incidental catch by fishing gear (bycatch); entanglement in active, discarded, or lost fishing gear; intended or targeted catch for consumption; deliberate harassment, injuring, or killing; and damage or consumption of bait or catch by marine mammals (depredation) (Read 2008). Indirect or ecological interactions include competition with fisheries for prey populations; damage or destruction of marine mammal habitats by fishing; and degradation of ecosystem integrity and function by fishing.

Each year direct or operational fishery interactions result in injuries to, or deaths of, thousands of marine mammals in U.S. fisheries and hundreds of thousands worldwide. Each year during the 1990s, over three thousand cetaceans and three thousand pinnipeds were incidentally caught or entangled in U.S. fisheries (Read 2008). Almost all cetacean bycatch (99.3 percent) involved harbor porpoises, dolphins, and the toothed whales other than sperm whales. Gillnet fisheries accounted for most of the serious injuries and deaths—84 percent of cetaceans and 98 percent of pinnipeds.

Furthermore, those numbers are underestimates, perhaps substantially so, because some fisheries are not observed, not all marine mammal injuries and deaths are recorded even with observers on board, and fishers operating without observers on board typically do not report all their interactions with marine mammals (Moore et al. 2009, Read et al. 2006). To make matters worse, the bycatch in U.S. fisheries is only the tip of the iceberg. Global estimates for the early 1990s indicate a minimum bycatch in gillnets alone at 500,000 to more than 800,000 marine mammals per year (Table VII-1, Read et al. 2006).

The ecological effects of fishing on marine mammals could be equally or more severe, but they have received less attention by scientists and fishery managers, in part because of the difficulties in understanding complex marine habitats and food webs. Modern fisheries management is designed to reduce the biomass of fished stocks by 60 percent relative to their expected biomass if they were not fished (Walters and Martell 2004). The goal of such fishing is to achieve the optimum yield, which is based on the maximum sustainable yield as reduced by any relevant economic, social, or ecological

Table VII-1. Estimates of bycatch of marine mammals in the world's fisheries (derived from Read et al. (2006) and Inter American Tropical Tuna Commission[1]

Gill net	Gillnet - cetaceans	Gillnet - pinnipeds	Gillnet - total	Purse seine	Trawl	Other	Total
1990	466,392	182,763	649,154	53,874	3,719	3,717	1,359,619
1991	320,633	336,748	657,381	27,127	5,828	3,930	1,351,647
1992	239,766	568,518	808,283	15,539	4,344	10,079	1,646,529
1993	218,513	313,654	532,167	3,601	2,379	1,612	1,071,926
1994	258,250	312,228	570,478	4,096	3,904	9,849	1,158,805

[1] http://www.iattc.org/PDFFiles2/AnnualReports/IATTC-Annual-Report-2008.pdf

factor. Removing 60 percent of the biomass of a target fish stock may have severe effects on marine mammals and other predators if they depend on that stock for prey. In addition, some types of trawl and dredge fishing have been shown repeatedly to significantly alter the physical and biogenic structure of benthic habitats (Dayton et al. 1995, Auster and Langton 1999), thus affecting marine mammals that depend on those habitats.

Developments in ecosystem-based and adaptive management should promote better assessment and management of ecological fishery interactions (Sissenwine and Murawski 2004). Nevertheless, both operational and ecological interactions reasonably can be expected to increase in the future as marine mammal populations recover from previous depletion and human populations continue to grow, thereby increasing their demand for seafood and ecological footprint on marine habitats.

This chapter describes the Commission's interactions with aspects of federal fisheries management including the actual and potential interactions of marine mammals with fisheries; the List of Fisheries; regional stock assessment reports; take-reduction team activities; proposed guidelines to National Standard 2 of the Magnuson-Stevens Fishery Conservation and Management Act; proposed rulemaking concerning imports of fish and fish products; a proposed rule pertaining to vessels engaged in illegal, unregulated, unreported fishing; the development of a national aquaculture policy; a section 7 consultation regarding the western stock of Steller sea lions; pinniped-fishery interactions related to Bonneville Dam, Washington; and harbor seal – mariculture interactions in Drake's Estero, California.

The Marine Mammal Protection Act establishes a regime for assessing the status of marine mammal stocks and reducing their incidental take in commercial fisheries. The Act requires the National Marine Fisheries Service, Fish and Wildlife Service, and U.S. Geological Survey to (a) assess the status of all marine mammal stocks in U.S. waters, (b) monitor the incidental take of marine mammals by commercial fishing operations, (c) classify fisheries based on their relative level of incidental take, and (d) implement fishery management measures or take reduction plans to address situations where incidental take is not sustainable. The results of these efforts are evident in annual stock assessment reports, the annual List of Fisheries, and take reduction team recommendations and plans, which are discussed in the following sections.

Stock Assessments—2010

Section 117 of the Marine Mammal Protection Act requires the National Marine Fisheries Service and the Fish and Wildlife Service to prepare and periodically update marine mammal stock assessment reports for each stock occurring in U.S. waters under their respective jurisdictions. The National Marine Fisheries Service is responsible for all species of cetaceans and most pinnipeds. The Fish and Wildlife Service is responsible for manatees, sea otters, polar bears, and walruses.

The Act requires that, within each stock assessment report, the Services describe the geographic range of the stock and estimates of the stock's minimum population size, population trend, current and maximum net productivity rates, and potential biological removal level. The potential biological removal level is an estimate of the number of individuals that could be taken as a result of human activities while still allowing the stock to recover to or remain within its optimum sustainable population range. It is calculated based on the stock's minimum population estimate, maximum net productivity rate, and a recovery factor that is designed to provide additional protection based on the relative status of the stock under consideration and account for uncertainties other than those associated with the abundance estimate.

The Act also requires the Services to describe for each stock the commercial fisheries that it interacts with and its total mortality and serious injury caused by human activities. Finally, each report must categorize each stock as strategic or not strategic. Stocks that are listed as threatened or endangered under the Endangered Species Act or depleted under the Marine Mammal Protection Act are considered to be strategic by default. Other stocks are categorized as strategic if the estimate of human-caused mortality and serious injury for the stock exceeds its potential biological removal level.

On 4 August 2010 the National Marine Fisheries Service announced that its draft 2010 stock assessment reports were available for review (75 Fed. Reg. 46912). On 2 November 2010 the Commission provided comments, and on 6 October 2011 the National Marine Fisheries Service released the final versions of the documents (76 Fed. Reg. 34054). The more important comments are provided in part below. Agency responses are provided in Appendix A of this report.

General comments

When done well, these reports provide information needed to resolve important marine mammal conservation issues. However, many of the 2010 draft reports continued to fall well short of Marine Mammal Protection Act requirements. The lack of assessment information has sorely confounded efforts to evaluate and/or resolve significant conservation issues such as fishery bycatch (e.g., in the central and western Pacific), climate disruption (e.g., in the Arctic), and oil spills (e.g., in the Gulf of Mexico). Furthermore, inadequate assessment information impedes management of the species of concern and the ecosystem in which they occur.

Observer effort: The 2010 draft stock assessments reveal continued shortcomings with regard to assessment of marine mammal bycatch in every region.

In Alaska, fishery managers use two observer programs—the Alaska groundfish observer program and the Alaska marine mammal observer program—to monitor fishery bycatch. The groundfish observer program is well funded, primarily by the fishing industry, and provides adequate coverage of those federally managed fisheries. In contrast, managers use the Alaska marine mammal observer program to monitor the state's nearshore fisheries and record interactions with marine mammals. Funding for this program is inconsistent, covering (sometimes inadequately) only one fishery at a time. The nearshore fisheries that are likely to interact with marine mammals are observed at intervals of 10 years or more, which is inconsistent with the Service's own stock assessment guidelines. As a result, the available data on marine mammal bycatch are not sufficient to characterize or manage interactions with these fisheries.

In Hawaii nearshore state-managed fisheries are not adequately characterized or observed. Those fisheries are small in terms of numbers of fishermen and distribution of effort, but they are likely to interact with a number of species, such as the insular stock of false killer whales, which appears to have declined markedly in recent decades, a number of insular stocks of bottlenose dolphins that were first designated in the 2010 stock assessment reports, and the Hawaiian monk seal. For reasons that are not entirely clear, the Hawaiian monk seal population is declining in the Northwestern Hawaiian Island but increasing in the main Hawaiian Islands, where it is at high risk of interacting with nearshore fisheries.

Observer coverage also is inadequate in the Gulf of Mexico, where one might infer that no interactions occur based on a lack of reported interactions. However, fishery managers currently do not require observers on some key fisheries (e.g., the menhaden fishery) despite historical records indicating that fishery interactions have killed substantial numbers of cetaceans in the past.

Inadequate observer coverage remains a significant issue in most U.S. waters. To address this concern, the Commission repeated its 2009 recommendation that the Service review its observer programs nationwide, set standards for observer coverage, identify gaps in existing coverage, and determine the resources needed to (1) observe all fisheries that do or may interact directly with marine mammals and (2) provide reasonably accurate and precise estimates of serious injury and mortality levels. The Commission recognized that the cost of adequate observer programs is not trivial, but it believes that the industry should be responsible for demonstrating that its activities do not adversely affect marine mammals and other non-target species. With that in mind, the Commission also repeated its 2005, 2006, and 2009 recommendations that the Service work with federal and state fishery management agencies and the industry to develop a funding strategy that will support adequate observer programs for collecting data on incidental serious injury and mortality of marine mammals and other protected species.

The Service noted that its 2004 Evaluating Bycatch Report developed standardized national bycatch reporting methods and on 22 September 2011 the Service released its first National Bycatch Report.[2] At the end of 2011 the Service also was preparing a report on its national observer programs that it expected to complete and publish in 2012. The latter report will provide an important baseline for the level and nature of observer coverage by region at present and identify gaps to be addressed as the Service continues to develop its observer programs.

Transboundary stocks: Many stocks that occur in U.S. waters also range into foreign or international waters. Assessing transboundary stocks is particularly challenging because they may range widely and may be taken by fisheries and subject to other human threats both within and outside U.S. waters. Estimation of abundance requires greater survey capacity and estimation of fishery interactions requires exchange of information with appropriate foreign or international organizations or government agencies. Nonetheless, assessing transboundary stocks is essential if our national conservation strategy for marine mammals is to be complete and responsive to the directives of the Marine Mammal Protection Act. For these reasons, the Commission has recommended to the Service that it develop a strategy for collaborating with other nations to expand existing surveys and assessments for stocks that move into international or foreign waters and may be subject to fishery interactions or other human-related risk factors. The Commission further recommended that priority be given to those stocks that are hunted in other parts of their range or are known to interact significantly with fisheries or other marine activities that are domestic, foreign, or international, and that the goal should be to manage transboundary stocks using a potential biological removal level calculated for the entire stock. To address these concerns, the Service's Office of International Affairs is developing an international plan for marine mammal conservation. The Service expects to publish the plan in 2012.

Addressing all human-related risk factors: The death of an individual animal has the same demographic consequences for its stock regardless of the cause of death. That is, with regard to its effect on the stock, it matters not whether the animal was killed as a result of commercial or recreational fishing, a subsistence harvest, entanglement in debris, research activities, a stranding associated with anthropogenic sound, a vessel strike, or some other risk factor. Section 117 of the Marine Mammal Protection Act requires that, in each stock assessment, the Services "estimate the annual human-caused mortality and serious injury of the stock by source and, for a strategic stock, other factors that may be causing a decline or impeding recovery of the stock, including effects on marine mammal habitat and prey." Despite this guidance, the draft stock assessments are inconsistent in their treatment of risk factors other than fisheries, which confounds the full assessment of an individual stock and full evaluation of specific risk factors. To ensure that the combined effects of all human-related risk factors are being considered for a particular stock, the Commission recommended that the Service develop and implement a systematic approach for integrating all human-related risk factors into stock assessment reports. The Agency responded by citing pertinent sections of the Marine Mammal Protection Act, but it did not indicate how it will address this issue.

Atlantic and Gulf of Mexico stock assessment reports

In 2010 the Commission made a number of recommendations on stock assessment reports in the Atlantic and Gulf of Mexico. Several of the more important were as follows.

Pinniped surveys: Along the northeast seaboard up-to-date pinniped surveys are necessary to evaluate, among other things, the impacts of gillnet and trawl fishery bycatch and the causes and significance of unusual mortality events. The gray seal population appears to be increasing fairly rapidly in some areas and the harbor seal population has experienced a number of unexplained mortality events. The Commission recommended that the Service conduct these surveys and bring its stock assessments up-to-date.

[2] http://www.nmfs.noaa.gov/by_catch/bycatch_nationalreport.htm

Figure VII-1. Dolphins swimming through Deepwater Horizon oil slicks (Source: National Marine Fisheries Service)

Bottlenose dolphins: The Service has made commendable progress investigating stock structure of bottlenose dolphins in the Atlantic, but not in the Gulf of Mexico. In both areas, dolphin interactions with fishing (commercial and recreational), oil and gas operations, shipping, military activities, tourism, and coastal development almost certainly will increase in the foreseeable future. The Deepwater Horizon oil spill was a resounding reminder of the need for baseline information and bottlenose dolphins especially may be at risk from human activities because they depend on shallow coastal habitat where human activities are concentrated (Figure VII-1). Therefore, the Commission repeated its long-standing recommendation that the Service improve stock assessments for bottlenose dolphins, especially in the Gulf of Mexico.

Other cetacean stocks: Efforts to respond to and assess the damage from the Deepwater Horizon oil spill also highlighted the current lack of information on other cetacean stocks in the Gulf of Mexico. With regard to marine mammals, virtually all attention after the spill focused on bottlenose dolphins and sperm whales, with some later attention given to Bryde's whales. Those are but 3 of the 21 species listed by the Service as occurring in the Gulf of Mexico and the Commission recommended that the Service develop a stock assessment plan for the Gulf of Mexico that includes (1) a feasible strategy for assessing all of the Gulf's marine mammal stocks, (2) the necessary infrastructure, (3) the necessary expertise, and (4) the funding needed to implement the plan. The Service concurred with the need for such a plan, and stated that the plan elements highlighted by the Commission are described in its Stock Assessment Improvement Plan and the Southeast Fisheries Science Center's Marine Mammal Program Strategic Plan. However, the Service does not describe how it will secure the needed resources and address those elements.

Alaska stock assessment reports

In 2010 the Commission recommended a number of changes to stock assessment efforts in the Alaska region. Several of the more important were as follows.

Harbor seal stock structure and status: In numerous previous letters, the Commission had emphasized the importance of investigating harbor seal stock structure to ensure that management efforts under the Marine Mammal Protection Act are based on the appropriate conservation units. With regard to harbor seals in Alaska, the best scientific evidence available demonstrates that each of the three stocks currently recognized in the Service's stock assessment reports is actually composed of multiple stocks with variable status. More than six years ago, Service scientists proposed the designation of 12 harbor seal stocks in Alaska, but those stocks have yet to be recognized. The main reason for the delay was concern among members of the Alaska Native Harbor Seal Commission about possible implications for subsistence harvests if the proposed stocks were designated. In commenting on the harbor seal stock assessments, the Commission understood that Alaska Native concerns had been addressed and that the new stocks would be recognized in the 2011 stock assessment reports. Based on that understanding, the Commission recommended that the Service proceed with formal recognition of 12 stocks of harbor seals in Alaska and then proceed with the necessary research and management of those stocks as required by the Marine Mammal Protection Act. The Service cited its previous responses to similar comments by the Commission, affirming its commitments to continue working with its co-management partners to revise the stock structure of harbor seals in Alaska and complete the 2011 stock assessment reports, which include separate evaluations of 12 harbor seal stocks for Alaska (Figure VII-2).

Figure VII-2. A harbor seal hauled out in Alaska (Source: National Marine Fisheries Service)

Ice seals: Climate disruption likely is having significant effects on ringed, bearded, ribbon, and spotted seals (Figure VII-3). Assessments of these stocks remain among the poorest in the Alaska region and, indeed, in all U.S. waters. The lack of information stems, in part, from their extensive range and the logistical difficulty and cost of studying them. Although the Service has initiated assessment studies and included funding in the fiscal year 2010 budget for ice seals, much more could and should be done. Therefore, the Commission recommended that the Service continue to seek the additional support needed to develop and implement an ice seal research and management strategy that is commensurate with the grave threats that these species face. The Service recognized the value of studying the ecological, demographic, and life-history characteristics of the ice seals and recently completed status reviews highlighting the importance of such research for assessing threats to the species. The Service stated that it continues to seek federal funding appropriate to the task, and that it will continue to augment its efforts as possible through collaboration with other agencies.

Figure VII-3. A spotted seal entering the water from an ice flow (Source: National Marine Fisheries Service)

Eastern North Pacific right whale stock: The draft assessment for this stock states that it is "…arguably the most endangered stock of large whales in the world," but it rarely receives the attention that it warrants, probably because of its small population size, the difficulty of finding the remaining individuals, and the fact that it is not known to interact with or impede any significant human activity, at least for the time being. That may change in the near future with increasing effort to find oil and gas in regions where right whales do or may occur. Through the end of 2011 the Secretary of the Interior has decided not to open the North Aleutian Basin for leasing. The Commission concurred with that decision, in part, because of the potential for harm to this critically endangered stock. However, given the Secretary's decision, the Bureau of Ocean Energy Management, Regulation, and Enforcement may reduce support for research on this species. Although the draft assessment states that "[t]here are no known current threats to the habitat of this population," it also recognizes that "this [statement] partly reflects a lack of information about the current distribution and habitat requirements of right whales in the eastern North Pacific, as well as about the location and nature of any potential threats to the animal or its environment." Because of the grave status of this stock, the Commission recommended that if it has not already done so, the Service ensure that funding for studies of the eastern stock of North Pacific right whales is incorporated into the Administration's fiscal year 2012 budget, whether that funding is provided to the Service or to the Bureau of Ocean Energy Management, Regulation, and Enforcement. The Agency acknowledged the importance of such funding, and stated that it will continue to seek resources to study this critically endangered population.

Figure VII-4. North Pacific right whale (Source: National Marine Fisheries Service)

Pacific stock assessment reports

In 2010 the Commission recommended a number of changes to stock assessment efforts for the Pacific, including the West Coast and the central and western Pacific. Several of the more important were as follows.

West Coast harbor porpoise: In 2002 the state of California banned the use of gillnets inshore of the 60-fathom isobath to eliminate or reduce the potential for harbor porpoise bycatch in commercial fisheries. Between 2003 and 2007 five harbor porpoises stranded in Monterey Bay showing evidence of fishery interaction. The draft assessment of the northern Oregon/Washington coast harbor porpoise stock noted a total of 114 harbor porpoise strandings in 2006 and 2007, leading the Service to declare an

Figure VII-5. Stranded harbor porpoise calf (Source: Oregon Marine Mammal Stranding Network)

unusual mortality event. Of the animals determined to have died from trauma (other than neonates), the report noted that "suspected or confirmed fishery interactions were the primary cause of adult/subadult traumatic injuries." In view of the marked increase in the number of strandings, the Commission repeated its 2009 recommendation that the Service investigate the possible sources of fishery-related mortality from central California to the Washington coast and ensure adequate observer coverage on vessels in fisheries that may be taking harbor porpoises so that the total bycatch can be estimated more accurately. The Service's general response to this recommendation is that it does not have sufficient resources for such an investigation.

Harbor seal surveys: At the time that the Commission commented on the 2010 stock assessments, the abundance estimates for harbor seals in the northeast Pacific were more than eight years old and outdated based on the Service's own standards. Because harbor seals from those stocks are taken in both gillnet and trawl fisheries, but the significance of that take has not been evaluated, the Commission recommended that the Service conduct new surveys and update the stock assessment reports for harbor seals along the Oregon/ Washington coast and in Washington inland waters. The Service's general response to this recommendation is that it does not have sufficient resources for such a survey.

Stock Assessments—2011

On 24 August 2011 the National Marine Fisheries Service announced that its draft stock assessment reports for marine mammals were available for review (76 Fed. Reg. 52940). On 11 November 2011 the Commission provided comments, responses to which were provided by NMFS on May 12, 2012 (77 FR 29969) and are included in Appendix A.

General comments

The Commission expressed its general concern that although these reports provide important information needed to understand and resolve vital marine mammal conservation issues, that information often is not sufficient to meet the requirements of the Marine Mammal Protection Act. Many stock assessments lack even the most basic information such as up-to-date minimum abundance estimates, which are necessary to calculate the stocks' potential biological removal levels. Estimates of serious injury and mortality rates are lacking for even more stocks. In the absence of such information, managers cannot confidently determine the status of these stocks, the extent of impacts from human interactions, and whether management measures intended to protect them are effective. In the end, the lack of information means that managers are more likely to err by over- or under-protecting marine mammal species, either of which can be unnecessarily costly.

Marine mammal population surveys: The Marine Mammal Protection Act requires that stock assessments be prepared and periodically updated for all stocks of marine mammals in U.S. waters. The resources for conducting population surveys, primarily the availability of ship and aircraft time, have not been adequate. To address this shortcoming, the Commission recommended that the Service develop a nation-wide, five-year schedule for carrying out stock assessments that describes the funding and ship and aircraft time needed to complete marine mammal population surveys. NMFS responded that it agrees that such a schedule would be useful, and is currently in the process of developing a strategic plan to focus on resource acquisition and a prioritization scheme to meet stock assessment goals.

Observer effort: The Commission reminded the Service that the 2011 stock assessments once again suffered from inadequate assessment of marine mammal bycatch. It supported its view using examples from the Atlantic, Gulf of Mexico, and Alaska. To address the shortcoming, the Commission repeated its 2010 recommendation that the Service review its observer programs nationwide, set standards for observer coverage, identify gaps in existing coverage, and determine the resources needed to (1) observe all fisheries that do or may directly interact with marine mammals, especially strategic stocks and (2) provide reasonably accurate and precise estimates of serious injury and mortality levels. The Commission

recognized that the cost of adequate observer programs is not trivial and that the Service is facing significant funding challenges, but it believes that the Service, working with the industry and other stakeholders, should be able to develop alternative, innovative mechanisms to provide funding and incentives. The Commission then argued that if the Service is unable to do so, then the responsibility for demonstrating that fisheries do not adversely affect marine mammals should fall to those fisheries. Finally, to address the need for increased and better observer effort, the Commission recommended that the Service partner in 2012 with state fishery management agencies, the fishing industry, and other stakeholders to develop a funding strategy that will substantially improve the extent and level of observer coverage and data collection concerning incidental serious injury and mortality of marine mammals within five years.

NMFS responded that it is seeking to improve its capacity to address marine mammal interactions through the Marine Mammal Take Reduction Program, enhanced observer coverage and gear marking, and further characterizations of fishing gear and the nature of interactions. The agency has taken several steps in recent years to address shortcomings in protected species observer coverage, including increased observer coverage in the Gulf of Mexico reef fish fishery, the North Carolina inshore gillnet fishery, the American Samoa longline fishery, and the Gulf of Mexico menhaden purse seine fishery. NMFS is preparing to observe the Southeast Alaska drift gillnet fishery, beginning in 2012.

Observer program limitations: Observer programs alone do not provide a sufficient basis for evaluating marine mammal/fishery interaction rates. For example, in the Atlantic, entanglements of right whales have not been reported in any observed fishery since 1993, and yet right whale entanglements are common (85 confirmed entanglements from 1990 to 2009) and have led to the serious injury or death of at least one whale per year over the last five years. Knowlton et al. (2005) found that up to 76 percent of examined right whales had at least one scar that can be attributed to fishing gear. Observer programs may not be able to estimate entanglement rates because the per-vessel rates are low, coverage is inadequate, or entanglements occur primarily when nets or lines are not being tended. Regardless, the Service's existing observer program and management strategy is not providing the information needed to manage the responsible fisheries adequately. Therefore, the Commission recommended that the Service develop alternative strategies for collecting information on mortality and serious-injury levels in fisheries for which entanglements are difficult to detect or quantify using traditional observer programs.

Transboundary stocks: The majority of marine mammal stocks occurring in U.S. waters also occur in adjacent or neighboring international or foreign waters. Assessing transboundary stocks can be particularly challenging because it requires cooperation with research organizations and, in some cases, management authorities outside the United States. Perhaps the most common problem is a lack of information on bycatch levels from stocks shared with other countries or taken in international waters, which undermines stock assessment efforts. The level of cooperation in assessing transboundary stocks often falls short even with our closest neighbors.

The Commission cited, for example, the fact that the lack of observer data from Canadian fisheries undermines assessment of many of the stocks shared with Canada. In the Gulf of Maine, observer coverage of 4 to 7 percent per year in the northeast sink gillnet fishery from 2005 to 2009 produced a serious injury and mortality estimate of 395 to 666 harbor porpoises killed per year. Although, the same harbor porpoise stock also occurs in the adjacent Canadian waters of the Bay of Fundy, where a similar and sizeable gillnet fishery occurs, Canada does not have comparable observer coverage, and as such, comparable data to determine bycatch levels in Canadian waters are lacking.

In Hawaii, recent surveys have provided evidence of unsustainable takes from false killer whale stocks. Observers on U.S. longline vessels have documented an annual bycatch of roughly 20 pelagic false killer whales in the deep-set pelagic longline fishery, which far exceeds the stock's potential biological removal level of 2.4. In 2009 the estimate for false killer whales seriously injured or killed outside the U.S. Exclusive Economic Zone spiked to more than twice the largest number estimated in recent years. The spike may indicate that U.S. bycatch outside the zone is much higher and more uncertain than previously thought.

Clearly, the Service must be able to assess and manage transboundary stocks if our national conservation strategy for marine mammals is to meet the objectives of the Marine Mammal Protection Act. Therefore, the Commission recommended that the Service collaborate with other nations and international fishery management organizations to develop and implement cooperative or complementary strategies for assessing the status of transboundary marine mammal stocks and the rate of serious injury and mortality of such stocks in fisheries. Further, the Commission argued that priority should be given to those stocks that are known to interact significantly with fisheries, with the goal being to manage transboundary stocks by comparing their potential biological removal levels to their total human-related take, not just take occurring in the U.S. Exclusive Economic Zone.

The Service has previously responded to this comment (76 Fed. Reg. 24054) by indicating that its Office of International Affairs is preparing a comprehensive international action plan for marine mammal conservation and that it also is evaluating strategies to obtain information on the marine mammal conservation programs in other nations pursuant to MMPA section 101(a)(2)." It also asserts that it is collaborating with Canada and with Regional Fishery Management Organizations where appropriate.

Addressing all human-related risk factors: The Marine Mammal Protection Act clearly indicates that the potential biological removal level calculated from stock assessment information is to be compared to the total human-related mortality and serious injury. Nonetheless, the estimates of serious injury and mortality are mostly derived from fishery interactions because of the difficulty of characterizing the effects of certain risk factors. To address this problem, the Commission recommended that the Service consider the various approaches for integrating all human-related risk factors into stock assessment and adopt an integration method that will produce, at a minimum, reasonable estimates of the lower and upper bounds of serious injury and mortality rates for every stock.

The Service has responded to this comment (76 Fed. Reg. 24054) simply by noting that "MMPA section 117(3) contains directions for including risk factors in SARs [stock assessment reports]. The MMPA states that SARs should estimate annual human-caused mortality of each stock, by source, and, for strategic stocks, other factors that may be causing a decline or impeding recovery of the stock, including effects on marine mammal habitat and prey."

2011 List of Fisheries

On 25 June 2010 the National Marine Fisheries Service published its proposed List of Fisheries for 2011 (75 Fed. Reg. 36318) and on 8 November 2010 it published its final list (75 Fed. Reg. 68468). The Service proposed changes to numerous fisheries. Some of the more substantial (additions of fisheries or species, or reclassifications) are listed in Table VII-2.

The Commission concurred with some of the proposed changes, provided recommendations to alter some others, or offered no opinion. The Service responded to the Commission's recommendations in its issuance of the final List of Fisheries on 8 November 2010 (75 Fed. Reg. 68468).

Splitting the Dungeness crab pot fishery

The Commission recognized the geographical basis for splitting the fishery, but argued that the decision should be based primarily on (1) compelling evidence that the risks posed to marine mammal species in the two proposed fisheries are, in fact, different, and (2) clear evidence that the Puget Sound fishery is not likely to take any marine mammals and does not require an observer program. The taking of a single whale in the coastal area of an unobserved fishery is not a sufficient basis for such a conclusion. Without additional information or long-term observer data the splitting appears simply to be a means of reducing management and observer requirements. Therefore, the Marine Mammal Commission recommended that the Service provide additional justification for splitting the Washington Dungeness crab pot/trap fishery into two fisheries, considering the risks to humpback whales, sea otters, and other marine mammals. The Commission also recommended the Service consult with the Fish and Wildlife

Table VII-2. Substantial changes to the List of Fisheries for 2011, as reported by the National Marine Fisheries Service (75 Fed. Reg. 36318)

Fishery or fisheries	Change
Hawaii kaka line, vertical longline, crab net, hukilau net, lobster tangle net, and bullpen trap	Added to the List of Fisheries based on the potential to take marine mammals, but classified as Category III fisheries because of a lack of known incidental mortalities or serious injuries. The Service noted that the Hawaii kaka line fishery may be analogous to the Category II Hawaii shortline fishery, although the depth or position in the water column at which the gear is fished is different.
Hawaii shallow-set (swordfish target) longline/set line	Changed the basis for classification as a Category II fishery from humpback whales (central North Pacific stock) to bottlenose dolphins (Hawaii pelagic stock). From 2004 to 2008 the mean serious injury and mortality rate for humpback whales was 0.2 whales per year (0.33 percent of the stock's potential biological removal level), while the mean rate for bottlenose dolphins was 0.6 dolphins per year (1.1 percent of the stock's potential biological removal level).
	Added the Hawaii pelagic stock of false killer whales to the list of marine mammal stocks incidentally injured or killed in this fishery based on one non-serious injury in 2008.
	Added *Kogia* spp. (Hawaii stock) to the list of marine mammal stocks incidentally injured or killed in this fishery (and by extension its high seas western Pacific pelagic shallow-set component) based on one non-serious injury in 2008 in waters outside of the U.S. Exclusive Economic Zone.
	Added the Hawaii stock of striped dolphins to the list of marine mammal stocks incidentally injured or killed in this Category II fishery based on the serious injury of a dolphin outside the U.S. Exclusive Economic Zone in 2008.
	Removed sperm whale (stock unknown) from the list of species or stocks incidentally killed or injured in this fishery based on the absence of documented takes in the latest five years.
Hawaii deep-set (tuna target) longline/set line	Added the Palmyra Atoll stock of false killer whales to the list of marine mammal stocks incidentally injured or killed in this Category I fishery. From 2004 to 2008 the estimated take rate was 0.3 whales per year (4.7 percent of the stock's potential biological removal level).
	Added the Hawaii insular stock of false killer whales to the list of marine mammal stocks incidentally injured or killed in this Category I fishery. From 2004 to 2008, the estimated take rate was 0.6 whales per year (98.3 percent of the stock's potential biological removal level).
American Samoa longline fishery	Added the American Samoa stock of rough-toothed dolphins to the list of marine mammal stocks incidentally killed or injured in this Category II fishery based on an estimated serious injury and mortality rate of 3.6 dolphins per year (6 percent of the stock's potential biological removal level).
Washington Dungeness crab pot	Split this fishery into the Washington Puget Sound Dungeness crab pot/trap fishery and the coastal Dungeness crab pot/trap fishery. Classified both as Category III fisheries, the former based on a lack of known incidental mortalities or serious injuries and the latter based on the serious injury of only a single humpback whale (California/Oregon/Washington stock) entangled in Dungeness crab pot/trap gear in 2008.

Fishery or fisheries	Change
California halibut/white seabass and other species set gillnet (3.5 in mesh)	Added the California/Oregon/Washington stock of humpback whales to the list of species/stocks incidentally killed or injured, based on one serious injury or mortality (annual mortality and serious injury rate of 0.2 animals per year or 1.7 percent of the stock's potential biological removal level), and specified this take instead of take of California sea lions (U.S. stock) and harbor seals (California stock) as the reason for the Category II classification.
California yellowtail, barracuda, and white seabass drift gillnet (mesh ≥3.5 in and 14 in) fishery	Changed the basis for classifying as a Category II fishery from take of long-beaked common dolphin to similarity to the Category II California halibut/white seabass and other species gillnet (>3.5 in mesh) with regard to gear used, areas fished, and seasons fished.
California anchovy, mackerel, sardine purse seine	Removed the California/Oregon/Washington offshore stock of bottlenose dolphins from the list of species/stocks incidentally killed or injured and reclassified as Category III based on the lack of reports of their interactions in this fishery since the early 1990s and the lack of other information indicating that this fishery is causing serious injury or mortality of bottlenose dolphins.
California pelagic longline	Removed the California/Oregon/Washington stock of Risso's dolphins from the list of species/stocks incidentally killed or injured based on a lack of interactions in the latest five years.
Southeastern U.S. Atlantic, Gulf of Mexico shrimp trawl	Elevated the southeastern U.S. Atlantic, Gulf of Mexico shrimp trawl fishery from Category III to Category II based on interactions with six marine mammal stocks based on observer reports, stranding data, and fisheries research data.
	Elevated the fishery from Category III to Category II based on interactions with the following strategic bottlenose dolphin stocks: South Carolina/Georgia coastal, northern Gulf of Mexico coastal (eastern, northern, and western), and Gulf of Mexico (bay, sound and estuary), and the following non-strategic stocks: bottlenose dolphin (northern Gulf of Mexico continental shelf), and spotted dolphin (northern Gulf of Mexico).
	Added northern Gulf of Mexico stock of Atlantic spotted dolphins to the list of species/stocks incidentally killed or injured in this fishery, based on one mortality in 2006 in southeast U.S. research trawl operations and/or relocation trawls conducted in conjunction with dredging and other marine construction activities and the similarities between commercial fishing and relocation trawls.
Mid-Atlantic bottom trawl	Added the western North Atlantic offshore stock of bottlenose dolphins to the list of species/stocks incidentally killed or injured in this Category II fishery based on four mortalities in 2009 (0.8 animals/year, 0.14 percent of the stock's potential biological removal level).
U.S. Mid-Atlantic mixed species stop seine/weir/pound net (except the North Carolina roe mullet stop net)	Added the northern North Carolina estuarine system stock of bottlenose dolphins to the list of species/stocks incidentally killed or injured in this Category III fishery based on the stranding of one bottlenose dolphin in a North Carolina pound net in 2004.
High Seas Western Pacific Pelagic (shallow-set component)	Removed the sperm whale (stock unknown) from the list of marine mammal stocks incidentally injured or killed in this Category II fishery, which is an extension of the Category II Hawaii shallow-set (swordfish target) longline/set line fishery operating within the U.S. Exclusive Economic Zone based on no documented takes in the last five years.

Service, tribal authorities, and other relevant groups on the need for observer coverage of the Washington Dungeness crab pot/trap fisheries both along the outer coast and in Puget Sound to assess bycatch risks to sea otters (Figure VII-6).

In its rationale for its final list, the Service justified its decision by arguing that 1) the fisheries are managed separately by the state, 2) the migratory route of humpback whales does not pass through Puget Sound, 3) sea otters only occasionally enter Puget Sound, and 4) the human population density in Puget Sound makes it likely that any entangled whale would be detected. The Service stated that it consulted with the state and tribal agencies, but did not find any reports of interactions with sea otters.

Figure VII-6. A sea otter feeding on a crab in Monterey Bay, CA. (Photo courtesy of Tania Larson, USGS)

Addition of Hawaii kaka line and vertical longline fisheries

The Commission agreed that the kaka line fishery is similar to the Hawaii shortline fishery. The Commission also considered the vertical longline fishery to be similar because the mainline and leader line gear are alike (although they are set in a different orientation) and present similar risks to marine mammals that may depredate or otherwise interact with the fishery. For those reasons, the Commission suggested that a more appropriate approach would be to establish an observer program to better characterize the nature and level of the interactions of these fisheries with marine mammals, before assuming that such interactions do not or only rarely occur. The Commission also recommended that the Service list both fisheries as Category II (because observer programs are more likely to be implemented in Category II fisheries) and work with the state of Hawaii to create an effective observer program for them.

The Service responded that it found no support for a Category II classification, and that it was following established regulation (50 CFR 229.2) in the process it used to classify the fisheries in the absence of reliable information indicating the frequency of incidental mortality and serious injury of marine mammals in the fisheries. The Service concluded that the added fisheries are sufficiently different from the Hawaii shortline fishery and, considering those differences and the lack of even anecdotal information or marine mammal interacations in the kaka line and vertical longline fisheries, judged them to have a low risk of marine mammal interactions.

Southeastern Atlantic, Gulf of Mexico shrimp trawl

The Commission noted that the Service's take estimates for the fishery are limited by poor observer coverage, and argued that management of this fishery and its interactions with marine mammals likely will remain inadequate until the Service collects sufficient reliable data on marine mammal mortality and serious injury rates and provides more complete assessments of the marine mammal stocks involved. Therefore, the Commission recommended that the Service increase observer coverage in the southeastern U.S. Atlantic, Gulf of Mexico shrimp trawl fishery and conduct the stock assessments necessary to estimate reliable potential biological removal levels for the affected marine mammal stocks.

The Service agreed with the importance of increasing coverage and improving knowledge of stock structure and identified increasing coverage as a resource-dependent priority.

Reiteration of previous recommendations

The Service proposed to update estimated effort levels for several mid-Atlantic and New England fisheries based on the number of vessels or persons with state and/or federal permits. The Service noted, however, that this approach might overestimate actual effort. In fact, under this new approach the new estimates of effort for many fisheries increased by more than an order of magnitude. The Commission acknowledged this problem, but pointed out that the previous method may underestimate effort, which also is a problem. It therefore recommended that the Service devise new methods that will produce accurate, reliable estimates of effort for the fisheries in question. The Service responded that a clear measure of effort for all state fisheries in the Northeast and Mid-Atlantic has not been determined because many state permits allow fishers to use multiple gear types, and that the numbers provided in the List of Fisheries will be used for descriptive purposes and will not be used for developing current or future management measures or determining observer coverage.

The Commission noted that since 2005 it has recommended that the Service include observer coverage for each fishery in the List of Fisheries. The Service responded by providing links to coverage data for Category I and II fisheries. The Commission then recommended that the Service also provide links to observer coverage data for Category III fisheries and the Service agreed that it is important to provide the basis for classifying fisheries. However, the Service also noted that including observer coverage would not fully explain classification decisions as it uses several sources of information to reach those decisions. Nonetheless, it agreed to consider how to best provide observer data during the development of the 2012 List of Fisheries.

2012 List of Fisheries

On 28 June 2011 the National Marine Fisheries Service published its proposed List of Fisheries for 2012 (76 Fed. Reg. 37716) and on 29 November 2011 it published its final list (76 Fed. Reg. 73912). The Service proposed changes to numerous fisheries, some of the more substantial of which are described in the following table.

The Commission concurred with some of the proposed changes, provided recommendations to alter others, or offered no opinion. The Service responded to the Commission's recommendations in its issuance of the final List of Fisheries on 29 November 2011 (76 Fed. Reg. 73912).

Virginia pound net

The Commission concurred with the addition of this stock to the list. It also emphasized the need for an onboard observer program or some other monitoring system and recommended that the Service work with the state of Virginia to develop such a system. The Service reported that it is discussing this matter with state of Virginia.

Mid-Atlantic bottom trawl

The Commission concurred with the Service's proposal to add the western North Atlantic stock of Risso's dolphins to the list of stocks incidentally killed or seriously injured in the Mid-Atlantic bottom trawl fishery, and recommended that the Service further investigate the notable recent increase in takes of these dolphins. The Service agreed with this comment, recognizing that the increased bycatch could be caused by several possible factors, and reported that the Northeast Fisheries Science Center would be investigating these bycatch events as part of its 2012 stock assessment process.

Table VII-3. Substantial changes to the List of Fisheries for 2012, as reported by the National Marine Fisheries Service (76 Fed. Reg. 37716)

Fishery or fisheries	Change
California thresher shark/swordfish drift gillnet	Elevated this fishery from Category III to Category II, based on a fisherman's report of an entangled humpback whale (California/Oregon/Washington stock) and the subsequent determination that it was seriously injured. This single serious injury amounts to a rate of 0.2 whales per year (1.8 percent of the stock's potential biological removal level).
	Added humpback whale (California/Oregon/Washington stock) to the list of marine mammal stocks incidentally injured or killed in this fishery, based on the serious injury described above, and reclassified the fishery as Category II on that basis.
Hawaii charter vessel, and Hawaii trolling, rod and reel	Elevated these fisheries from Category III to Category II based on their fishing techniques and reports of hookings of Pantropical spotted dolphins (Hawaii stock); such hookings may be considered serious injuries.
	Added pantropical spotted dolphins (Hawaii stock) to the list of marine mammal stocks incidentally injured or killed in these fisheries based on the injuries described above, and reclassified the fishery as Category II on the likelihood of occasional serious injuries or mortalities of this stock.
Southeastern U.S. Atlantic, Gulf of Mexico stone crab trap/pot	Elevated this fishery from Category III to Category II based on 1) similarity to the Category II Atlantic blue crab trap/pot fishery, and 2) serious injury and mortality to three bottlenose dolphins (multiple stocks) reported in stranding data from 2002 to 2010. The Atlantic blue crab trap/pot and the southeastern U.S. Atlantic, Gulf of Mexico stone crab trap/pot fisheries use similar fishing techniques, habitat and gear, and, therefore, pose similar interaction risks to bottlenose dolphins.
	Added the following stocks to the list of species or stocks incidentally killed or injured in this fishery: Bottlenose dolphin (central Florida coastal stock), bottlenose dolphin (Gulf of Mexico eastern coastal stock), bottlenose dolphin (Florida Bay stock), bottlenose dolphin (Gulf of Mexico bay, sound and estuary stocks, Florida west coast portion), bottlenose dolphin (Indian River Lagoon estuarine system stock), bottlenose dolphin (Jacksonville Estuarine System stock), and bottlenose dolphin (Gulf of Mexico northern coastal stock) based on 10 serious injuries or mortalities.
Rhode Island floating trap	Added this fishery to the List of Fisheries, and classified it as Category III based on a lack of reported interactions.
Atlantic Ocean, Gulf of Mexico, Caribbean commercial passenger fishing vessel	Added the Gulf of Mexico bay, sound, and estuary stocks of bottlenose dolphins to the list of species or stocks incidentally killed or injured in this Category III fishery based on evidence of gear interactions from eight stranded animals.
Atlantic Ocean, Caribbean, Gulf of Mexico large pelagic longline	Added the following stocks to the list of species or stocks incidentally killed or injured in this Category I fishery: killer whale (Gulf of Mexico oceanic stock), sperm whale (Gulf of Mexico oceanic stock), and Gervais' beaked whale (Gulf of Mexico oceanic stock) based on injuries to these species in 2007 and 2008.
Southeastern U.S. Atlantic shark gillnet	Added the northern Florida coastal stock of bottlenose dolphins to the list of species or stocks incidentally killed or injured in this Category II fishery based on two takes in 2002 and 2003.

Fishery or fisheries	Change
Southeastern U.S. Atlantic, Gulf of Mexico shrimp trawl	Added the Gulf of Mexico northern coastal and Gulf of Mexico continental shelf stocks of bottlenose dolphins to the list of species or stocks incidentally killed or injured in this Category II fishery based on numerous takes believed to have occurred in these fisheries from 1992 to 2008.
North Carolina long haul seine	Added the southern North Carolina estuarine system stock of bottlenose dolphins to the list of species or stocks incidentally killed or injured in this Category II fishery based on three bottlenose dolphins caught and released alive in this fishery.
Virginia pound net	Added the northern North Carolina estuarine system stock of bottlenose dolphins to the list of species or stocks incidentally killed or injured in this Category II fishery based on stranding data from 17 dolphins and live releases from gear from 2004 to 2008.
Florida spiny lobster trap/pot	Added the central Florida coastal stock of bottlenose dolphins to the list of species or stocks incidentally killed or injured in this Category III fishery based on four serious injuries or mortalities possibly from this stock.
Southeastern U.S. Atlantic, Gulf of Mexico, and Caribbean snapper-grouper and other reef fish bottom longline/hook-and-line	Added the Gulf of Mexico continental shelf stock of bottlenose dolphins to the list of species or stocks incidentally killed or injured in this Category III fishery based on one death and one serious injury in 2010.
	Added the Gulf of Mexico bay, sound, and estuary stocks of bottlenose dolphins to the list of species or stocks incidentally killed or injured in this Category III fishery based on 35 strandings and two releases from gear from 2002 to 2009.
Mid-Atlantic bottom trawl	Added the western North Atlantic stock of Risso's dolphins to the list of species or stocks incidentally killed or injured in this Category II fishery based on 15 Risso's dolphin mortalities in 2010.
	Added the western North Atlantic stock of harbor seals to the list of species or stocks incidentally killed or injured in this Category II fishery based on one death in 2009.
Northeast bottom trawl	Added the western North Atlantic offshore stock of bottlenose dolphins to the list of species or stocks incidentally killed or injured in this Category II fishery based on five mortalities from 2009 to 2010.
	Added the western North Atlantic stock of gray seals to the list of species or stocks incidentally killed or injured in this Category II fishery based on an observed mortality in 2009.
High Seas Pacific highly migratory species drift gillnet	Elevated this fishery from Category III to Category II because it is an extension of the Category II California thresher shark/swordfish drift gillnet fishery operating within the U.S. Exclusive Economic Zone.
High Seas Western Pacific pelagic (Hawaii deep-set component)	Added the California/Oregon/Washington stock of humpback whales to the list of species or stocks incidentally injured or killed in this fishery based on one serious injury in the component of the fishery operating in U.S. waters in 2009.
	Added unknown stocks of Blainville's beaked whale, bottlenose dolphin, Pantropical spotted dolphin, Risso's dolphin, short-finned pilot whale, and striped dolphin to the list of species or stocks injured or killed in this Category I fishery to acknowledge uncertainty in stock identity of these species taken on the high seas.
High Seas Western Pacific pelagic (Hawaii shallow-set component)	Added unknown stocks of bottlenose dolphin, Bryde's whale, *Kogia* spp. whale, Risso's dolphin, and striped dolphin, to the list of species or stocks injured or killed in this Category II fishery to acknowledge uncertainty in stock identity of these species taken on the high seas.

Atlantic Ocean, Gulf of Mexico, Caribbean commercial passenger fishing vessel

The Commission concurred with the Service's proposal to add several stocks of bottlenose dolphins to the list of species or stocks incidentally killed or injured in this fishery (Figure VII-7). At least 38 dolphins were taken in this fishery between 2002 and 2008, giving the Service sufficient evidence to conclude that the fishery results in at least occasional takes and warrants a Category II listing. However, the Service disagreed, arguing that available data do not support elevation of this fishery. It argued that the same gear is used by commercial passenger fishing vessels and individual recreational anglers, which makes it difficult to know how many strandings are due to interactions with each fishery.

Figure VII-7. Bottlenose dolphin bycatch resulting from either commercial passenger fishing vessel or recreational angler gear (Source: National Marine Fisheries Service)

Western Pacific pelagic, Hawaii deep-set component and western Pacific pelagic, Hawaii shallow-set component

The Commission concurred with the Service's proposal to add several marine mammal stocks to the list of those subject to incidental killing or serious injury in the Category I western Pacific pelagic fishery, Hawaii deep-set component and the Category II western Pacific pelagic fishery, Hawaii shallow-set component. The Service noted that the information on stock identity and fishery interactions was inadequate for those fisheries. The Commission concurred and emphasized the need to work with the industry and increase investment and initiatives to gather more information about high seas marine mammal stocks, including their boundaries and interactions with fisheries. The Service responded that it has and will continue to work with international and industry partners as recommended by the Commission.

Reiteration of previous recommendations

The Commission reminded the Service that in commenting on the proposed List of Fisheries in several recent years, it has expressed ongoing concern about the lack of information on many species and stocks of marine mammals in the Gulf of Mexico, which is a concern especially for bottlenose dolphins. Noting the dearth of information about stock structure, abundance, potential biological removal levels, and rates of interaction with different fisheries, the Commission has argued that the inadequacy of such information constrains the Service's ability to characterize marine mammal and fishery interactions and to manage the fisheries so that takes of marine mammals are reduced. The Commission pointed to the fact that, again, in the proposed 2012 List of Fisheries, the Service was forced to make assumptions about which stocks were affected by which fisheries, how often takes occurred, and how significant those takes were for the affected stocks. Although the Commission had usually supported the assumptions made and precautionary measures taken to date, it noted that managing by assumption is not a sound long-term conservation strategy, especially when the assumptions are likely to have significant social and economic impacts. The Commission also noted that the insufficiency of information about marine mammals limits the nation's ability to understand the relative impacts of other types of threats to marine mammals—such as oil spills, exposure to toxic materials in dispersants and other industrial sources, toxic algae, and hypoxia—and to undertake appropriate response, restoration, and conservation activities.

The Commission also noted that, in responding to such recommendations by the Commission, the Service has consistently stated that collection of information about fishery interactions is a high priority but dependent on the availability of resources. The Service also has emphasized the value of information gathered from stranding networks and self-reporting by fishermen. In its response to the Commission's letter on the proposed 2011 List of Fisheries, the Service noted how, as a result of the BP Deepwater Horizon oil spill response and restoration efforts, additional surveys and mark-recapture studies were underway for some bay, sound, and estuary stocks, and that this work would provide updated abundance estimates and potential biological removal levels for some stocks. The Commission stated its appreciation for the Service's expressed intention to expand its efforts and investments in these areas. However, the Commission also stated its belief that these efforts and investments would benefit from a more comprehensive, aggressive, and innovative strategy. Finally, the Commission recommended that the Service work with the Commission to develop an effective long-term strategy, based on analysis of the limiting factors, needed resources, and alternative courses of action, for determining marine mammal stock structure and abundance, potential biological removal levels, and fisheries mortality and serious injury rates in the Gulf of Mexico. The Service assured the Commission that improving knowledge of stock structure, abundance, potential biological removal levels, and fisheries mortality and serious injury rates are priorities for the Service, but did not indicate that it would be taking any additional actions to collect/analyze the needed information.

The Commission noted that the Service proposed to update its reports on the numbers of vessels/persons for several Southeast Atlantic, Mid-Atlantic, and New England fisheries and the Service anticipated that, in many cases, the new numbers again would represent increases or decreases of up to several thousand permit holders. The Commission acknowledged that it understands, based on the Service's responses to previous recommendations on this issue, that the newly proposed numbers were intended to reflect potential effort, and that "a clear measure of effort for all state fisheries in the northeast and Mid-Atlantic has not been determined because many state permits allow the use of multiple gear types" (75 Fed. Reg. 68478). Although the Service has tried to reassure the Commission that these great fluctuations in vessel/person numbers have no management or observer implications, the Commission remains concerned about the uncertainty conveyed by these numbers. For example, if the number of active fishermen is only a fraction of the potential number, it remains unclear how many vessels actually engage in fishing. Put bluntly, the Commission again stated its position that fisheries managers, both state and federal, should have clear measures of effort for the fisheries they manage. To that end, the Commission recommended that the Service work on its own and in collaboration with coastal states to develop new, consistent methods for estimating fishing effort. Finally, the Service reported that it has expressed and will continue to express to the states the need for more accurate measures of fishing effort.

Take Reduction Teams

Section 117 of the Marine Mammal Protection Act directs the Service to prepare stock assessment reports for all marine mammal stocks in U.S. waters. The reports must include a finding as to whether each stock should be classified as "strategic," meaning that it meets at least one of the following criteria: (1) the number of annual fishery-caused deaths or serious injuries exceeds their calculated potential biological removal (PBR) level, (2) the stock is listed as endangered or threatened under the Endangered Species Act, or (3) the stock is classified as depleted under the Marine Mammal Protection Act. Section 118 of the Act also requires the National Marine Fisheries Service to classify all U.S. fisheries into one of three categories according to the frequency that they incidentally kill or seriously injure marine mammals relative to each stock's PBR. Category I fisheries include those that take marine mammals frequently (i.e., at levels greater than 50 percent of any stock's PBR per year), Category II are those with occasional takes (i.e., between 1 and 50 percent of any stock's PBR per year), and Category III have no or a remote likelihood of takes (i.e., less than 1 percent of any stock's PBR per year). For all Category I fisheries that take marine mammals from stocks classified as strategic, the Service is to convene a take reduction team

to prepare a recommended take reduction plan. The Act sets the goal of reducing deaths and serious injuries in strategic stocks to levels below their PBR within six months and to a zero mortality rate (considered to be 10 percent or less of PBR) within five years.

The Assistant Administrator of the National Marine Fisheries Service appoints the members of take reduction teams, drawing from representatives of involved fisheries, conservation groups, the scientific community, and federal and state agencies. The Service currently has seven take reduction teams, including one, the Hawaiian false killer whale team, that met for the first time in 2010 (Table VII-4). Representatives of the Marine Mammal Commission participate on most teams. During 2010 and 2011, the false killer whale team, the Atlantic pelagic longline team, and the Atlantic large whale team met either in person or by teleconference. Results of the false killer whale and Atlantic pelagic longline team meetings are discussed below. The meeting of the Atlantic large whale team is discussed in the North Atlantic right whale section in Chapter IV. Steps to implement rules for take reduction plans recommended by the bottlenose dolphin and harbor porpoise teams, which last met before 2010, also are discussed below. The other teams were inactive while awaiting results of research and monitoring to determine the success of take reduction measures implemented before 2010. Those teams are not discussed below.

False killer whale take reduction team

The false killer whale (*Pseudorca crassidens*) is a large delphinid that occurs in relatively discrete populations in tropical and subtropical regions around the world. Although little is known about most of

Table VII-4. Take reduction teams established under the Marine Mammal Protection Act and still operational, although not necessarily active in 2010 or 2011

Take reduction team	Year established	Team focus
Atlantic large whale	1996	Take of right, humpback, and fin whales in various Atlantic coast trap/pot and gillnet fisheries for lobster, crabs, conchs/whelks, groundfish, monkfish, sharks, hagfish, and other finfish
Pacific offshore cetacean	1996	Take of short-finned pilot, sperm, pygmy sperm, humpback, and beaked whales (Cuvier's, Baird's, and *Mesoplodon* spp.) in Pacific drift gillnet fisheries for sharks and swordfish
Harbor porpoise	1997	Take of harbor porpoises in various Atlantic coast set gillnet fisheries for groundfish (e.g., haddock, cod, and flounder), coastal finfish, spiny dogfish, and monkfish
Bottlenose dolphin	2001	Take of bottlenose dolphins in various mid-Atlantic set gillnet, trap, seine, and pound-net fisheries for coastal finfish, dogfish, and crabs
Atlantic pelagic longline	2005	Take of long- and short-finned pilot whales and Risso's dolphins in Atlantic coast pelagic longline fisheries for swordfish, sharks, and tuna
Atlantic trawl gear	2006	Take of long-finned and short-finned pilot whales, common dolphins, and white-sided dolphins in Atlantic coast trawl net fisheries for various finfish, squid, and shellfish
Hawaii false killer whale	2010	Take of pelagic and insular stocks of false killer whales in Hawaii-based deep-set and shallow-set longline fisheries

their populations, these whales interact with commercial longline fisheries by taking bait and caught fish,and are occasionally killed or seriously injured when they become caught on hooks or entangled in lines. Several U.S. longline fisheries in the central and western Pacific incidentally kill or seriously injure false killer whales. For at least the Hawaii pelagic population, which occurs principally in waters from about 40 km around the Main Hawaiian Islands (MHI) seaward,[3] bycatch exceeds PBR and likely is not sustainable.

Since the mid-2000s, the Marine Mammal Commission and others have urged the National Marine Fisheries Service to convene a take reduction team and prepare a take reduction plan to reduce the take of false killer whales in U.S. longline fisheries in the Pacific. Despite Marine Mammal Protection Act requirements, staff and funding limitations prevented the Service from doing so. The Hui Malama i Kohola, the Center for Biological Diversity, and the Turtle Island Restoration Network sued the Service and, shortly thereafter, the Service provided the necessary funding.

Formation and scope of the take reduction team: The Service announced its plans to establish a False Killer Whale Take Reduction Team and requested public comments on the scope of the team's charge on 19 January 2010 (75 Fed. Reg. 2853). The Service focused the team on the Hawaii deep-set longline fishery for tuna and the Hawaii shallow-set longline fishery for swordfish, as they may affect the Hawaii pelagic and Palmyra Atoll false killer whale populations, (both of which occur within and beyond the U.S. Exclusive Economic Zone), and the Hawaii insular population, which has been documented out to about 100 km offshore of the MHI.

On 17 February 2010, the Commission responded to the Service expressing support for the team's formation and its attention to all three populations. Noting that longline fisheries also take false killer whales in American Samoa but that the information on that false killer whale population is limited, the Commission recommended that the team review information on that population with a view towards developing a research plan to guide the Service's investigation of interactions with longline fishing in that area. Depending on results of those or other future studies, the Commission suggested the Service retain the option of amending the team's scope and membership to address potential incidental takes by the American Samoa longline fishery. Finally, concerned about the potential for interactions between false killer whales in the Hawaii insular population and the Hawaii shortline and kaka fisheries, the Commission also recommended that the Service either include those fisheries within the team's scope or work with the state of Hawaii to (1) characterize their interactions with false killer whales and (2) identify and implement measures to avoid such interactions.

After considering those and other comments, the Service convened a 19-member team composed of representatives of the fishing industry, conservation groups, the scientific community, and concerned agencies, including a representative of the Marine Mammal Commission. It declined to add other fisheries to the team's scope because it considered the available information on the fisheries and their interaction rates to be too limited. It did, however, state that it would consider adding other fisheries to the team as warranted.

When the Service formed the team, the status of false killer whale populations was known only within the U.S. Exclusive Economic Zone. The Service estimated the abundance of the Hawaii pelagic population to be 484 whales and the observed mortality and serious injury rate to be 7.4 animals per year within that zone by the two fisheries combined. The calculated PBR for the population was 2.5 animals per year (Carretta et al. 2010), which qualifies the stock as strategic. The Service estimated the size of the Hawaii insular population to be 123 whales with a calculated PBR of 0.8 whales per year. The Service did not have confirmed records of mortality or serious injury for the insular population and it was not designated as strategic, but the Service included it within the team's scope because of its small size, the occurrence (albeit occasional) of deep-set longline fishing within the population's nearshore range, and evidence suggesting that unreported takes had occurred. The latter includes photographs of whales with disfigured fins consistent with injuries known to have been caused by longline gear (Baird 2009). As discussed in Chapter IV, these factors also prompted a petition to list the Hawaii insular population as

[3] See the 2010 stock assessment report for this stock at http://www.nmfs.noaa.gov/pr/sars/species.htm#smallwhales

either endangered or threatened under the Endangered Species Act. The Service estimated the size of the Palmyra Atoll false killer whale population to number 1,329 whales with an observed mortality and serious injury rate of 0.3 whales per year, which was well below the population's calculated PBR of 6.4 whales per year. Although it does not classify this stock as strategic, the Service included it in the team's scope because the Hawaii-based deep-set longline fishery is classified as a Category I fishery and is known to take whales from this population.

Development of a recommended take reduction plan: During the first six months of 2010 the team met four times to develop a recommended take reduction plan. At its first meeting, the team reviewed information on false killer whale biology and ecology and the longline fisheries. It also discussed possible plan elements and data analyses needed to guide subsequent deliberations. At its second meeting, the team reviewed analyses by the Service such as catch rates of target species by the deep-set and shallow-set longline fisheries, fishery operations, false killer whale interactions with the fisheries, and actions taken in other longline fisheries to reduce interactions with marine mammals. Based on that information, the team began deliberations on possible mitigation measures.

At the third meeting, the team continued its consideration of (1) mitigation measures that would reduce the chances whales would find longline vessels (e.g., by reducing deck lighting, using hydrophones to detect whales, reducing sources of noise whales might use to locate vessels, and deploying decoy fishing buoys), (2) strategies to minimize depredation (e.g., altering acoustic signatures of bait and catch with metal inserts or streamers, retaining used bait and fish offal, limiting line length and soak time, altering the way lines were set, using acoustic deterrents, and moving to a new site when whales were seen), (3) ways to avoid hooking and injuring whales (e.g., improved techniques to handle and release hooked and entangled animals, and different hook types such as circle hooks, weak hooks, and barbless hooks), and (4) fishing closures in times and areas whales are most likely to occur. The team also identified longer-term research needs, and began outlining alternative sets of recommendations.

At its fourth meeting the team examined the costs and benefits of alternative mitigation measures and developed, by consensus, a set of recommendations. It also proposed a two-phase implementation approach in which some measures would become effective immediately or as soon as possible after the Service adopted final rules for the plan, and others would be implemented only if initial measures failed to reduce deaths and serious injuries in the Hawaii pelagic false killer whale population below a specified threshold based on its calculated PBR level. This two-tiered approach was deemed necessary because the Service typically requires several years to develop and adopt new take reduction rules and that was considered too long to wait should initial measures prove inadequate.

The team recommended that the Service require the use of weak hooks on all deep-set long line vessels, impose time-area closures, and develop training sessions for fishermen on ways to handle hooked or entangled whales. Weak hooks were defined as 14/0 to 16/0 circle hooks with shafts made of round wire not to exceed 4.0 mm in diameter and a 10 degree offset or less. Preliminary testing of 4.0 mm hooks revealed that they would straighten under a force of about 205 pounds, a strength that was thought to be weak enough to allow hooked false killer whales to straighten the hook and escape with minor injury, yet strong enough to catch targeted tuna. Support for the approach was provided by recent experiments in a longline fishery for yellowfin tuna in the Gulf of Mexico where fishermen are required to reduce bycatch of large bluefin tuna. In that case, weak hooks reduced the bycatch of big bluefin tuna by 75 percent, whereas the catch of yellowfin tuna declined by only 5 percent.

To ensure that weak hooks used in the Hawaii-based longline fisheries are the weakest part of the gear, the team recommended that all monofilament branch lines and leaders have diameters no less than 2.0 mm in diameter to ensure that they would not break under the strain required to straighten the hooks. The team also recommended that field tests be done with weak hooks before issuing final rules to ensure that they would not significantly reduce the catch of tuna. The team did not recommend that the measure be applied to the shallow-set swordfish fishery because swordfish can approach the weight of false killer whales and weak hooks would likely reduce the catch. The team also believed that bycatch reduction objectives could be achieved without applying this measure to the shallow-set fishery because (1) most swordfish fishing occurs north of the Hawaiian Islands' Exclusive Economic Zone in waters north of the

range of false killer whales and (2) observed false killer whale deaths and serious injuries in the shallow-set fishery have been close to zero in recent years.

The team also recommended that the Service modify provisions of an existing management area closed to all deep-set and shallow-set longline fishing around the MHI. That existing zone is in effect year-round, but with boundaries that shift seasonally. From February through September the boundary varies from approximately 78 km to 194 km from shore to 194 km (104 nmi) from shore around the MHI, but from October through January the northern boundary of the zone drops south to points as close as 45.1 km (24.3 nmi) to the MHI (Baird 2009). The team recommended that the existing February through September outer boundaries be maintained year-round. This measure was deemed important to protect the insular population, which, at the time was being considered for listing as an endangered or threatened species under the Endangered Species Act (see Chapter IV). The team also recommended that the Service (1) expand and clarify marine mammal handling and release guidelines presented at the Service's annual protected species workshops to instruct vessel captains and owners on how to respond to interactions with marine mammals, and (2) include additional measures to ensure that deckhands promptly notify vessel captains of marine mammal bycatch events.

Assuming the weak hook and release measures may prove to be inadequate, the team recommended that all waters south of the MHI in the U.S. Exclusive Economic Zone be closed to deep-set longline gear if false killer whale bycatch levels remained high. The recommended closure area extended from 165° W and 154° 30' W longitude, which is approximately the eastern end of the Northwestern Hawaiian Islands to the island of Hawaii, and was called the "Southern Exclusion Zone." It was to be closed if (1) two false killer whale deaths or serious injuries were observed in the deep-set longline fishery in any single year after the date of plan implementation or (2) the number of observed takes, when roughly extrapolated to a fleet-wide estimate based on the level of observer coverage, exceeds the applicable PBR level in effect at that time.[4] If the zone is closed, the first closure would remain in effect for the remainder of the year. If two more observed deaths and serious injuries (or more than PBR) occurred in the subsequent year after the zone was reopened, it would again be closed immediately and remain closed until certain bycatch reduction thresholds were met.[5]

Finally, the team recommended additional information-gathering activities to inform future team deliberations on management needs related to reducing takes of false killer whales. Those recommendations called for additional research on operations of and possible bycatch in Hawaii's shortline and kaka line fisheries and other fisheries that may interact with false killer whales. They also called for research on false killer whale photo identification and stock structure. The team further recommended that fishery observers be required to gather certain additional types of information and it prioritized the needed information.

Adoption of a final take reduction plan: From July 2010 to July 2011 the Service considered the team's recommendations and began drafting rules to implement a final plan. It also continued related research activities, including a new survey to estimate false killer whale abundance in waters around Hawaii and the recommended field test to determine if weak hooks would affect catch rates of target species. Final results of the population survey were not available at the end of 2011, but the three-month field test of weak hooks was completed late in 2010. The test revealed no significant difference either in the size of fish caught or the total landings when using 4.0 mm weak hooks versus hooks with a 4.5 mm shaft.

On 18 July 2011 the Service published a proposed rule to implement regulations based on the take reduction team's recommendations (the draft take reduction plan) and requested public and agency comments (76 Fed. Reg. 42082). The proposed rule generally followed the team's recommendations. The rule required deep-set fishing vessels to use weak circle hooks with shafts no larger than 4.0 mm diameter

[4] The team recognized that between the time of its recommendations and the date that final rules go into effect, a new PBR level may be calculated for false killer whale stocks based on new abundance estimates generated from a Hawaiian Islands Cetacean Assessment Survey conducted by the Service in the fall of 2010.
[5] http://www.nmfs.noaa.gov/pr/pdfs/interactions/fkwtrp_draft.pdf

and monofilament leaders and branch lines at least 2 mm diameter. It also modified the existing MHI Longline Fishing Prohibited Area to make the closest part of its boundary roughly 50 nmi (80 km) around the MHI year-round for both deep-set and shallow-set longline fisheries. However, instead of making the closure part of the take reduction rule, it tied it to regulations developed specifically to govern the western Pacific longline fisheries. Consistent with the team's recommendations, the proposed rule included provisions for captain and crew training and posting placards. Instead of requiring that deckhands notify their captain of each interaction, the rule simply stipulated that vessel captains would be responsible for overseeing the handling of marine mammal bycatch events.

With regard to contingency provisions, the proposed rule included the team's recommended southern exclusion zone, but deviated from the team's recommended trigger to implement it. Instead of following the team's advice for a fixed number of observed deaths or serious injuries, the Service proposed a formula that it felt would better assure that PBR levels would not be exceeded when averaged over a five-year period. In part the Service noted that this provided needed flexibility to account for year-to-year variations in incidental take levels, and partly to avoid the need for new rulemaking actions whenever new information caused a change in calculated PBR levels. Under its proposed approach, the Service would calculate and announce the number of takes that would trigger a closure of the zone each year based on a five-year average (i.e., the fishery could take all its five-year allotment in a single year under an assumption that the take level would be zero in the other four years). If the zone was closed because the threshold take level was exceeded, the Service would keep the zone closed for the remainder of the fishing year, (which matches the calendar year) and then reopen it at the beginning of the next fishing year (1 January). However, if one false killer whale was confirmed as being killed or seriously injured by the deep-set long line fleet within the Hawaii Exclusive Economic Zone in any of the four years after the trigger had been exceeded the first time, the Southern Exclusion Zone would again be closed and remain closed until such time as the Service's regional administrator decided to reopen it. Thus, unlike the team's recommendation, the proposed rule included no specific criteria for reopening the exclusion zone and instead left that action entirely to the discretion of the Service.

During the comment period, the Service reconvened the take reduction team on 27–29 July 2011 to review the contents of the regulations, explain its rationale for elements that differed from the team's consensus recommendations, and determine what steps the team may want to take in response to the proposal. During the meeting, the Service explained its rationale for deviating from the team's recommendations and the team considered the potential consequences for false killer whales and the fishery. The team expressed concern over the proposed formula for triggering closure of the Southern Exclusion Zone, in part because it was aware that PBR levels for false killer whale populations would likely change within a few years when results of new population assessment surveys became available. Some members were concerned about the lack of criteria for reopening the exclusion zone. Based on the discussion, team members were unable to reach consensus on whether or not to support the changes in the Service's proposal.

On 17 October 2011, the Marine Mammal Commission wrote to the Service commenting on the proposed rules and non-regulatory measures described in the preamble to the proposed rules. The Commission recommended that the Service adopt and implement the proposed rules subject to certain changes or clarifications. Noting that the force required to straighten a hook with a stainless steel shaft of 4.0 mm may change depending on hook manufacturer and how the stainless steel stock for the hooks was forged, the Commission recommended that the Service consider defining weak hooks based on a performance standard that measures the force required to straighten a hook (e.g., an average 205 pounds), rather than a specific wire diameter.

Regarding the basis for deciding when to close the Southern Exclusion Zone, the Commission concluded that the Service's approach seemed reasonable, but that relying entirely on the discretion of the Service to reopen the area was a significant departure from the team's consensus recommendation. It also noted that the same rationale for using a formula to trigger a closure of the zone seemed equally justified for reopening it. Therefore, the Commission recommended that the Service adopt the proposed PBR-

based formula for triggering closure of the Southern Exclusion Zone, but that it develop and include in the regulations a similar formula for determining when the zone would be reopened.

The Commission also was concerned about procedural implication stemming from the inclusion of some regulatory provisions under authority of the Marine Mammal Protection Act (i.e., 50 CFR part 229) and others under authority of the Magnuson-Stevens Fishery Conservation and Management Act (i.e., 50 CFR part 665). Because the Service usually defers to advice from fishery management councils to amend rules codified to implement fishery management plans, the Commission was concerned that the latter rules might be amended in the future at the recommendation of a fishery council while giving little or no weight to advice by the take reduction team. Such problems arose in the past when the Service deferred to fishery management council recommendations rather than the recommendations of take reduction teams established to protect harbor porpoise. The Commission therefore recommended that the Service either (1) include all take reduction measures in full in 50 CFR part 229 under authority of the Marine Mammal Protection Act, or (2) include additional language in part 229 of the proposed rule requiring that any changes to take reduction measures under 50 CFR part 665 follow procedures identical to those required to make changes in take reduction measures under 50 CFR part 229, including advance review by and consultation with the False Killer Whale Take Reduction Team.

The Commission also recommended that the Service deploy fishery observers to collect data on marine mammal interactions in the Hawaii shortline fishery, which had not yet been subject to observer coverage, and that the False Killer Whale Take Reduction Team be expanded to include representatives of that fishery.

At the end of 2011, the Service had not yet published a final rule or announced its decision regarding final provisions of the False Killer Whale Take Reduction Plan.

Atlantic pelagic longline take reduction team

The Atlantic longline team was established in 2005 to reduce the bycatch of short- and long-finned pilot whales (*Globicephala macrorhynchus* and *G. melas*) and Risso's dolphins (*Grampus griseus*) in commercial longlines set in U.S. waters of the Atlantic, Gulf of Mexico, and Caribbean to catch tuna and swordfish (Figure VII-8). When the team was formed, the largest concern was the take of pilot whales, most of which were taken between South Carolina and Cape Cod, Massachusetts. Assessing bycatch levels for pilot whales has been particularly challenging because the two affected species are almost identical in appearance and overlap in range. Long-finned pilot whales range from North Carolina north to Greenland and Iceland and short-finned pilot whales range from Cape Cod south to the Gulf of Mexico and Caribbean, with the two species overlapping between Cape Hatteras and Cape Cod. Within that overlap area, it has not been possible to reliably determine in the field whether a pilot whale that has been killed or seriously injured is from the short- or long-finned species. As a result, the Service combines bycatch estimates for the two species.

Figure VII-8. Risso's dolphin (Photo courtesy of J. Cotton, National Marine Fisheries Service)

In 2009 the Service adopted a final take reduction plan for Atlantic pelagic longline fisheries following recommendations by the Atlantic longline team. The plan (1) established a research area along the outer continental shelf off northern North Carolina and required longline vessels to (a) notify the

Service at least 48 hours before leaving port to fish in that area and (b) carry an observer if asked to do so; (2) limited the length of deployed longlines to no more than 20 nm (37 km) based on observer data that suggested shorter lines would reduce bycatch; and (3) required the posting of placards on longline vessels describing marine mammal handling and release guidelines.

Since 2005 when the team was formed, pilot whale mortalities and serious injuries in longline gear have declined significantly. Whereas an estimated 213 pilot whales (both species combined) were killed or seriously injured in 2005, the estimate for 2009 (the latest year for which data are available) was just 17 whales. Compared to currently calculated PBRs of 93 whales per year for long-finned pilot whales and 172 whales per year for short-finned pilot whales (Waring et al. 2010) it appears that pilot whale bycatch by longline vessels has recently declined well below the PBR levels for both species. However, pilot whales also are taken in various bottom and mid-water trawl fisheries along the Atlantic coast. In the past those other fisheries took fewer pilot whales than the longline fisheries, but their bycatch levels have not declined and in 2009 Atlantic coast trawl fisheries were estimated to have taken 32 pilot whales. Nonetheless, the combined bycatch for both fisheries was below PBR in 2009.

On 16 September 2010, the Service reconvened the team in a teleconference to review recent research and monitoring results and for planning purposes. During the teleconference, the Service noted that although the estimated bycatch level was low in 2009, it likely would increase for 2010 given preliminary observer data yet to be extrapolated to the entire fleet, which included an increase in observed takes. In part those observations included an unusual catch of three pilot whales in a single set. The Service also noted that many vessels have been disregarding the restriction on longline length and instead have been using far longer lines. The Service indicated that it would address this problem by expanding outreach efforts rather than enforcement.

In 2010 the Service reported, for the first time, separate abundance estimates for the two pilot whale species: 12,619 long-finned pilot whales and 24,647 short-finned pilot whales (Waring et al. 2010). Based on those estimates, the Service calculated PBRs of 93 and 172 long- and short-finned pilot whales, respectively, the total of which is slightly higher than the combined PBR of 249 whales per year calculated previously. The Service also updated the team on studies to test the use of weak hooks in other longline fisheries, which might be used in fisheries that take pilot whales.

Bottlenose dolphin take reduction team

In the 1990s the Service estimated that more than 200 bottlenose dolphins were being killed or seriously injured each year in gillnets, pound nets, and crab traps between New York and Florida. The take was thought to exceed PBR for at least some of the multiple overlapping populations of dolphins occurring in the area. The Service therefore formed a bottlenose dolphin team in 2000. As discussed in previous annual reports, the Service has struggled to assess the effects of incidental bycatch in fisheries and to identify appropriate mitigation measures because of uncertainty regarding how many distinct populations exist, the extent of their various migrations, and/or their abundance. In 2009, based on genetic analyses, photo-identification, and telemetry tagging and tracking studies since 2000, the Service concluded in 2009 that, although further research is still needed, bottlenose dolphins from the Florida Keys to New York appear to comprise at least nine discrete populations in various bays and estuaries, several coastal populations and two coastal migratory populations inhabiting open ocean waters along that stretch of coast.

In September 2009 the Service reconvened its bottlenose dolphin team to update members on studies of stock structure and status. During the meeting, it advised the team that take levels from at least one population, the Northern North Carolina Estuarine System population, likely exceeded its PBR level. That population occurs mainly in Pamlico Sound, but at least some dolphins appear to migrate from that area north to the mouth of the Chesapeake Bay in Virginia. Several tens of stranded dolphins have been recovered in the lower Chesapeake Bay in recent years with net marks suggesting they were entangled and drowned in nets associated with a pound net fishery in that area. Pound nets are fixed fish traps composed of nets strung between poles set permanently into the bottom sediment. Nets at one end of the

structure form a large rectangular trap or "pound" several tens of feet across that trap fish. A string of nets called a leader is also strung between a straight line of poles about a quarter of a mile long or longer extending from the trap. When fish encounter the leader net, they turn and follow the leader into the trap. Because a large number of stranded dolphins found in the lower Chesapeake were thought to be from the North Carolina population, the team recommended measures to reduce bycatch in the Virginia pound net fishery.

This fishery also catches significant numbers of endangered sea turtles. To reduce sea turtle bycatch, the Virginia Marine Resources Commission seasonally limited the leader net to about three feet high in certain areas of the lower Chesapeake Bay so turtles could swim over it. The team believed this limit also could reduce dolphin bycatch and recommended that it be applied year-round to all Virginia state waters seaward of the Chesapeake Bay Bridge Tunnel. At the team's request, the National Marine Fisheries Service wrote to the Virginia Commission asking that it consider (1) the need for consistency between the federal and state rules and (2) the value of adopting the pound net limits more quickly while the Service proceeded to develop its rule under the take reduction plan.

In December 2009, the Virginia Commission adopted a new rule similar to that recommended by the take reduction team. Preliminary information from stranding records suggests that the state rule has reduced, but not eliminated, the dolphin bycatch. However, the state rule did not apply year-round or to all areas recommended by the team, and covered only inshore pound nets whose leader nets are entirely in shallow waters. During 2010 and 2011, the Service worked on drafting regulations and associated environmental analyses with intent to publish a proposed rule to amend the bottlenose dolphin take reduction plan in 2011. Its progress was interrupted by the Deepwater Horizon oil spill in the Gulf of Mexico. At the end of 2011, the Service expected to publish its rule on the Virginia pound net fishery in 2012. The Commission understood that the new rule would include all measures recommended by the team, including those that were not adopted under state regulations. In addition, the Service is planning on issuing a separate rule early in 2012 to ban nighttime sets of medium mesh gillnets. The current measure includes a three-year sunset provision and expires in May 2012.

In 2010 and 2011, the Service also continued research efforts to improve understanding of the extent and areas of overlap between four different coastal and estuarine bottlenose dolphin populations that occur either seasonally or year-round in North Carolina. In 2011 work focused on collecting genetic samples and photo-identification records of dolphins in the Northern North Carolina Estuarine System population to evaluate ways to distinguish them from members of other populations. The Service also increased fishery observer efforts in North Carolina, including efforts to monitor a gillnet fishery for mackerel that is believed to interact with bottlenose dolphins but has not been well monitored to date.

Harbor porpoise take reduction team

In 1998 the National Marine Fisheries Service implemented a Harbor Porpoise Take Reduction Plan to address bycatch of Gulf of Maine/Bay of Fundy harbor porpoises by various gillnet fisheries from the U.S.-Canada border to North Carolina. For several years thereafter bycatch levels declined significantly to below the harbor porpoise population's PBR level. Take levels never declined below the population's zero rate mortality rate goal (i.e., 10 percent of PBR), but the Service suspended team meetings after 2000 given the reduction in bycatch levels and limited funds for team meetings.

Measures implemented under the plan relied on a combination of seasonal fishing closures and two sets of gear requirements—one set for fisheries off New England and the other for fisheries off mid-Atlantic coastal states. Off New England, plan regulations require the use of acoustic deterrent devices called "pingers" in various time-area management zones. Pingers are soda-can sized devices attached to the float line of gillnets at set intervals. They emit periodic sounds within specified frequency ranges to alert porpoises of the presence of nets and deter them from approaching the nets. Off mid-Atlantic coastal states, a different set of measures was developed in deference to the region's gillnetters who did not want to use pingers. Based on fisheries observer data indicating that lower bycatch rates are associated with certain fishing techniques and gear configuration, plan regulations require the use of net twine of a certain

diameter, limits on the number of nets per boat and soak time, and the use of "tie-downs" that limit the height of nets between the net bottom (i.e., "lead line") and top (i.e., "float line").

Based on a population survey in 2006, the size of the Gulf of Maine/Bay of Fundy harbor porpoise population was estimated to number 89,045 porpoises and its PBR level was calculated to be 703 porpoises per year (Waring et al. 2009). After a few years of declining bycatch levels between 2003 and 2007, bycatch estimates began increasing to levels above the population's calculated PBR. Based on fishery observer data collected over that period, it was estimated that an average of 807 porpoises per year were being incidentally killed or seriously injured in U.S. east coast gillnet fisheries, including averages of 557 per year in the Northeast sink gillnet fishery and 250 per year in mid-Atlantic gillnet fisheries (Waring et al. 2009). Some uncertain additional number of porpoises from the same population also were taken by gillnets in Canadian waters. The increase in the U.S. was believed to have been caused by a combination of poor compliance with established regulations and a shift in the distribution of bycatch to areas outside of established time-area management zones. In December 2007 the Service reconvened the team. Analyses of bycatch for the period 2004 to 2008, the most recent five-year period for which data were available at that time, were slightly higher at an average of 877 porpoise per year (572 in Northeast gillnets and 305 in mid Atlantic gillnets) (Waring et al. 2010). Based on outdated data, at least 45 porpoises are considered to be taken by gillnets in Canada.

Following recommendations developed by the take reduction team in 2007 and 2008, the Service published proposed regulations to modify the harbor porpoise take reduction plan on 21 July 2009 (74 Fed. Reg. 26058). In addition to increased enforcement and fishery outreach measures to increase compliance rates, the Service proposed new regulatory measures to expand the times and boundaries of management areas off New England where use of pingers would be required. For the mid-Atlantic region, the proposal called for modifying certain gear restrictions and establishing a new management area off New Jersey that would be closed seasonally and require more stringent gear modifications at other times of the year. The proposed rules also called for contingency measures that would go into effect if bycatch was not reduced to rates equivalent to those expected based on observer data from vessels fishing in full compliance with pinger and other gear requirements. For management areas off Rhode Island and the south coast of Massachusetts, the bycatch rate for triggering contingency measures was calculated to be 0.023 porpoises per metric ton of fish landings; for management areas off eastern New England that rate was 0.031 porpoise per metric ton of landings. Exceeding those rates for two consecutive years would trigger a closure for gillnet fishing within three specific areas (Figure VII-9).

As noted in its previous annual report, the Commission commented on the proposed changes to the rules commending the team and the Service for their efforts and recommending that the changes be adopted. The Commission also recommended that all fishery observers carry devices to assess whether pingers on observed trips were functioning properly. Noting that there were no estimates of bycatch levels from the portion of the population in Canadian waters since 2000, the Commission also recommended that the Service consult with the Canadian Department of Fisheries and Oceans about the need to reinitiate harbor porpoise bycatch monitoring in the Bay of Fundy immediately north of the U.S. border. Finally, it recommended that an area closed to all gillnet fishing under related fishery management plans (i.e., the western Gulf of Maine closure area) also be incorporated as a closure under the harbor porpoise plan. This measure had been recommended by the team because of the potential for high bycatch in the area and the possibility that fishery managers might eliminate the closure from fishery management plans without considering the effects on harbor porpoise bycatch. The Service, however, did not include that measure in its proposed rules.

On 19 February 2010 the Service adopted final rules consistent with its proposed rules (75 *Fed. Reg*. 7383). The Service did not incorporate the western Gulf of Maine closure area into plan measures stating that a portion of that zone with high historical bycatch levels was already included in the plan's mid-coast management area. For other areas that it might have closed, the Service stated it could not evaluate the potential conservation benefits because it did not have the necessary bycatch information. The Service also stated that it was working with Canadian officials on the need to monitor bycatch in Canadian waters. With regard to the ability of observers to determine whether pingers are functioning properly, the Service

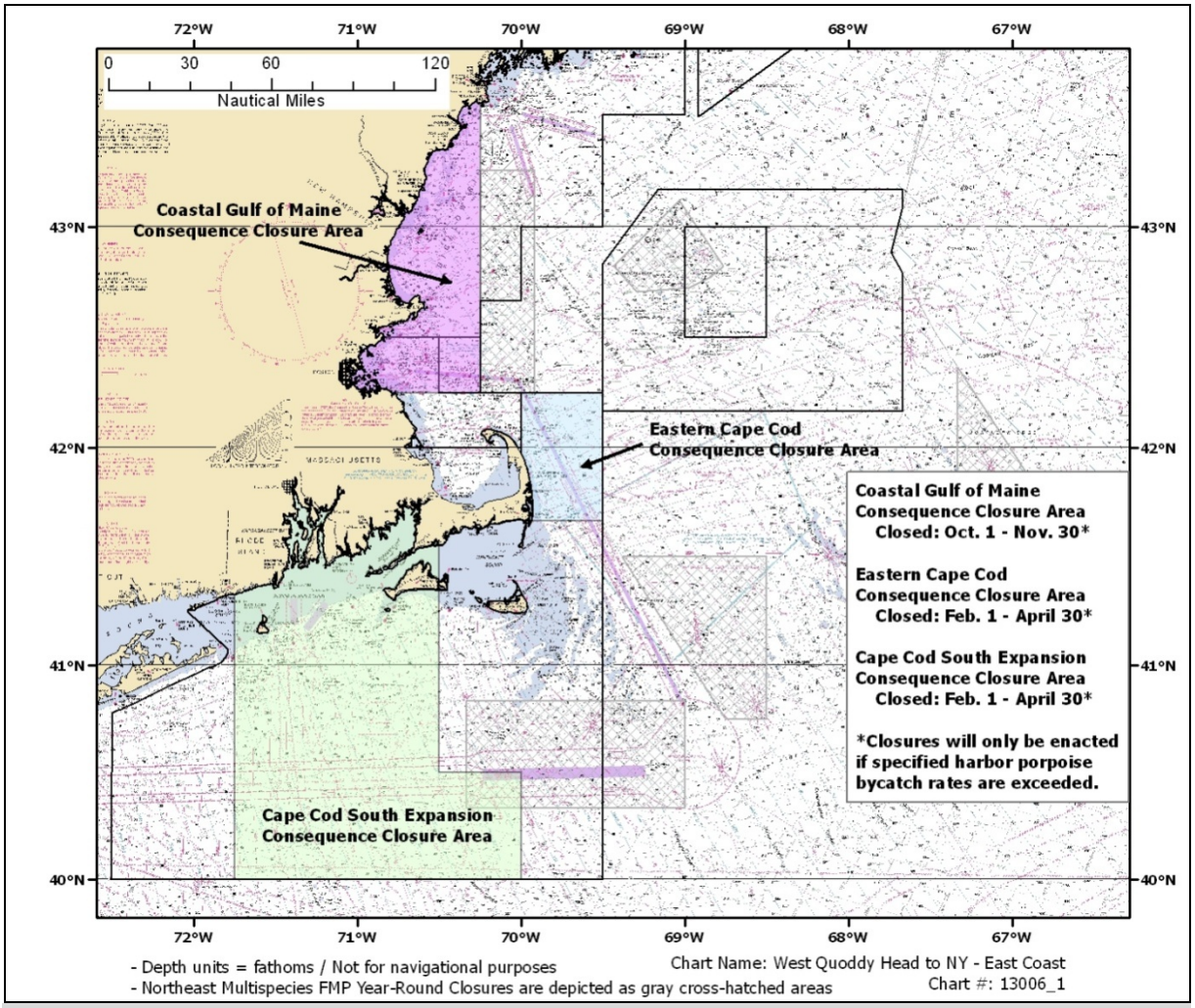

Figure VII-9. Consequence closure areas for the Harbor Porpoise Take Reduction Plan (Source: National Marine Fisheries Service)

stated that it had six open-air devices to detect whether pingers are working properly and that it routinely provided them to observers on gillnet vessels. The Service also stated that it had contracted for the design and purchase of new, more durable devices to replace the current units. It was not clear, however, whether available units are adequate to ensure that all observed trips would be equipped with the devices.

During late 2011, preliminary results from fisheries observer data collected during the first year under the new regulations indicated that gillnet fisheries in southernmost New England (i.e., south of Rhode Island and Massachusetts) as well as those in southeastern New England (i.e., off the east coasts of Massachusetts and New Hampshire) had the potential to exceed the established bycatch rates for triggering the identified contingency closures. On 15 August 2011, the Service therefore wrote to participants in the fishery advising them of the situation and urging their compliance with established requirements. The Service advised that if bycatch rates continued to exceed the established levels for two consecutive years, the consequence closure areas identified in the revised Harbor Porpoise Take Reduction Plan (i.e., areas where and times when the fishery and harbor porpoise overlap most; Figure VII-9) would go into effect closing them seasonally to all gillnet fishing.

Marine Mammal Commission Annual Meeting—2010

The 2010 Annual Meeting of the Commission was held in Hawaii and focused on marine mammal issues in the Pacific Islands region. Based on input from regional experts received during the meeting, the Commission sent a letter to the National Marine Fisheries Service highlighting three important fishery interaction issues.

Assessment of Pacific cetacean stocks

Figure VII-10. Rough-toothed dolphin pod, Hawaii (Photo courtesy of Robin Baird)

The United States claims 1.7 million square nautical miles of Pacific Ocean within its Exclusive Economic Zone. With that claim come both the authority and the responsibility for managing the associated living marine resources (Figure VII-10). Doing so clearly is a great challenge because of the vastness and considerable biodiversity of the ecosystems encompassed. The National Marine Fisheries Service, through its Pacific Islands Fisheries Science Center and Pacific Islands Regional Office, is responsible for managing fisheries and various protected resources within the U.S. Exclusive Economic Zone in this region. The Marine Mammal Protection Act provides that marine mammal stock assessment reports should provide a clear description of each stock's distribution, abundance, trend, productivity, potential biological removal level, take by fisheries and other human activities, and status. That information provides the basis for managing marine mammals so that each stock can recover to or remain within its optimum sustainable population level.

Although the Service lists 24 marine mammal stocks in its assessment reports for the central and western Pacific Ocean, 23 of which are cetaceans, all but three are referred to as Hawaiian stocks. Many other stocks may exist in U.S. waters in the central and western Pacific, but the Service has not had the resources to identify and assess them. The lack of such information constitutes a considerable gap in the Service's marine mammal stock assessment efforts. In essence, the Service has not yet identified even the basic units of management and conservation for many of the Pacific cetacean species under its purview and the information needed to guide management is notably incomplete. The 2009 stock assessment reports indicate that assessment efforts are sufficient to provide a reasonably precise estimate of abundance for only one of the 23 listed cetacean stocks. This accounting clearly indicates that both the Service and the Commission must find ways to improve research and management efforts for cetaceans in U.S. waters of the central and western North Pacific.

The lack of attention to Pacific cetaceans appears to be based in part on (1) the lack of funding to support research and management, (2) limited on-site resources and infrastructure to study and manage cetaceans over such vast areas, and (3) a focus on Hawaii-based species, including monk seals and certain cetaceans. Given the vast areas involved, potential number of stocks in those areas, current lack of infrastructure and research/management capacity, and inherent difficulty in studying cetaceans, the resources being put to the task are insufficient to meet even the most basic research and management responsibilities. Meeting those responsibilities will require a frank appraisal of necessary research and management activities and a commitment by Service leaders and decision-makers higher in the

Administration and Congress to build the needed programs with required personnel, infrastructure, fiscal resources, and interagency collaborations.

To build the necessary capacity, the Commission recommended that the Service (1) review its responsibilities for cetacean research and management throughout the Pacific region, (2) develop a strategic plan and budget for addressing those responsibilities, (3) identify strategies to strengthen cooperative partnerships with other agencies and groups that work in the Pacific region and that can complement and facilitate the Service's cetacean research and management objectives, and (4) initiate and expand international partnerships to coordinate U.S. research and management efforts with those of other countries.

The Service responded that the Pacific Islands Fisheries Science Center has assessed the literature and created a list of 104 regional stocks that it will survey and study as funding permits. It planned to perform stock assessments for Palmyra Atoll stocks in 2011. It also described its plans for a 2010 cetacean assessment survey around Hawaii that would involve two vessels and 175 sea days of effort and should lead to stock assessments with greater precision. The Service also pointed to collaborative, multi-year research with the University of Hawaii and Scripps Institution of Oceanography. Scripps is developing autonomous gliders that will carry passive acoustic sensors that will collect data for stock assessment purposes. The Service also described collaborative data collection efforts underway in the Northern Mariana Islands.

Evaluation of Hawaii kaka and short-line fisheries

Fishery interactions pose a significant threat to cetaceans around the main Hawaiian Islands. The Pacific Islands Regional Office recently convened a take reduction team to address interactions between Hawaiian longline fisheries and false killer whales (Figure VII-11). The Commission commended the Service for doing so, but also recommended that the Regional Office have the team consider Hawaii's kaka and short-line fisheries in its deliberations. The Office declined to do so but did acknowledge the need to assess the interaction rate between these fisheries and false killer whales, as well as other small cetaceans.

Figure VII-11. False killer whales, Hawaii (Photo courtesy of Robin Baird)

The Commission indicated that it was not aware of any further action by the Service to address this issue, despite the marked decline of the insular population of false killer whales over the past three decades. Accordingly, the Commission recommended that the Service work with the state of Hawaii to develop an observer program or other independent monitoring strategy for assessing the interaction between marine mammals and Hawaii's kaka and short-line fisheries. The Commission also suggested that the kaka-line fishery may warrant listing as Category II (based on the similarity of fishing gear to longline fisheries) and the more careful monitoring and management required for such fisheries.

The Service responded, recognizing the potential for interactions with these fisheries. They noted that the shortline fishery is designated as Category II, based on two analogous longline fisheries and because of anecdotal reports of interactions with marine mammals in the fishery. The Service stated its intention to add the kaka line fishery to Category III in the 2011 List of Fisheries, judging that gear and placement differences decrease the likelihood of interactions. The Service also noted that it has directed the False Killer Whale Take Reduction Team to consider potential interactions with these fisheries, which has formed a working group and is developing research recommendations to address the issue.

Evaluation of marine mammal bycatch in Pacific fisheries

Fishery bycatch is the largest direct threat to marine mammals on a global basis and likely is the largest threat to Pacific cetaceans generally. The Commission raised concern regarding the potential for interactions between longline fisheries and cetaceans based on data presented by the Western Pacific Regional Fishery Management Council. Such interactions are known to pose significant threats to certain cetacean stocks in waters around the Hawaiian archipelago where fishing effort is relatively low compared to many other Pacific areas. In addition, many stocks that occur in U.S. waters also move into foreign and international waters where they are at risk of being taken by fisheries of other nations.

Based on these concerns, the Commission recommended that the Service's Office of Protected Resources and Office of International Affairs increase their efforts to track fisheries in international and foreign national waters of the central and western Pacific, assess bycatch in those fisheries, and cooperate with regional fishery management organizations to reduce bycatch to safe levels. Finally, the Commission noted that it and the Service need to pay more attention to the Marine Mammal Protection Act provision that requires countries seeking to export fish or fish products to the United States to meet U.S. standards with respect to interactions between their fisheries and marine mammals.

The Service responded, agreeing that additional effort is necessary to obtain accurate, regional bycatch estimates and that it will require cooperating with regional fishery management organizations. The Service described some actions that it has taken with the Western and Central Pacific Fisheries Commission, the Forum Fisheries Agency, the Secretariat of the Pacific Community of Oceanic Fisheries Programme, and several Pacific island nations to make such improvements. The Service also reported that during 2010 it would be developing procedures to address the question of compliance of foreign fish-importing countries with U.S. requirements with respect to fishery interactions.

Marine Mammal Commission annual meeting—2011

The Commission held its 2011 annual meeting in New Orleans and focused on marine mammal issues in the Gulf of Mexico, especially as related to the Deepwater Horizon oil spill (Figure VII-12). Based on input from regional experts received during the meeting, the Commission sent a letter to the National Marine Fisheries Service highlighting three important fishery interaction issues.

Figure VII-12. Deepwater Horizon oil slick (Source: NOAA)

Fishery observer coverage

Assessing the significance of fishery-related takes in the Gulf of Mexico is difficult because the Service's monitoring efforts have not been sufficient to characterize the status of the stocks potentially affected or the nature, rate, and frequency of interactions. A number of Gulf fisheries may have significant effects on cetacean stocks. The Service has increased observer coverage on the worst of these (a Category I pelagic longline fishery) from 10 percent in 2006 to 22 percent in 2009, but others known or suspected of interacting with marine mammals (i.e., Gulf gillnet, shrimp trawl, purse seine, trap/pot fisheries) are not monitored adequately or

not monitored at all. Furthermore, the Service has provided estimated potential biological removal levels for only two of the stocks known or thought to interact with these fisheries.

Representatives from the Southeast Fisheries Science Center described the Center's 2008 strategic plan for determining marine mammal stock structure and abundance, potential biological removal levels, and fishery mortality and serious injury rates. They could not describe how the Service would accomplish those objectives absent more resources. To address this concern, the Commission recommended that the Service work with the states, industry, and conservation organizations to develop a realistic but aggressive strategy for characterizing the extent and significance of marine mammal mortality and serious injury caused by Gulf of Mexico fisheries. The Service replied that in July 2009 it held a meeting of staff of the Office of Protected Resources, Southeast Regional Office, and Sustainable Fisheries, NOAA Fisheries, to address the problem of recreational fishery interactions with bottlenose dolphins. The outcome of the meeting emphasized the need for stronger outreach efforts to recreational and commercial fishermen. In the correspondence following the Commission's annual meeting, the Commission and Service agreed that greater precision is needed to describe marine mammal/fishery interactions in the Gulf of Mexico. The two agencies also agreed that increasing observer coverage was one way to improve precision, but others—such as matching observer coverage to spatio-temporal variation in take rates—also must be considered.

Research and relocation trawls

Fishery-related federal and state research trawls, and sea turtle relocation trawls have seriously injured or killed marine mammals in the Gulf of Mexico. The Service has documented the taking of 22 bottlenose dolphin in research gillnets since 1984 and 10 interactions with research and relocation trawls. The agencies conducting gillnet research and relocation trawls (e.g., the Service, Army Corps of Engineers, Texas Parks and Wildlife) have neither obtained incidental take authorizations for those activities nor assessed their interactions with dolphins, and it is not clear what—if any—steps they have taken to avoid or minimize such interactions. In the Commission's meeting, a representative of the Service described the processes and protocols for working with other agencies to assess incidental marine mammal takes during research or relocation trawls. To the Commission's knowledge, the agencies involved have not yet engaged in those processes and protocols. Indeed, the agencies appear to be out of compliance with the Marine Mammal Protection Act. To address that problem, the Commission recommended that the Service (1) engage the Army Corps of Engineers, Texas Parks and Wildlife, and any other agencies or organizations that take marine mammals incidentally using research gillnets or relocation trawls, (2) review their responsibilities for obtaining letters of authorization for incidental takes of marine mammals, and (3) take the steps needed to comply with this requirement, report any takes that occur, and develop and implement best practices for avoiding such takes. The Service replied that it has engaged with and established partnerships with a range of other entities regarding observer programs.

Recreational fishing and boating interactions

Substantial recreational fishing occurs in the Gulf of Mexico from shore, party/charter vessels, and private or rental operations. Marine mammal species that occur close to shore are more likely to interact with recreational fishers. Marine mammals may be hooked by recreational fishing gear and also may steal bait and already caught fish (referred to as depredation). The population consequences depend on the rate of such interactions, their consequences (i.e., are they lethal), and the size of the affected marine mammal population. At its meeting the Commission expressed concern that a lack of information on the frequency and severity of recreational fishery interactions precludes a reliable analysis of their impacts on marine mammal stocks. The Commission then noted that the first step would be to characterize the interactions—that is, the manner and frequency with which they occur and the species or stocks affected. The Commission acknowledged the efforts that the Service has made toward this end, and encouraged it to continue and expand those efforts.

Figure VII-13. NOAA billboard intended to discourage feeding of wild dolphins (Source: NOAA)

In addition, the Commission expressed concern over the increasingly common practice of discarding fish overboard and otherwise attracting dolphins to fishing and recreational vessels. To address this concern, the Commission recommended that the Service increase outreach and enforcement efforts to prevent feeding of marine mammals by commercial and recreational fishermen and develop measures to control regulatory and other discards to avoid attracting dolphins (Figure VII-13).

The recreational boating fleet also engages in dolphin feeding activities to attract dolphins so that tourists can observe them or swim with them. These activities pose a risk to the dolphins and the people who enter the water with them. To address this concern, the Commission recommended that the Service (1) seek opportunities to partner with states, waterfront managers, and the recreational boating industry to gather information on dolphin feeding and attraction activities and (2) review its outreach and enforcement efforts to determine how they might be more effective. The Service responded that it has been implementing a feeding and harassment outreach and enforcement plan since 2006. It has discovered that feeding occurs regularly by recreational and commercial fishermen throughout the Gulf of Mexico. Consequently, the Service stated that it is planning to develop a feeding outreach and enforcement plan in 2012 that will focus on areas with the highest frequency of feeding activity. The Service stated that it cannot yet develop a program to control regulatory discards because of a lack of information on discards and complexity of associated dolphin behavior, and the complexity that would be required for developing effective regulations. The Service also highlighted partnerships that it has with several entities to gather information on feeding activities, develop outreach materials, bring experts together, conduct research, and to implement the Dolphin SMART program in Florida.

National Standard 2

On 11 December 2009 the Service released its proposed rule on the guidelines for National Standard 2 of the Magnuson-Stevens Fishery Conservation and Management Act (74 Fed. Reg. 65724). This standard directs the Service and eight regional fishery management councils to base conservation and management measures on the best scientific information available. The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 directed that harvest limits be set based on the advice of fishery scientists and it established a peer-review process to ensure that the councils have the benefit of the best

available scientific information. In response to the reauthorization, the Service proposed to revise the existing National Standard 2 guidelines and to establish new guidelines for scientific peer review. The Commission, which is charged with overseeing federal actions that affect marine mammals and the ecosystems upon which they depend, expressed its general support of efforts to ensure adherence to the highest scientific standards in managing fisheries and marine ecosystems, and provide the Service with the following specific comments.

Using ecological information

The Commission argued that the requirement to use the best scientific information available should apply to all aspects of fishery management. To ensure effective management of fisheries and fished ecosystems, fishery scientists and ecologists must provide information on such variables as the abundance (or biomass), distribution, and population dynamics of the target species, as well as their natural history and ecological relationships. In addition, to inform managers about the socioeconomic consequences of their decisions, social scientists and economists must provide information on fishing practices and the individuals, companies, and communities that depend on fishing. Although the proposed rule acknowledged the need to collect, analyze, and apply biological, economic, sociological, and ecological information, it provided little guidance to managers who must consider and use this information, particularly as it pertains to ecosystem science. As the nation's marine policies move toward ecosystem-based management, fishery managers and fishery management councils also should operate under scientific guidelines consistent with, and supportive of, that approach. Therefore, to advance an ecosystem-based approach to fishery management, the Commission recommended that the Service include further direction in the proposed revised guidelines for fishery managers to use scientific information at the ecosystem level.

Principles for evaluating the best scientific information

The Commission noted that the principles for evaluating the best scientific information—relevance, inclusiveness, objectivity, transparency, openness, timeliness, verification and validation, and peer review—put forth in the proposed revisions are sound and widely accepted. The Commission also noted that the National Research Council (2004) recommended a similar suite of guidelines for identifying best scientific information available rather than a static, inflexible, and overly prescriptive approach because information that is considered relevant and inclusive, for example, will evolve through scientific inquiry. The Commission encouraged the Service to retain the above principles in the final guidelines, and noted that verification and validation—the assurance of sufficient data documentation and proper performance of analytical methods, respectively—are particularly important in fishery and marine ecosystem modeling.

Contending with uncertainty

Given the inherent complexity and potential significance of the biological, ecological, and socioeconomic information involved in fisheries science and management, the Commission argued that, for even the best scientific information, scientists must describe any and all the associated uncertainty, sources of error, and limitations (both individually and in combination). Managers must understand the potential significance of that uncertainty and account for it in their fishery management decisions. In particular, full disclosure of uncertainties and associated risks should help managers make prudent and appropriately cautious management decisions. Consequently, the Commission recommended that the Service retain language emphasizing the importance of evaluating uncertainty, identifying gaps in information, and recognizing the associated risks of moving forward with management actions poorly supported by scientific information. Further, the Commission recommended that the Service promote a

more cautious interpretation of findings where uncertainty is high to (1) ensure conservation of data-poor species and (2) provide an incentive to collect the necessary information.

Peer review

Peer review is an important tool for evaluating scientific uncertainty and determining what scientific information constitutes the "best available." The framework for the peer-review process, outlined in the proposed revised rule, enables scientists and managers to tailor review processes to specific information needs, ensure timeliness, properly define the scope of work, ensure expertise and balance in reviewers, minimize conflicts of interest, maximize independence, and strive for transparency—all consistent with widely accepted standards for promoting integrity in scientific research (see the Final Information Quality Bulletin for Peer Review, published in 2004 by the Office of Management and Budget, 70 Fed. Reg. 2664). Therefore, the Marine Mammal Commission recommended that the Service retain the framework and work with fishery management councils to determine if, when, and how peer reviews should be conducted.

Conflicts of interest

Avoiding or minimizing actual or perceived conflicts of interest is an essential element of the peer-review framework. The proposed revised framework defined conflicts of interest and established full-disclosure requirements for minimizing such conflicts when they cannot be avoided. The proposed revised process would require members of fishery management council scientific and statistical committees to meet conflict-of-interest criteria if and when they serve on peer-review committees. Because real or perceived conflicts of interest may undermine the quality and integrity of any advice or findings that result from the review, the Commission recommended that the Service retain the conflict of interest provisions in the final rule, and ensure that they apply to all peer reviewers, including scientific and statistical committee members.

Stock assessment and fishery evaluation (SAFE) reports

SAFE reports provide important scientific information to councils and the public. The proposed guideline revisions included clarification of the purpose and content of those reports. The Commission considers them valuable documents but expressed concern with two elements of the proposed revisions.

First, the proposed rule stated that "the Secretary or council may utilize any combination of personnel from council, state, federal, university, or other sources to acquire and analyze data and produce the SAFE report." However, it did not contain any instructions for disclosing the source(s) of information, nor did it include any requirements for the SAFE report to undergo a separate peer review. The Commission found this to be a troubling oversight, considering that the Secretary can include any new information, from any source, that becomes available. Therefore, the Commission recommended that the Service include requirements for the Secretary to disclose the source of any information included in a SAFE report and conduct a targeted peer review of new information included in the document.

Second, the proposed rule described information that SAFE reports should contain. The information required at the target species and stock levels was exhaustive, whereas the information at the ecosystem level was sparse, at best. The Commission argued that a SAFE report should include a robust assessment of fishery effects on the ecosystem, including habitat alterations and indirect or ecological effects on other species, including marine mammals and other protected resources. To that end, the Commission recommended that the Service require more thorough assessments of marine ecosystems in SAFE reports.

Fish Imports to the United States

In 2010, the United States imported 5.5 billion pounds of edible fish products worth 14.8 billion dollars, 61 percent of which came from Asia (National Marine Fisheries Service 2011). In contrast, the amount of all commercially landed edible fish and shellfish in the United States that year was 6.5 billion pounds valued at $4.4 billion. Imports have increased by roughly 30 percent in the last decade.

On 30 August 2010 the Service published an advance notice of proposed rulemaking to implement section 101(a)(2) of the Marine Mammal Protection Act concerning imports of fish and fish products (75 Fed. Reg. 22731). In the notice, the Service described several standards applicable under the Marine Mammal Protection Act and the Endangered Species Act that can be used to evaluate the impact of foreign fisheries on marine mammals. The Commission responded on 4 March 2010 with the following background, recommendations, and rationale.

When it enacted the Marine Mammal Protection Act in 1972, Congress recognized the importance of promoting marine mammal protection beyond U.S. waters. Section 101(a)(2) of the Act (16 U.S.C. § 1371(a)(2)) directs the Secretary of the Treasury to "ban the importation of commercial fish or products from fish which have been caught with commercial fishing technology which results in the incidental kill or incidental serious injury of ocean mammals in excess of United States standards." That provision further directs the Secretary of Commerce to "insist on reasonable proof from the government of any nation from which fish or fish products will be exported to the United States of the effects on ocean mammals of the commercial fishing technology in use for such fish or fish products exported from such nation to the United States." Although these requirements have been included in the Act since 1972, implementing regulations have never been promulgated and the provision has been used only rarely.

On 5 March 2008, the Center for Biological Diversity and the Turtle Island Restoration Network submitted a petition to the Departments of Homeland Security, Treasury, and Commerce to compel those agencies to carry out their "non-discretionary" duties under section 101(a)(2) of the Act with respect to swordfish imports. On 15 December 2008 the Service published a notice describing the petition and seeking information and comments from the public. On 29 January 2009 the Commission submitted comments stressing the importance of quantitative and performance standards in evaluating the actions and marine mammal take levels of nations seeking to export fish to U.S. markets. The Commission also stressed the immediate collection of marine mammal bycatch and enforcement information from those nations seeking to export swordfish products, directly or as an intermediary exporting nation, to the United States.

The Service's resulting advance notice of proposed rulemaking (75 Fed. 22731) invited public comment on potential standards that it could apply to other nations in evaluating whether or not their fisheries result in excessive incidental killing or serious injury of marine mammals relative to U.S. standards, as well as procedures for applying those standards. In its 30 August 2010 response the Commission stressed, first and foremost, the need to observe faithfully the statutory mandate and legislative intent in defining those standards and processes. The Commission also noted the importance of defining those standards clearly and consistently so that they are readily apparent to other nations, flexible enough to allow the standards to be met through the management systems unique to each nation (which vary in terms of available information, stock status, fishing practices, and management measures), and verifiable through acceptable forms of proof or evidence. Those criteria would help facilitate trade among nations that would reduce bycatch to meet U.S. standards. At the same time, the Commission noted the urgency of developing these standards and procedures, given the immediate threats facing marine mammals from foreign fisheries, the need to satisfy this as-yet-unrealized congressional mandate, and the potential for fishery imports to be enjoined or limited through legal action because foreign nations are unable to demonstrate that their marine mammal bycatch does not meet unarticulated U.S. standards. The Commission stated its belief that prompt issuance of regulations to implement section 101(a)(2) would facilitate global marine mammal conservation by providing incentives for other nations to take concrete steps to protect marine mammal stocks encountered by their fisheries. Such regulations also would have

the effect of ensuring that U.S. fishermen—who are required to use or abide by bycatch-reduction measures, such as caps on effort and potentially costly gear modifications—are not put at an economic disadvantage relative to those nations that do not implement effective conservation measures.

Standards

In its advanced notice of proposed rulemaking, the Service described nine options for defining standards and stated that it may proceed with any one or a combination of them. Several, but not all, of the options were performance-based standards or were defined on the basis of the outcome or achievements of marine mammal stock protection measures required by existing U.S. statutes. Such standards ensure that the focus is on the health or status of marine mammal stocks and have the added benefit of allowing fishing nations to use a range of management measures or regulatory programs appropriate to their specific conditions. Proven practices, technologies, and programs for reducing marine mammal bycatch can then be passed on to other nations.

The Commission also recommended that the Service collaborate with relevant trade-related offices in the Departments of the Treasury, State, and Homeland Security as well as the U.S. Trade Representative, to analyze the feasibility of proposed performance-based standards. Such analyses should ensure the standards would be sound, clear, consistent, uniformly applicable, and easily verifiable.

The Service stated its intent "to select only standards and associated criteria that have been met by U.S. domestic fisheries" (75 Fed Reg. 22733). However, the Commission noted that the Act refers to applicable U.S. standards, not the actual performance of U.S. fishermen in meeting those standards. Therefore, the Marine Mammal Commission recommended that the Service include in the feasibility analyses all of the standards applicable to U.S. fisheries, regardless of whether those standards have yet to be met fully by U.S. fisheries.

In addition, the Commission recommended that the Service develop its proposed rule with sufficient detail to allow for meaningful comment and, if the rule were adopted, create regulations to provide sufficient direction to other countries, agency reviewers, and the public as to what information they would be required to submit and how that information would be evaluated. The Commission also recommended that the Service specify that fish-exporting nations provide "reasonable proof" of the effects of their fishing operations on marine mammals. Presumably, countries would be required to submit not only summary information on the number of deaths and serious injuries that occur but also an explanation for how those levels were determined.

Finally, the Commission raised the question of whether imports from an exporting nation should be banned until that nation demonstrates that the fish to be traded were caught in a way that was consistent with U.S. standards, or whether a ban should be imposed only after the Secretary has determined that excess marine mammal mortality and serious injury have occurred. The Commission noted that one part of the Act suggests that the Secretary of the Treasury is to impose a ban only after a problem has been identified. However, another section indicates an affirmative duty on exporting countries to demonstrate that the fish were caught in a way that is consistent with the requirements of the Act. Therefore, the Commission recommended that the Service specify where the burden of proof lies with respect to imports of fish and fish products.

Procedures

The Service stated that it was considering (1) a process for evaluating bycatch in fisheries that supply products for exporting to the United States that would be consistent with the domestic approach for managing marine mammal bycatch and (2) a process for assessing and certifying nations for bycatch of marine mammals. It indicated that these processes would be based on the Marine Mammal Protection Act or the High Seas Driftnet Fisheries Moratorium Protection Act (16 U.S.C. 1826k). The Commission acknowledged the Service's interest in using existing processes and agreed that it may be reasonable and prudent to adopt them to the extent that they are consistent with section 101(a)(2) of the Marine Mammal

Protection Act. However, the Commission identified critical differences between the processes described in the two Acts, most notably with respect to the degree of consultation, the opportunity to take remedial action, and the immediacy of any import ban.

Given the directives in the Marine Mammal Protection Act, the Commission recommended that the Service establish regulatory procedures under which fish-exporting nations must submit promptly the required level of proof concerning the effects that each applicable commercial fishery is having on marine mammal mortality and serious injury relative to U.S. standards. The Commission further recommended that the Service require that any findings of non-compliance or inadequate proof be forwarded immediately to the Secretary of the Treasury so that the U.S. government can take the steps necessary to ban fish imports from offending nations.

The Commission also noted that fisheries bycatch has been identified as the leading human-related cause of marine mammal mortality worldwide, and highlighted the compelling need to reduce such mortality in foreign fisheries. The Commission offered that the United States should work aggressively to reduce marine mammal bycatch in those fisheries using all tools at its disposal. It recommended that the Service consult as soon as possible with those nations whose fish products are banned from U.S. markets to identify and rectify the causes of marine mammal bycatch in excess of U.S. standards, with the dual goals of protecting marine mammals and resuming trade.

The Secretary of Commerce is responsible for receiving and reviewing information on fishing practices and their effects on marine mammals. The Secretary of the Treasury is required to ban the importation of fish and fish products caught using fishing technology that results in excess take. How those responsibilities mesh with one another is not clear, nor is it clear what steps the Secretary of the Treasury must take to impose an importation ban once a determination of excess mortality and serious injury has been made. The Commission, therefore, recommended that the Service work closely with the Treasury Department to identify ways in which the envisioned regulations would address both the procedures for assessing the effects of foreign fisheries on marine mammals and those for imposing or lifting import bans accordingly.

Finally, the Service sought comments on whether the processes should apply to intermediary nations or those that re-export fish or fish products to the U.S. from fisheries conducted by other nations. The language of the Act is clear in this regard—its provisions apply to any nation seeking to export fish or fish products to the United States. It contains no language to suggest that these requirements are limited to fishing nations. A loophole under which non-compliant fish and fish products could be "laundered" through intermediary nations and imported into the United States would run counter to the fish import provision and the purpose of the Act to protect marine mammals. Therefore, the Commission recommended that the Service require any nation seeking to export fish products, or any intermediary nation seeking to re-export fish or fish products, to the United States to provide documentation or evidence regarding marine mammal bycatch in the harvest of those products relative to U.S. standards.

Illegal, Unregulated, and Unreported Fishing

Illegal, unregulated, and unreported (IUU) catch amounts to roughly 27 percent of the global catch by all fisheries (Pauly 2008). On 11 January 2009 the Service released a proposed rule (75 Fed. Reg. 1324) that would implement international conservation and management measures adopted by regional fishery management organizations and aimed at vessels engaged in IUU fishing. In a 4 March 2010 letter to the Service, the Commission expressed its support for efforts to deter and prevent such activities and provided a number of detailed comments described below. For the most part, the Service's final rule (27 September 2010, 75 Fed. Reg. 59136) did not respond to the Commission recommendations.

Combating IUU fishing is a considerable challenge. Such fishing is an elusive yet lucrative practice that undermines the effectiveness of international conservation and management of international fish stocks and protected species. Conservation and management also may be confounded by the diversity of measures in place and the varying definitions of IUU fishing adopted by different regional fishery

management organizations, inconsistency and lack of clarity regarding the relationship of domestic and international policies, and the design of the interagency consultations that may lead to port denials. The measures also may be of limited use if the vessels that may be sanctioned under the proposed regulations are constrained by vessel size limits, the accuracy and completeness of each organization's offending vessel list, and the fact that some bodies, such as the parties to the Agreement on the International Dolphin Conservation Program, have not yet developed such lists.

Regional fishery management organizations with lists of vessels engaged in IUU fishing have adopted measures including port denial and vessel inspections, and they have identified the conditions under which those sanctions may be applied. Nonetheless, the diversity of existing measures can complicate efforts to create uniform and streamlined international policies where needed. To address this concern, the Commission recommended that the Service work closely with the Department of State to promote greater consistency in deterrence and prevention measures authorized under different regional fishery management organizations. The Service did not respond to this recommendation.

Figure VII-14. An IUU fishing vessel in Gabon, Africa (Source: NOAA)

Regional fishery management organizations also may vary in their definitions of IUU fishing. In this regard, the Commission recommended that the Service work with the Department of State to encourage regional fishery management organizations to adopt consistent definitions comparable to that of the U.S., including provisions for listing vessels with unauthorized or unsustainable bycatch of marine mammals and other protected species. The Service did not respond to this recommendation.

The success of any regulations imposed will hinge on the ability of regional fishery management organizations to identify and list offending vessels (Figure VII-14). The listing processes may be complicated, slow, and subject to internal dispute, potentially limiting U.S. options for applying sanctions to certain vessels. Cases likely will arise in which the United States has evidence of IUU fishing by vessels that are not listed by any organization, and the United States should not be precluded from taking action against those vessels. To identify and eliminate possible gaps in the coverage under existing statutes, the Commission recommended that the Service review its current legislative authorities for imposing sanctions in cases where the United States has sufficient evidence of IUU fishing by vessels not listed by any fishery management organization or where the activities of such vessels are in dispute and, to the extent that any gaps in authority are identified, recommend amendments to close them. The Service did not respond to this recommendation.

The interagency consultative processes that govern U.S. actions regarding offending fishing vessels are complex. Under the proposed rule, the Service would receive notice that a foreign vessel intends to land in a U.S. port and it would then consult with the U.S. Coast Guard, Department of State, and possibly Customs and Border Protection and the Office of the U.S. Trade Representative to determine the most appropriate response. The proposed rule provided little information on the mechanics of this consultation, such as how and when decisions would be made and how disputes or contradictory information would be addressed. It also was vague with regard to response alternatives. Because the effectiveness of this policy depends on making timely and justifiable decisions, the Commission recommended that the Service clarify the specific steps to be taken during the interagency consultative

process to determine whether to deny a specific vessel access to a port or commercial transactions. Further, given the broad discretion that would be available to the Assistant Administrator for Fisheries in making the determinations, the Commission argued that decisions must be transparent. To that end, the Commission also recommended that the Service provide notice and explanations for actions taken pursuant to these regulations, whether access is denied or not, because such information would enable interested parties to assess the effectiveness of these regulations and help raise awareness about efforts to combat IUU fishing. The Service agreed that actions stemming from this rule should be as transparent as possible. It described some of the steps involved in the consultative process, referred to some of the actions that the agencies are required to undertake, and noted that the process would conform to the Department of Homeland Security's Maritime Operational Threat Response Plan. However, the Service did not agree to the specific recommendations made by the Commission.

The Commission expressed concern that the proposed regulations may not have been sufficiently comprehensive. Specifically, the advance notification requirements for interagency consultation apply only to vessels greater than 300 gross tons. Smaller vessels, which may contribute significantly to this kind of fishing, might not be managed effectively. To address this concern, the Commission recommended that the Service support ongoing U.S. Coast Guard efforts to eliminate the notification exemption for foreign vessels less than 300 gross tons to help ensure comprehensive screening of all commercial vessels seeking access to U.S. ports. The Service did not respond to this recommendation.

Finally, when the rule was proposed the parties to the Agreement on the International Dolphin Conservation Program had not developed a list of vessels engaged in IUU fishing despite an established listing mechanism and the availability of information needed to compile a list. That agreement calls for an international review panel to set dolphin mortality limits on a vessel-by-vessel basis, requires observation of all of vessels in the fishery, and uses the review panel to evaluate any infractions. The agreement provides the option of denying a vessel a new dolphin mortality limit if it has exceeded its past limits. The Commission recommended that the Service convey to member nations of the agreement the importance of creating a provisional list of vessels engaged in IUU fishing at the program's annual meeting in June 2010. The Service did not respond to this recommendation.

National Aquaculture Policy

From 2000 to 2009 global marine aquaculture production rose from 11.9 to 17.6 metric tons. From 2004 to 2009 aquaculture production in the United States was valued at $1.1 to $1.2 billion but declined from 880 to 724 thousand pounds (National Marine Fisheries Service 2011). In contrast, U.S. production is a small portion of the total U.S. fishery market (one tenth the size of commercial landings), but is expected to increase significantly in coming years (Olin et al. 2012). The marine aquaculture industry may have a number of environmental effects caused by such things as escapement, effluents, eutrophication, habitat loss, disease/parasite transfer, and forage fish depletion (Diana 2009), all of which may have implications for marine mammals or their habitat.

In early 2010 the National Oceanic and Atmospheric Administration (NOAA) sought input and advice regarding the development of a draft national aquaculture policy, to which the Commission provided ideas and comments in July of that year. In February 2011, NOAA released a draft policy for public comment, but has not yet produced the final policy.

Statutory and regulatory considerations

The Commission began its comments by suggesting that any authorizing legislation and implementing regulations associated with a national aquaculture policy should recognize the complex legal framework for managing other activities in the marine environment and strive for clarity and compatibility across uses. It also suggested that aquaculture policy should recognize that aquaculture operations are not commercial fisheries, in the traditional sense, and do not fit well under existing

fisheries legislation. The Commission recommended that, in developing its aquaculture policy, NOAA clarify that aquaculture operations do not constitute "fishing" for purposes of the Magnuson-Stevens Fishery Conservation and Management Act and recognize the need for a separate statutory and regulatory regime to govern aquaculture activities.

The Marine Mammal Protection Act does not define the term "fishery" but it does refer to the definition of a fishery found in the Magnuson-Stevens Fishery Conservation and Management Act. That definition and past interpretations by NOAA are consistent with the view that fishing and aquaculture should be treated differently. Therefore, the Commission recommended that the national policy specify that aquaculture activities do not constitute commercial fishing operations for purposes of the Marine Mammal Protection Act. The clarification could be accomplished either through statutory changes or by revisions of the National Marine Fisheries Service's implementing regulations.

Incidental take of marine mammals

Aquaculture can take marine mammals in a variety of ways ranging from harassment to injury, and even death. Aquaculture facilities may attract marine mammals seeking potential prey (Figure VII-15). At those facilities, they may encounter risks such as nets, contaminants, disease, parasites, and deterrence measures. Although well-designed, well-constructed, and well-managed aquaculture operations should have a low probability of causing the serious injury or death of a marine mammal, the performance of many facilities has fallen short of this ideal.

Figure VII-15. Aquaculture pen (Source: NOAA)

If NOAA were to manage aquaculture activities under the Marine Mammal Protection Act incidental take regime for commercial fisheries, it would give aquaculture facilities virtually unlimited authority to engage in sub-lethal types of taking (e.g., harassment or exclusion from important habitat) without any responsibility to mitigate the potentially significant impact of their operations on marine mammals. Some facilities use high-powered acoustic harassment devices or other deterrents to prevent marine mammals from approaching and trying to enter enclosures. Although such deterrents may effectively discourage marine mammal depredation, they also may affect marine mammal hearing and behavior. Such takes are excluded from consideration under the Marine Mammal Protection Act as long as they do not kill or seriously injure marine mammals, unlike the production of high-intensity sound by the U.S. Navy or those conducting seismic surveys. Therefore, the Commission recommended that NOAA shape its aquaculture policy to exclude aquaculture facilities from coverage under section 118 of the Marine Mammal Protection Act and require those using high-powered acoustic or other deterrent devices likely to take marine mammals to obtain incidental taking authorizations under sections 101(a)(5) or 101(a)(4) of the Act.

The Commission also encouraged NOAA to think broadly about other possible impacts of aquaculture operations on marine mammals, noting that siting, constructing, discharging wastes from, servicing, and decommissioning aquaculture facilities could have impacts in other, less obvious ways. Because these types of impacts may be unique to aquaculture operations, the Commission recommended that NOAA's aquaculture policy not rely entirely on section 101(a)(5) to address possible impacts on marine mammals but adopt additional measures as necessary to mitigate all possible effects on marine mammals.

Ecosystem effects

To that end, the Commission expressed its view that NOAA must look beyond possible operational effects and also consider the broad ecosystem effects of aquaculture and its associated activities. The Commission noted that the concentration of fecal matter, unconsumed food, assorted chemical additives, and the possible introduction of various diseases may affect not only marine mammals but also entire biological communities and food webs around the aquaculture site. The Commission recommended that NOAA develop standards and requirements for aquaculture facilities to limit discharge of aquaculture byproducts—including fish or shellfish wastes, feeds, and antibiotics or other chemicals—to levels determined to be safe for the affected biological communities including, but not limited to, marine mammals.

Aquaculture also poses a risk of altering the abundance of wild fish stocks that are important in their own right but also constitute the forage base for marine mammals. For example, the harvesting of forage fish to feed predatory aquaculture species means that those forage fish are no longer available as prey for marine mammals. Therefore, the Commission recommended that NOAA craft its policy to ensure that the foods used for cultivated stocks are derived from sustainable sources that do not deplete the wild forage base for marine mammals or other marine species.

Finally, aquaculture also poses a risk that cultivated fish may escape and then interact with their wild counterparts, where they may compete for food, transmit disease, or interbreed and thereby alter the genetic composition of the wild stock. The Commission pointed out that such effects could have secondary consequences for marine biological communities via ecological interactions including predation, competition, and transmission of disease, and that the implications for marine mammals could be serious, particularly for endangered or threatened marine mammal stocks. To avoid such ecological consequences, the Commission recommended that NOAA establish and uphold rigorous standards and requirements for design, construction, and maintenance of aquaculture facilities, including reliable measures for preventing the escape of cultivated stocks.

Integration of marine mammals and aquaculture in marine spatial planning

Spatial considerations will be an important determinant of the long-term consequences of aquaculture in U.S. waters, and, for that reason, NOAA must develop its aquaculture policy in a manner that is consistent with and fully integrated into the Administration's coastal and marine spatial planning framework. Given the potential application of the framework to aquaculture, the Commission recommended that NOAA delay completion of its aquaculture policy until the coastal and marine spatial planning framework has been approved by the President and NOAA has confirmed that all aspects of its policy are consistent with the framework. In addition, the Commission recommended that NOAA implement its aquaculture policy in a manner that takes into account the best available scientific information on the spatial distribution, movement, and habitat-use patterns of marine mammals.

Research and monitoring priorities

The national aquaculture policy must find ways to facilitate economic activity in the marine environment while ensuring that the environment is adequately protected, a challenge made more complicated by scientific uncertainty. NOAA must secure funding for scientific research into the potential problems surrounding aquaculture development. Because of scientific uncertainty, attempts to minimize or mitigate these environmental impacts are limited, often to the disadvantage of marine mammal populations. NOAA must be precautionary in such matters if it is to be consistent with the Administration's developing ocean policy. To address the need for adequate scientific information, the Commission recommended that NOAA include in its aquaculture policy a clear description of the existing

gaps in the scientific information needed to manage aquaculture, the research required to address those gaps, and the funding required to support the research.

One of the most important types of information to be collected pertains to the nature, frequency, and significance of aquaculture/marine mammal interactions. The most effective means of evaluating such interactions and identifying possible unforeseen effects is by imposing monitoring and reporting requirements on aquaculture operators. Therefore, the Commission recommended that NOAA include in its policy a requirement that each permit for an aquaculture facility include a monitoring program adequate to detect and record the nature and frequency of direct interactions between facility operations and marine mammals.

NOAA has not yet provided a detailed response to the Commission's comments, although it will presumably do so when it issues the final policy. However, in July 2010 NOAA responded generally, recognizing the potential importance of a domestic aquaculture industry in reducing dependency on imports but also stated its commitment to managing the industry to maintain healthy and productive ecosystems, including the marine mammals that depend on those ecosystems. NOAA assured the Commission that its aquaculture policy will be comprehensive, enable sustainable aquaculture activities, protect ocean resources, safeguard ecosystems, and protect marine mammals.

Steller Sea Lion Section 7 Consultation

Beginning in the mid to late 1970s the Steller sea lion population began to decline throughout much of its Alaskan range. In 1990 the National Marine Fisheries Service listed it as threatened under the Endangered Species Act and in 1997 the Service divided the population into two distinct population segments, changing the status of the western segment to endangered and continuing the status of the eastern segment as threatened. A variety of potential causes have been examined to explain the ~80 percent decline, and after considerable scientific investigation, the primary factors of concern have focused on large-scale oceanic regime shifts (i.e., changes in oceanic conditions), predation by killer whales, and competition with the Alaska groundfish fisheries. Since the late 1990s the Service has conducted several section 7 consultations on the fisheries that have led to a finding of jeopardy or adverse modification of Steller sea lion critical habitat. In recent years, much of the focus has shifted to the portion of the western distinct population segment occurring in the western Aleutian Islands, as that portion has continued to decline despite stabilization of the overall segment in other regions. The debate over the effects of fishing and other factors has yet to be fully resolved. Chapter IV of this report provides a detailed description of the Steller sea lion and efforts to identify the cause of its decline and promote its recovery.

Pinniped-fishery Interactions: Bonneville Dam

Certain seal and sea lion populations in U.S. waters have increased substantially since passage of the Marine Mammal Protection Act. Reports of seal and sea lion interactions with commercial fisheries and protected stocks of salmon also have increased, especially on the U.S. West Coast. In 1994 Congress added section 120 to the Marine Mammal Protection Act to address concerns about predation on depleted salmonid stocks. Section 120 allows states to apply to the Secretary of Commerce to obtain authority for lethal taking of individually identifiable pinnipeds that are having a significant negative impact on the decline or recovery of certain salmonid fishery stocks. These fish stocks must either be (1) listed under the Endangered Species Act, (2) approaching threatened or endangered status, or (3) migrating through the Ballard Locks at Seattle, Washington. Section 120 requires the National Marine Fisheries Service to review a state’s application and, if the application contains sufficient information, establish a pinniped-fishery interaction task force. The task force evaluates the situation, provides advice on whether the pinnipeds are having a significant negative impact on the decline or recovery of the particular fish stocks, and offers recommendations regarding research and management needs.

Establishment of a task force

Under the protection provided by the Marine Mammal Protection Act of 1972, pinniped populations on the U.S. West Coast have been increasing. In recent years managers have observed increased numbers of pinnipeds at Bonneville Dam. In 1997 the Oregon Department of Fish and Wildlife, with support from the National Marine Fisheries Service and the state of Washington, began capturing and marking California sea lions near the mouth of the Columbia River at Astoria so that they could monitor sea lion movements and behavior as related to their predation on salmonid species at and downriver from the dam. Since 2002 the Army Corps of Engineers' Fisheries Field Unit has assessed the presence and abundance of pinnipeds in the Bonneville Dam tailrace during spring months and has recorded observations of pinnipeds consuming fish, including salmonid species listed under the Endangered Secies Act.

In 2004 the Service, Corps, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, and Columbia River Inter-Tribal Fish Commission met to discuss non-lethal deterrent actions to stop pinniped predation on salmonids at Bonneville Dam. They decided to test the effectiveness of existing non-lethal methods for excluding sea lions from the fish passageways and deterring them from entering the tailrace. They initiated hazing activities in 2005 and expanded their efforts in 2006. Based on those efforts, they concluded that non-lethal alternatives would not be sufficient to reduce California sea lion numbers and predation rates at the dam and that predation was having a significant negative impact on the decline and recovery of endangered and threatened Columbia River salmonid stocks.

On 5 December 2006 the states of Washington, Oregon, and Idaho submitted an application to the National Marine Fisheries Service seeking authorization for lethal taking of California sea lions at the dam and urging the Service to form a task force to consider their request. In their application the states contended that predation by California sea lions is having a significant negative impact on the recovery of eight different Pacific salmon and steelhead stocks listed as threatened or endangered under the Endangered Species Act. They sought authority to remove by lethal means up to 1 percent of the potential biological removal level for California sea lions (about 85 animals per year) between 1 January and 30 June for an unspecified number of years. They also sought authority to remove any California sea lion seen above navigation marker 85, about five miles downstream from Bonneville Dam. Finally, they sought authority to remove individually marked sea lions known to have fed on salmonids at Bonneville Dam whenever and wherever they occur.

The Service found that the application presented sufficient evidence to warrant review by a pinniped-fishery interaction task force, which was convened and met three times in 2007. All but one of the task force members recommended that lethal removals be authorized under specific circumstances in the Bonneville Dam area. The one dissenting member thought that the information available to the task force failed to demonstrate that predation on salmonid stocks by pinnipeds was having a significant negative impact when compared with "much higher rates of take that [the Service] itself allows for fisheries and other extractive users." That member also questioned whether removing up to 85 sea lions per year would provide any appreciable benefit to the fish stocks and suggested that it may simply create a vacated foraging niche for other sea lions to exploit. The Commission commented on the states' application, the task force's recommendations, and the environmental assessment prepared by the National Marine Fisheries Service on its proposed issuance of lethal taking authority. Those comments are summarized in the Commission's annual report for 2008.

Issuance of the 2008 authorization

On 17 March 2008 the National Marine Fisheries Service issued Oregon and Washington an authorization to remove pinnipeds. The authorization was to be valid until 30 June 2012, at which time the Service could extend it for an additional five years. The 2008 authorization allowed the lethal removal of individually identifiable California sea lions that are having a significant negative impact on endangered and threatened salmonids, subject to certain terms and conditions. Sea lions subject to removal must be individually distinguishable either by unique natural markings or applied features such

as brands. Those sea lions that meet one of the following criteria were to be placed on a list of animals eligible for removal: (1) the sea lion was observed eating salmonids in the area below Bonneville Dam at any time between 1 January and 31 May, (2) the sea lion was observed in the area below Bonneville Dam on a total of any five days (whether in a single year or over multiple years), or (3) the sea lion was sighted in the area below Bonneville Dam after having been subject to active non-lethal deterrence efforts. At the time the authorization was issued, 61 sea lions were identified as meeting those criteria. The authorization limited the number of lethal removals allowed annually to no more than 85 sea lions, although that number may fluctuate in subsequent years as population estimates and the potential biological removal level change.

The Service also conditioned the authorization to require the states to establish an animal care committee composed of qualified veterinarians and biologists to provide advice on protocols for capturing, holding, and euthanizing predatory sea lions. Sea lions identified for lethal removal that are captured in traps had to be held for at least 48 hours before being euthanized while the states determine the availability of a Service-approved facility that would permanently maintain the animals in captivity. Free-ranging sea lions included on the list of animals approved for lethal removal could be shot by a qualified marksman if they were hauled out at certain locations or when they were in the water within 50 feet of the dam's power houses or the concrete apron below the dam. As practicable, the states were required to retrieve the carcasses of all sea lions that were shot. The carcasses or tissues from them were to be made available for use in scientific research or for educational purposes.

The authorization also required that the states develop and implement a monitoring plan and submit an annual monitoring report to the Service by 1 November of each year. After the third year of sea lion removals (i.e., in June 2011), the Service and the states were required to conduct a review to determine whether the predation rate on salmonids had decreased to below 1 percent of the observed fish passage at the dam. If so, no lethal removals would be authorized in the following year. As discussed in the following section on litigation, no pinnipeds were removed in 2008 because of a lawsuit. Seven sea lions listed as eligible for removal were captured for placement at public display facilities. However, one of these died while under anesthesia during health screening prior to transfer to a facility. In addition, six other animals (four California sea lions and two Steller sea lions) died after having been trapped unintentionally, likely related to organ failure associated with stress and heat prostration. These included one sea lion identified as eligible for lethal removal. Following that trapping incident, the states consulted with their animal care committee and revised the trapping and monitoring protocols to avoid similar problems in the future. No similar events occurred in 2009 or in subsequent years.

Legal challenge to the 2008 authorization

On 24 March 2008, the same day that the Service published notice of its original authorization (73 Fed. Reg.15483), the Humane Society of the United States and other organizations filed a lawsuit challenging the authorization. The plaintiffs alleged violations of the Marine Mammal Protection Act, the National Environmental Policy Act, and the Administrative Procedure Act. Because lethal removal could have begun on 4 April 2008 under the authorization, they also filed a motion for a preliminary injunction seeking to block any removals while the court considered the merits of their claims. The parties entered into an agreement delaying any lethal removals until 18 April so that the court would have time to consider the plaintiff's motion on an expedited schedule. In the meantime, the states were allowed to trap, mark, and relocate sea lions.

On 16 April the U.S. District Court for the District of Oregon found that the likelihood of success on the merits of the case tipped somewhat in favor of the plaintiffs but that the balance of likely harm did not. It therefore denied the request for a preliminary injunction, prompting the plaintiffs to seek an emergency stay of the ruling pending appeal. The Ninth Circuit Court of Appeals issued a stay on 23 April, agreeing with the lower court's interpretation that the likelihood of success on the merits favored the plaintiffs but, in contrast to the district court, it found that the balance of likely harm if a stay were not issued also weighed in the plaintiffs' favor. The appellate court noted that, by definition, any lethal taking

of sea lions would be irreparable. In addition, approval of a stay would affect only the 2008 salmon runs, which all parties to the litigation had agreed were expected to be unusually large. As had the lower court, the appellate court allowed non-lethal removals to go forward so that the states could trap problem sea lions and transfer them to zoos and aquaria that had offered to house them.

Meanwhile, the district court continued to consider the merits of the case. On 25 November 2008 it issued its opinion, finding in favor of the federal and state agencies named as defendants. The plaintiffs had contended that the Service's criteria for determining the significance of predation by sea lions under the Marine Mammal Protection Act was deficient because it failed to link the predation to an impact on the decline or recovery of salmonid stocks. The Service used the impact on the productivity of salmonids as a proxy for the decline or recovery of the stocks, and the court found that approach consistent with the language of the Act. Although legislative history provides some support for the plaintiffs view, the court concluded the statutory provision was clear on its face and, hence, it need not consider that history to resolve any ambiguities. Because Congress had not defined more precisely what would constitute a significant negative impact on the salmonid stocks, the court examined the Service's interpretation of the ambiguous statutory phrase, and concluded that the Service's interpretation and findings were reasonable. The court also deferred to the agency's interpretation of the statute in formulating the criteria to be used to identify the individual sea lions contributing the most to predation at the dam.

The plaintiffs also had noted that the take of salmonids by pinnipeds near Bonneville Dam is much smaller than takes from other sources, e.g. fisheries and hydropower actions that the Service has determined not to be significant under the National Environmental Policy Act and the Endangered Species Act. They argued that these pinniped takes likewise should be considered insignificant and therefore below the statutory threshold for triggering lethal removals. The court, however, saw no incongruity in using different standards of significance under the different statutes. It therefore ruled that the Service was not obligated to discuss and explain how previous decisions about the impact to salmonids from fishing activities or operation of the dam reached under these other statutes are consistent with its decision under section 120 of the Marine Mammal Protection Act.

The court also rejected the plaintiffs' contention that the Service should have prepared an environmental impact statement rather than an environmental assessment. The plaintiffs had argued that, if sea lion predation is considered to be significant for purposes of the Marine Mammal Protection Act, it should also be considered significant when assessing impacts under the National Environmental Policy Act, requiring a more thorough examination through an environmental impact statement instead of the environmental assessment developed by the Service. The court ruled, however, that the two statutes have entirely different foci and the Service could reasonably conclude that the impact of sea lion predation meets the significance criteria of one statute but not the other. In the court's view, the environmental assessment prepared by the Service adequately demonstrated that the sea lion population would not be adversely affected by the authorized removals although the salmonid stocks would likely benefit.

On 5 December 2008, the Humane Society and other plaintiffs appealed the district court's ruling to the U.S. Court of Appeals for the Ninth Circuit, seeking a stay of the district court order pending a review of the appeal. A separate panel of the appellate court on 26 February 2009 declined to reinstitute a stay on removing sea lions pending resolution of the case. As such, lethal removals were allowed to go forward in 2009 and 2010. In 2009, 10 individually identifiable California sea lions were euthanized and an additional 4 placed in public display facilities. In 2010, 14 additional California sea lions were euthanized.

On November 23, 2010, the appellate court issued its ruling. In examining the case, the court focused specifically on whether the Service had adequately supported its finding that sea lion predation was having a significant negative impact on salmonids at Bonneville Dam. The appellate court found that the Service had "not adequately explained its finding that sea lion predation is having a significant negative impact on salmonid decline or recovery in light of its positive environmental assessments of harvest plans having greater mortality impacts" (*Humane Society* v. *Locke* 626 F.3d 1040 (9th Cir. 2010)). The court also questioned the Service's lack of explanation as to why a predation rate of 1 percent was set as the dividing line between scenarios where pinnipeds were having significant versus insignificant impacts on

salmonids, and why a predation rate of 1 percent would no longer constitute a "significant negative impact" to fish stocks (*Humane Society* v. *Locke* 2010). In weighing the case, the appellate court cited the Commission's letters to the Service that had repeatedly urged the agency to compare mortality caused by sea lions with other concurrent sources of human-related salmon mortality in making a determination on the impact of predation. Based on these inconsistencies and omissions, the appellate court ruled that the Service's decision was "arbitrary and capricious" under the Administrative Procedure Act. The appellate court rejected the plaintiff's National Environmental Protection Act claim that the Service should have completed an environmental impact statement, but reversed the district court's ruling on the plaintiff's Marine Mammal Protection Act claim, finding that the Service failed to explain how lethal removal of sea lions was consistent with the Act. The appellate court vacated the agency's decision and remanded it to the agency for further consideration and explanation.

Further review of the lethal removal authorization

Just before the appellate court issued its ruling, the Service had reconvened the pinniped-fishery interaction task force to review the implementation and effectiveness of management efforts under the 2008 authorization. The Service requested that the task force consider whether (1) the observed salmonid predation rate of 1 percent remains a useful criterion for evaluating effectiveness for removal, (2) non-lethal hazing techniques remain effective in reducing predation and if they should be modified or supplemented in any way, (3) current criteria in the authorization for identifying predatory sea lions remain appropriate, (4) removal activities are displacing sea lions to other sites along the Columbia River, causing problems at those sites, and (5) any authorization terms and conditions or any aspects of the states' removal activities hinder effectiveness.

The task force met on 25–26 October and 9–10 November 2010 and released its final report on 17 December 2010, concluding its three-year review and evaluation of the program. It found that the removal program (hazing, identifying, trapping, and removing specific sea lions) had not implemented fully the authorized activities to address the predation problem and had not achieved the goal of reducing salmonid predation to less than 1 percent of the annual spring runs (Pinniped Fisheries Interaction Task Force 2010). The task force concluded that the goal of reducing predation to below 1 percent should not be changed as its usefulness could not yet be evaluated. It recommended that the states develop more effective trapping methods and remove more sea lions to provide a basis for assessing the appropriateness of the 1 percent goal. Finally, the task force determined that the hazing program was not effective at reducing predation and, therefore, it recommended that the Service not require non-lethal hazing as part of the states' permit.

After reviewing the report of the task force and considering the issues identified by the appellate court, the National Marine Fisheries Service issued a new authorization to Oregon and Washington on 12 May 2011. The decision memorandum supporting that authorization noted that the predation problem below Bonneville Dam had steadily worsened since 2002 and explained that in 2010 a record-high 6,081 salmonids had been caught by California and Steller sea lions. About 90 percent of the observed predation was attributed to California sea lions. To support its finding that predation by California sea lions is significant, the Service indicated that (1) the predation is measurable, growing, and could continue to increase if not addressed, (2) the level of adult salmonid mortality is sufficiently large to have a measurable effect on the numbers of adult salmonids, and (3) the mortality rate for salmonids listed under the Endangered Species Act is comparable to the rates from other sources that have prompted corrective action under that Act. The decision memorandum found that the basis for linking success of the pinniped removal program with reducing the salmonid predation rate to 1 percent had been confusing. In its place, the Service adopted a new measure of success—whether there has been a detectable decline in the number of salmonids being killed by California sea lions each season and a declining trend in predation overall.

Dissatisfied that the Service had not adequately addressed the deficiencies noted by the Court of Appeals, the Humane Society and others filed a new lawsuit on 20 May 2011 challenging the re-issued authorization. The plaintiffs again contended that the criteria specified under section 120 of the Marine

Mammal Protection Act under which lethal removals of pinnipeds can be authorized had not been met. Rather than try to resolve the matter in an expedited manner while the authorization remained in place, the plaintiffs, the Service and Oregon and Washington reached an agreement that no pinnipeds would be killed before the court could hear the case. After considering the litigation risks associated with defending the May 2011 authorization, the Service informed the states that it was rescinding that authorization, effective 27 July 2011. In doing so, the Service noted that sea lion activity at the dam would be limited until the following spring and invited the states to submit a new application for action before the end of February 2012.

2011 application

On 22 August 2011Washington, Oregon, and Idaho submitted a new application seeking authorization to remove problem California sea lions at Bonneville Dam covering the period from 2012 to 2016. On 12 September 2011 the Service published a *Federal Register* notice announcing receipt of the application and requesting public comments (76 Fed. Reg. 56167).

The Commission provided comments on the new application to the Service on 18 October 2011. It reiterated its long-standing concern over the Service's program, including how the dividing line between "significant" and "non-significant" impacts of sea lion predation on salmonids would be set. It pointed out that the earlier goal of reducing predation to 1 percent was based more on the "gut feeling" of task force members than on any specific quantitative relationship designed to meet the recovery goals of the Endangered Species Act. It recommended that the Service seek a quantitative standard to relate specific pinniped consumption rates to population-level impacts on the affected fish stocks, which would provide the Service with a stronger rationale for finding that predation increases the extinction risk or would delay recovery of these fish stocks. It also noted that the method used to trap and mark sea lions for removal was not sufficiently selective, and was not removing the largest contributors to the fish predation problem. Finally, the Commission expressed ongoing concerns regarding the overall approach being used by the Service and states: more than a third of the 48 identifiable California sea lions at the dam in 2011 were new to the area, indicating that new sea lions quickly replace those that are removed.

On 24 October 2011, the Service reconvened the pinniped-fishery interaction task force to review and provide recommendations on the new application. In addition to the information presented in the application, the task force considered information provided in annual reports prepared by Oregon and Washington under the previous authorization and by the Army Corps of Engineers documenting the situation at the dam. As it had in the past, the majority of the task force recommended issuing a new lethal removal authorization. One member that had supported issuance of the earlier authorizations no longer thought that authorizing lethal removals would effectively address the pinniped predation problem. He noted that, despite removals under the previous authorization, the mean daily presence of pinnipeds at the dam had not changed appreciably. This suggests that the sea lions that are being removed are simply being replaced by new animals.

The 2010 and 2011 reports submitted by Oregon and Washington discussed the effectiveness of their nonlethal deterrence efforts, which are conducted during the period when most predation occurs (between 1 January and 15 May). They placed sea lion barriers in fish passage entrances; hazed sea lions below the dam using underwater percussive devices known as "seal bombs," cracker shells, rubber buckshot, and chase boats; and deployed underwater physical barriers. As in the past, the measures caused short-term changes in sea lion behavior but the states believed them to be unsuccessful generally. In 2010 the states captured 22 individual California sea lions, 14 of which met the removal criteria and were euthanized (Brown et al. 2010). The other captured California sea lions were marked and tagged with acoustic transmitters and depth recording devices. The states also captured nine Steller sea lions; eight were marked and instrumented with satellite telemetry devices and all nine were released. In 2011, the states captured 13 California sea lions and 10 Steller sea lions; all but one were branded, instrumented with acoustic and/or satellite tags, and released. A single California sea lion was euthanized before further

removals were halted under the 2011 agreement between the Service, the states, and the parties seeking to enjoin further removals (Brown et al. 2011).

Each year the Army Corps of Engineers prepares an annual report of (1) estimated numbers of salmonids, white sturgeon, pacific lamprey, and other fish consumed by pinnipeds at the dam; (2) seasonal timing and abundance of pinnipeds, known individuals, and their predation activity; (3) the effectiveness of pinniped deterrents and barriers; and (4) the impact of states' removal efforts on pinniped numbers and predation levels. After a brief decline to 54 animals in 2009, the number of California sea lions in the vicinity of Bonneville Dam increased to 75 animals in 2010 but then decreased to 54 animals in 2011 (Stansell et al. 2010, 2011). The Corps noted that many of the individual animals observed at the dam in 2011 had not been documented there before and that the 2010 increase could have reflected the movement of large numbers of sea lions northward in search of cooler waters and more abundant prey, likely in response to a recent warming of the California Current linked to El Niño conditions (Stansell et al. 2011).

Recent declines in the numbers of California sea lions present at the dam have been offset by increases in the numbers of Steller sea lions observed at the dam in 2010 and 2011. Since the mid-2000s, when generally fewer than 10 Steller sea lions were seen at the dam in a given year, the numbers have increased substantially. Observers recorded 75 different Steller sea lions in the vicinity of the dam in 2010, and a record high of 89 individuals in 2011. The peak of 54 Steller sea lions observed on one day in 2010 was more than double that of any prior year, and in 2011, the number of Steller Sea lions exceeded the number for California sea lions observed in the vicinity of Bonneville Dam for the first time (Stansell et al. 2010, 2011). Figure VII-16 illustrates the trend of increasing Steller sea lion abundance relative to California sea lions in the past several years. In terms of overall pinniped abundance, 166 animals documented by the Corps at Bonneville Dam in 2010 was the highest level since observations began in 2002. The total number of pinnipeds observed at the dam in 2011, 144, is the second highest.

The shift in the occurrence of California and Steller sea lions at Bonneville Dam has raised concerns that limiting removals to California sea lions will not effectively address the salmonid predation problem. Section 120 of the Marine Mammal Protection Act only allows for the lethal removal of pinniped species that are not listed under the Endangered Species Act, or considered depleted or strategic under the Marine Mammal Protection Act. The stock of Steller sea lions that occurs along the U.S. West Coast currently is

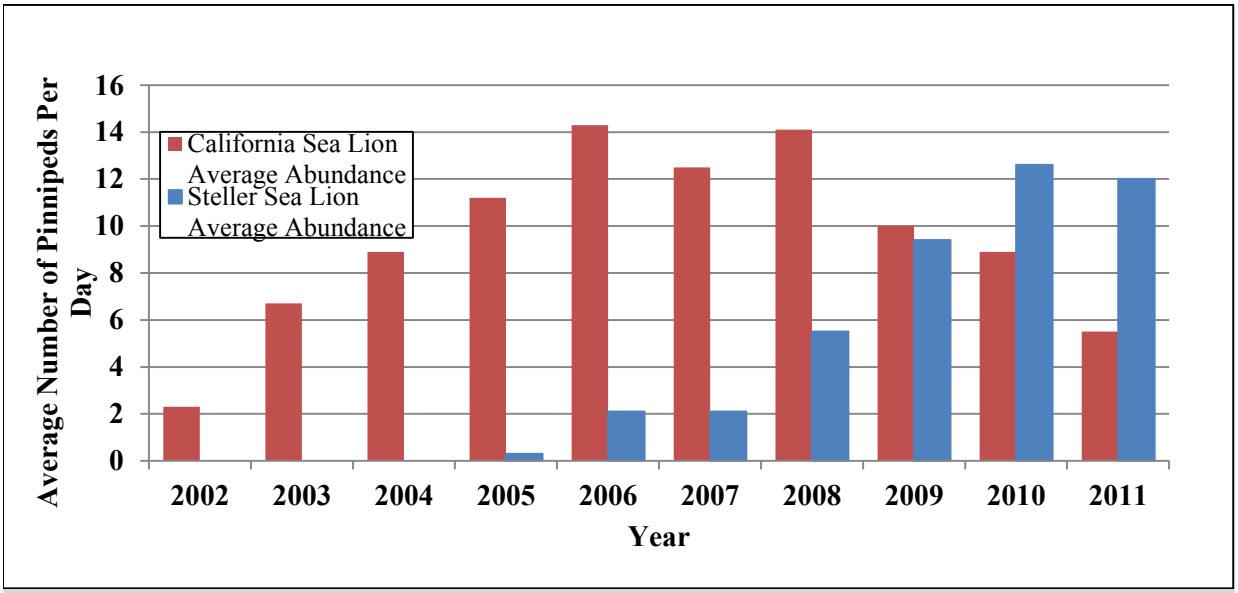

Figure VII-16. Daily average numbers of California and Steller sea lions observed in the vicinity of Bonneville Dam, 2002–2011. Average number of pinnipeds calculated from counts made during seasonal study period (Jan. 1–May 31) each year. (Source: DS Consulting 2011)

listed as threatened. This concern, in part, prompted Washington and Oregon, on 30 August 2010, to petition the National Marine Fisheries Service to delist the eastern distinct population segment of Steller sea lions. Further discussion of this petition and actions to respond to it are provided in Chapter IV.

Although the estimated number of salmonids consumed by pinnipeds at the dam increased in 2010, the percentage of fish consumed decreased from 2.7 to 2.4 percent (Figure VII-17). This is because the run sizes of salmonids vary from year-to-year and the number of adult salmon that passed by the dam in 2010 was among the highest in the past 10 years. In 2011 salmon counts remained high and, coupled with a substantial drop in the number of salmon consumed by pinnipeds (estimated to be 3,557), the percentage of salmonids consumed by pinnipeds at the dam decreased to 1.6 percent of the annual run (Stansell et al. 2011). In its 2011 report, the Corps stated that in 2011, both salmonid predation and California sea lion abundance dropped to levels not seen since 2003. The Corps speculated that this decline reflects the impact of removal efforts conducted from 2008 through 2011 (Stansell et al. 2011). The Corps also estimated that, consistent with their recent increase in abundance, Steller sea lions accounted for 32 percent of overall salmonid consumption in 2011, compared to 16 percent in 2010. The states have expressed concern over the recent increases in Steller sea lion predation of salmonids and noted that they do not have sufficient resources or legal authority to respond to this emerging issue. At the end of 2011 the Service was expected to reach a final decision on the states' permit application before the end of February 2012.

Congressional action

Congressional interest in the pinniped predation problem in the Columbia River has remained high over the past several years. As described in previous Commission reports, in 2006 representatives from

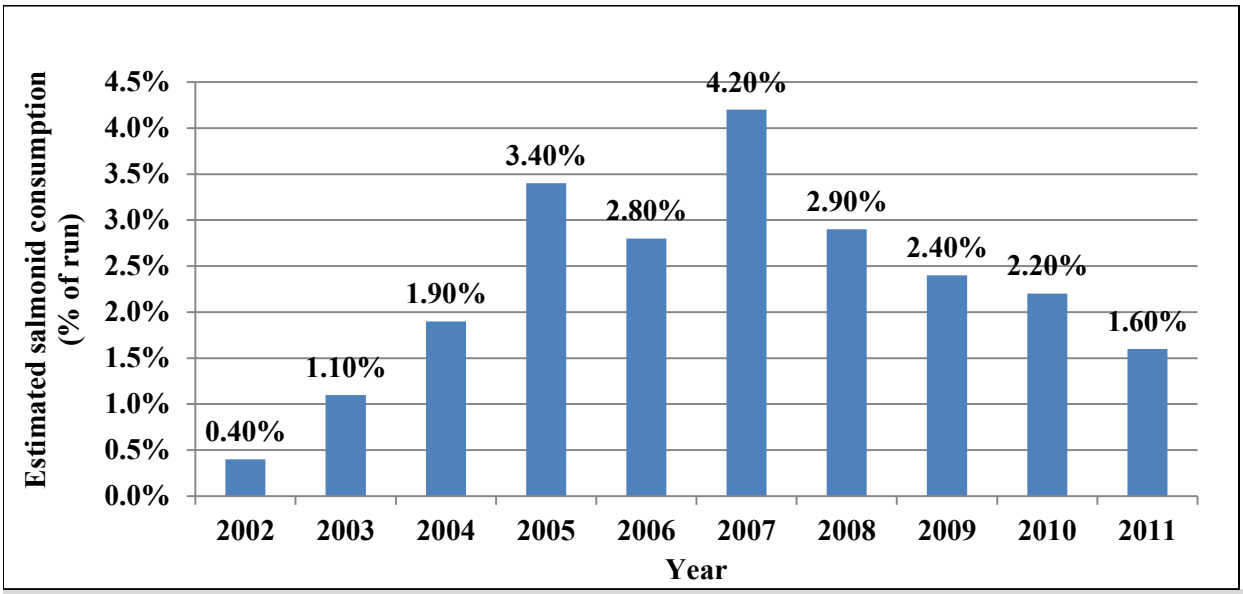

Figure VII-17. Estimated salmonid consumption expressed as a percentage of annual salmon run by California and Steller sea lions at Bonneville Dam, 2002–2011. Consumption estimates have been adjusted to include predation occurring when observers were not present. (Source: Stansell et al. 2011)

Washington and Oregon introduced legislation (H.R. 6241) to bypass the existing section 120 process by amending the Marine Mammal Protection Act to authorize, on a temporary basis, the intentional lethal taking of up to 1 percent of the annual potential biological removal level of California sea lions on the Columbia River or its tributaries. In 2007 the same representatives introduced a similar bill (H.R. 1769). In August 2007 the Commission testified at a hearing on H.R. 1769, stating that it supported the goal of

the bill—to restore healthy runs of salmon and steelhead in the Columbia River—as well as general principles to guide conservation of fish stocks. However, the Commission did not agree with the premise of the bill that the section 120 process is too protracted and cannot be accomplished quickly enough to protect endangered and threatened salmonids. The Commission's testimony reviewed the explicit timing requirements of the existing section 120 process and concluded it was possible for the Service to issue a final authorization within six months of receiving an application. The Commission also expressed concern that H.R. 1769 would allow several different entities to obtain multiple authorizations and then delegate legal removal authority to other organizations. Having up to eight different entities removing sea lions from the Columbia River and its tributaries could lead to uncoordinated and excessive taking of sea lions. The 110th Congress did not pass the bill during its legislative session.

Similar bills were introduced in the 112th Congress. On 8 March 2011, a representative from Washington introduced H.R. 946 entitled the "Endangered Salmon Predation Prevention Act." The bill would authorize the Service to issue one-year permits for the lethal taking of California sea lions in the Columbia River or its tributaries if the Secretary determines that alternative measures do not adequately protect endangered and threatened salmonids. Each permit would authorize lethal take of up to 10 sea lions per year, and the cumulative annual take would be limited to 1 percent of the annual biological removal. The bill would prohibit lethal removal of a sea lion unless the permit holder has determined that (1) the identified sea lion has preyed upon salmonid stocks in the Columbia River, and (2) alternative nonlethal measures have not been effective. The House Subcommittee on Fisheries, Wildlife, Oceans, and Insular Affairs held a legislative hearing on 14 June 2011, at which federal, state, and tribal representatives, as well as the Humane Society, testified. The Committee, however, took no further action on the bill. On 29 September 2011, the same representative introduced H.R. 3069, the "Endangered Salmon and Fisheries Predation Prevention Act." The bill contained language similar to H.R. 946, with a few key differences. For example, the proposed bill specifically names Washington, Oregon, and Idaho as potential state permit holders, and also includes the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, the Confederated Tribes and Bands of the Yakama Nation, and the Columbia River Inter-Tribal Fish Commission. The bill sets similar caps on annual removal, but does not specify that lethal take authority applies only to California sea lions, and instead allows the Secretary to authorize lethal removal of "sea lions that are part of a healthy population that is not listed as an endangered species or threatened species under the Endangered Species Act of 1973" (H.R. Rep. No. 112–322 2011). The bill was reported by the House Committee on Natural Resources and placed on the Union Calendar on 8 December 2011. No further action was taken in 2011.

Harbor Seal–Human Interactions in Drake's Estero, California[6]

In 2012 the Secretary of the Interior will determine whether to renew a Reservation of Use and Occupancy and a Special Use Permit issued to Drakes Bay Oyster Company for operations in Drakes Estero, an estuary on the West Coast just north of San Francisco, or convert the estuary to full wilderness status. The Secretary's determination is a matter of policy. Science, however, has a role in informing the Secretary about the potential consequences of his decision for resources within the estuary.

In 2009 the Marine Mammal Commission agreed to review the science pertaining to whether mariculture activities in Drakes Estero have affected or are affecting Pacific harbor seals (*Phoca vitulina*

[6] This textual description is the Executive Summary from a Commission report completed in November 2011 on the potential interactions between harbor seals and mariculture activities in Drake's Estero.

Figure VII-18. The mouth of Drakes Estero (Photo courtesy of National Park Service)

richardsi). The seals use the estuary for resting, breeding, pupping, and rearing their pups. The Commission was assisted in the first stage of its review by a panel of scientists with expertise in mariculture and in harbor seal health and ecology. The review objectives were to (1) evaluate the best available scientific information pertaining to harbor seals and mariculture effects; (2) evaluate the strengths and weaknesses of those data, (3) identify information gaps, and (4) recommend research and management activities to reduce scientific uncertainty and ensure the protection of harbor seals and their habitat. The Commission also agreed to review the Park Service's management of the harbor seal population.

The two proximate concerns regarding mariculture activities are that they might disturb seals or displace them from the habitat that they would otherwise use absent such disturbance. The broader concern, more difficult to measure, is that disturbance and displacement could reduce the seals' fitness—a measure of their ability to survive and reproduce.

The main data types available for the review include counts of seals within Drakes Estero and surrounding colonies, observations of disturbance events collected during those counts, and oyster harvest records kept by Johnson Oyster Company and its successor, Drakes Bay Oyster Company. Other useful or potentially useful documentation include photographs taken by automated cameras and videos taken during camera maintenance, observations of harbor seal mortality within the estuary, and aerial photographs of the estuary that were used by the National Park Service to assess the spatial extent (acreage) of mariculture activities in years dating back to 1993.

The review focused on three analyses conducted by the Park Service. The first was a preliminary analysis presented orally to the Marin County Board of Supervisors in May 2007. That analysis suggested that mariculture activities caused a large (80 percent) decline of harbor seal mothers and pups at one of the haulout sites (oyster bar, or OB) compared to previous observations at that site. Those results were based on counts conducted before 4 May 2007 and at the end of May the Park Service revised its estimate downward to a 55 to 60 percent decline. The Commission agrees that the number of seals using that site declined substantially in 2007. However, it also notes that the comparison was based on data from 2004, when the number of seals using the site was the highest on record. Given the natural variability of counts at that site, the Commission does not believe that the 2004 data constitute the appropriate basis for estimating the expected number of seals in 2007. The Commission also does not believe that the existing information is sufficient to determine the factor(s) that caused the change in seal numbers at the site.

The Park Service's second analysis was published as Becker et al. (2009) and is comprised of two parts. The first part examined the annual disturbance rate (i.e., reported disturbances per survey) as a function of the total annual oyster harvest. After examining individual disturbance records, the Commission concludes that, from time to time, mariculture activities have disturbed the seals. However, the data used in the analysis are not sufficient to support firm conclusions regarding the rate and significance of such disturbance.

The second part of Becker et al. (2009) analyzed factors that might explain harbor seal haulout patterns within the estuary during the seals' reproductive period. Importantly, this analysis shifted emphasis from individual disturbance records to use of the annual oyster harvest level as a proxy for mariculture activity (i.e., including the presence of boats, human activities, and mariculture materials). The results indicated that El Niño-southern oscillation (ENSO) events and annual oyster harvest levels best explain the seals' haulout patterns at the upper estuary haulout sites. The panel convened by the Commission in the early stages of this review raised strong concerns about this analysis and the use of annual oyster harvest levels as a proxy for mariculture effort. Their concerns were based on the fact that mariculture activity has varied by ownership and management, growing method, location within the estuary, and season and, therefore, may not be related to annual harvest level.

The Park Service responded to various criticisms of the Becker et al. (2009) paper by revising and expanding the analyses and publishing the results as Becker et al. (2011). This paper consists of three main parts. The first, not controversial, examines the haulout patterns of seal mothers and pups based on site isolation from land-based sources of disturbance.

The second part of Becker et al. (2011) is a reanalysis of harbor seal habitat use within Drakes Estero. The reanalysis examines whether seal haulout patterns in the upper (near mariculture) versus lower (away from mariculture) estuary are related to ENSO events, oyster harvest level, the spring (March–May) pooled disturbance rate (disturbances/number of surveys) in either the upper or lower estero, or the pooled maximum annual seal counts of all other Point Reyes area colonies (regional population size). The Park Service used two types of statistical analysis and incorporated new data dating back to 1982. As with Becker et al. (2009) the results suggest that ENSO events and mariculture harvest levels best explain the seals' use of haulout sites within Drakes Estero. The paper suggests that mariculture may have caused about an 8 ± 2 percent decline in harbor seal use of the upper estuary sites.

The third part of Becker et al. (2011) investigates harbor seal use of Drakes Estero versus neighboring colonies within the Point Reyes area as a function of multiple possible explanatory variables, including year (as a linear trend), the portion of Drakes Estero seals using subsite A (which was effectively lost to the seals between 2004 and 2007), the maximum annual seal count at Double Point (which experienced a rapid decline in 2003 because of a marauding elephant seal), annual spring human-related disturbance rate (all sources), years since the last ENSO event, regional annual maximum seal count (minus the number of seals at Drakes Estero), annual oyster harvest, and annual oyster harvest converted to a (high/low) binary variable. The Park Service also supported its contention that annual oyster harvest is a reasonable proxy for mariculture effort by analyzing relationships between annual harvest levels and the frequency of boats in the estuary, seasonal harvest patterns, and the acreage devoted to mariculture annually as estimated from aerial photographs of the estuary taken since 1993. The results

indicate that the 2003 event at Double Point, ENSO events, annual oyster harvest, and the loss of subsite A all may have influenced the distribution of seals between Drakes Estero and the neighboring colonies during the period in question.

The findings of Becker et al. (2011) have been challenged on a number of grounds, and the last phase of the Commission's review examined in detail the statistical methods used by the Park Service. The Commission structured this statistical review to allow the conservation organizations (National Parks Conservation Association and Save Our Seashore), Drakes Bay Oyster Company, and the Commission each to choose a statistician to review the methods. The statistician representing the conservation organization found that Becker et al. (2011) uses appropriate statistical methods and provides support for an inverse correlation between annual oyster harvest levels and the use of upper estuary haulout sites by harbor seals. The scientist chosen by Drakes Bay Oyster Company completed a set of analyses that he believed countered the results of Becker et al. (2011). He pointed toward the elephant seal event at Double Point in 2003 and the total number of seals in the area as the dominant factors explaining harbor seal haulout patterns both regionally and within Drakes Estero. However, his analyses are difficult to evaluate because his statistical models are confounded by built-in dependencies that are inconsistent with the statistical procedures he used. The third statistician, chosen by the Commission, found the statistical methods in Becker et al. (2011) to be generally appropriate but also made several suggestions for improving them. The Park Service concurred with those suggestions and conducted several additional analyses, reported in preliminary form in this report.

The Marine Mammal Commission believes that the data supporting the above analyses are scant and have been stretched to their limit. Nevertheless, the analyses in Becker et al. (2011) provide some support for the conclusion that harbor seal habitat-use patterns and mariculture activities in Drakes Estero are at least correlated. However, the data and analyses are not sufficient to demonstrate a causal relationship. Additional, carefully guided study would be required to determine if the apparent relationship is one of cause and effect.

To meet its objectives, the Commission describes in this report a number of shortcomings in the data used in the above analyses. Improvements are needed in the procedures used to collect disturbance data and to characterize mariculture activities and effort in the upper estuary. Photographs taken between 2007 and 2010 warrant further review to assess their usefulness for characterizing the rates and consequences of disturbance. Also, studies are needed to characterize harbor seal haulout patterns in the absence of disturbance, and to assess the biological significance of disturbance when it occurs.

Whether and to what extent the above shortcomings are addressed will depend, in part, on the decision by the Secretary of the Interior. If the Secretary determines that the estuary should be converted to full wilderness status, then the Park Service should continue to study the seals to determine if and how they may change in abundance or alter their habitat-use patterns. If the Secretary decides to renew the Reservation of Use and Occupancy and a Special Use Permit issued to Drakes Bay Oyster Company, then the Commission believes that he also should require the Park Service to implement an adaptive management approach that, if done well, should address the various weaknesses and gaps in the available data.

The Commission would be pleased to advise the Secretary in either case.

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Chapter VIII

MARINE MAMMALS AND SOUND

Human-generated sound in the ocean poses a risk to marine mammals and marine ecosystems. Despite ongoing research, analysis, and debate, the nature and severity of that risk remains controversial. The controversy is exacerbated to varying degrees by complexity of the physics of sound propagation in the oceans, and by uncertainty about the physiological effects of sound on marine mammals and other marine species, their behavioral responses, and the biological significance of short- and long-term effects and responses.

The activities that introduce sound into the marine environment generally are considered vital to our nation's interests. They support national and global transportation (i.e., commercial shipping), energy acquisition (e.g., oil and gas exploration and development and alternative energy development), national security (e.g., U.S. Navy and Air Force exercises that use sonar and underwater detonations), food security (e.g., commercial fishing), coastal development (e.g., port development and construction activities), and recreation (e.g., tourism). Most of those activities and the sound they generate will increase in the foreseeable future because of increases in U.S. and global human populations and the growing demand for marine resources, goods, and space. The challenge is to protect marine ecosystems, including marine mammals, without unnecessarily constraining those activities. Meeting that challenge requires investment by and cooperation of multiple agencies and organizations, including those that conduct sound-generating activities and those that regulate those activities. The two main topics in this section of the Commission's annual report focus on recent research and regulatory activities, with an emphasis on those activities that occurred in 2010 and 2011.

Research Activities

To date, much of the concern regarding human-generated sound in the marine environment has focused on the Navy's use of mid- and low-frequency active sonar for detecting submarines and on the use of seismic airguns for geophysical research and oil and gas development. Until recently, commercial shipping has received relatively little attention, despite the fact that it is a major source of low-frequency sound that persists over large spatial and temporal scales (Hildebrand 2009). That attention has focused on the mechanisms by which ships generate sound, potential sound-reduction measures, and—recently—reductions in marine mammal "communication space" as a result of masking (i.e., when an animal cannot detect biologically meaningful sounds because the background sound level is too great (Clark et al. 2009).

In 2008 an Interagency Task Force on Anthropogenic Sound and the Marine Environment completed a review of ongoing and planned agency efforts and a prioritized list of anticipated information needs and gaps (Southall et al. 2009). The plan is entitled "Addressing the Effects of Human-generated Sound on Marine Life: An Integrated Research Plan for U.S. Federal Agencies." It was reviewed by the Interagency Committee on Ocean Science and Resource Management Integration and, on 13 January 2009, approved by the White House Council on Environmental Quality and the Office of Management and Budget.

In 2010 and 2011 the Commission reviewed and provided recommendations on 11 scientific research permit applications or amendments pertaining to marine mammals and sound (Appendix A). For the most part, the studies were supported through individual agency budgets but, in 2010 and 2011, the agencies also contributed collectively about $2.5 million to sound research under the National Oceanographic Partnership Program, which was established in 1997 to promote such coordination. The contributing agencies included the Navy, National Science Foundation, Bureau of Ocean Energy Management,

National Oceanic and Atmospheric Administration, Sloan Foundation, and the Joint Industry Program. The research was directed toward projects that include development of prototype marine mammal databases, large-scale marine animal tagging, models of beaked whale hearing, and a library of marine animal sounds. The Navy, National Oceanic and Atmospheric Administration, and oil industry also co-sponsored a multi-investigator effort to expose marine mammals to controlled sound sources to assess behavioral responses under systematically varied signal characteristics. Such studies—described in more detail below—are necessary to assess possible sound effects on marine mammal behavior. Similar studies have been conducted in Norway by a coalition of U.S., Norwegian, Dutch, and British scientists. That program focused on the effects of fish-finding sonar and other sound sources on herring (*Clupea harengus*), sperm whales (*Physeter macrocephalus*), and killer whales (*Orcinus orca*). Australian scientists have initiated additional studies to evaluate the effects of seismic sounds on humpback whales (*Megaptera novaeangliae*), with the U.S. Bureau of Ocean Energy Management and the Joint Industry Program providing partial support for their work.

U.S. Navy and Office of Naval Research

Figure VIII-1. U.S. Navy vessels in formation in the Indian Ocean. (Photo courtesy of the U.S. Navy)

Over the past decade, the Navy has increased its focus on marine resource stewardship, including marine mammal conservation. In the last five years (combined), the Navy funded in excess of $100 million for environmental research, much of which focused on the potential effects of human-generated sound in the oceans and the means to monitor and mitigate such effects. In 2010 and 2011 the Office of Naval Research supported basic and early stage applied research including approximately $11.6 million each year for studies of marine mammal hearing, physiological and behavioral responses to sound, computer models of acoustic effects on marine life, and novel technologies for monitoring marine mammal behavior, movements, and habitat use. The operational Navy's applied research program—the Living Marine Resources Program—contributed an additional $7 to 8 million annually from 2009 to 2011. The Navy also contributed more than $10 million in both 2010 and 2011 to support environmental compliance activities such as surveys of marine mammals in or near naval training and testing areas, development and maintenance of databases and models of marine mammal distribution, assessments of behavioral and physiological responses to sonar and underwater detonations, and development of environmental documentation (Figure VIII-1). In 2011, the Navy also signed a memorandum of understanding with the National Marine Fisheries Service to assist with response to and investigation of uncommon stranding events that occur during major training exercises.

Behavioral response studies: In 2004 the Marine Mammal Commission sponsored a review of the effects of anthropogenic sound on beaked whales (family *Ziphiidae*). The review focused on an incident in the Bahamas in 2000 involving naval sonar. The resulting report (Cox et al. 2006) highlighted the need for what were then referred to as controlled exposure experiments to better describe such effects. The studies involve attaching various instruments to cetaceans (beaked whales, where possible) and then using those instruments to characterize the animals' responses when they are exposed to simulated sonar signals. The Navy initiated the studies, referring to them as behavioral response studies, in 2007 and 2008 at its Atlantic Undersea Test and Evaluation Center in the Bahamas. In 2009 the studies were shifted to the Alboran Sea (i.e., part of the western Mediterranean Sea) and in 2010 and 2011 they were again moved, this time to the Southern California Bight, where the Navy conducts extensive sonar training exercises (Figure VIII-2). In total these studies have involved numerous species, including beaked whales,

Figure VIII-2. Tagging of a fin whale during a behavioral response study in Southern California. (Photo courtesy of John Calambokidis)

killer whales (*Orcinus orca*), fin whales (*Balaenoptera physalus*), sperm whales (*Physeter macrocephalus*), blue whales (*B. musculus*), humpback whales (*Megaptera novaeangliae*), pilot whales (*Globicephala* spp.), melon-headed whales (*Peponocephala electra*) and Risso's dolphins (*Grampus griseus*). In November 2011 the Office of Naval Research sponsored a workshop at the biennial meeting of the Society for Marine Mammalogy that brought together participants from all those behavioral response studies. The workshop provided an opportunity for updating, discussing, and synthesizing the results from the various projects conducted to date. More information about this research approach[1] and a description of the studies in southern California waters[2] can be found online.

The Integrated Comprehensive Monitoring Program: In 2009 the Navy sought comments on a draft Integrated Comprehensive Monitoring Program that provides an overarching framework for coordination of the U.S. Navy's monitoring program. It was developed in direct response to Navy permitting requirements established under various Marine Mammal Protection Act final rules, Endangered Species Act consultations, and other applicable regulations. The program is aimed at ensuring environmental compliance and also provides an important source of information about marine mammal abundance, distribution, and status. Activities conducted under the program include visual and passive acoustic surveys at many locations, tagging and tracking of species of interest at several locations, literature reviews, and assessments of mitigation methods. The Navy summarizes those activities in annual reports to the National Marine Fisheries Service, as required for renewal of the Navy's letters of authorization for testing and training activities at the various range complexes.

The Commission has strongly encouraged the development of this program. Its letters to the Navy on this topic (16 March 2010 and 4 March 2011) have emphasized the importance of using this program to—

- assess the efficacy of the Navy's mitigation and monitoring measures;
- set standards for those measures to ensure that the effects of the Navy's activities are accurately characterized;
- ensure that the Navy's activities do not have more than negligible impacts and that the impacts they do have are the least practicable;
- collect baseline information essential for assessing the full range and cumulative significance of the Navy's impacts;

[1] Available at http://www.creem.st-and.ac.uk/mocha
[2] Available at http://www.sea-inc.net/socal-brs

- develop a similar program for assessing the impacts of the Navy's low frequency sonar; and
- assimilate into the Navy's testing and training activities the knowledge gained from the behavioral response studies.

Population consequences of acoustic disturbance: Since 2009 the Office of Naval Research and the University of California Santa Barbara have convened a working group and sponsored a series of meetings on the population consequences of acoustic disturbance (PCAD). The PCAD model (Figure VIII-3) was developed by a National Research Council panel (National Research Council 2005) and provides a heuristic model for translating the behavioral, physiological, and physical effects of exposure to sound into population effects.

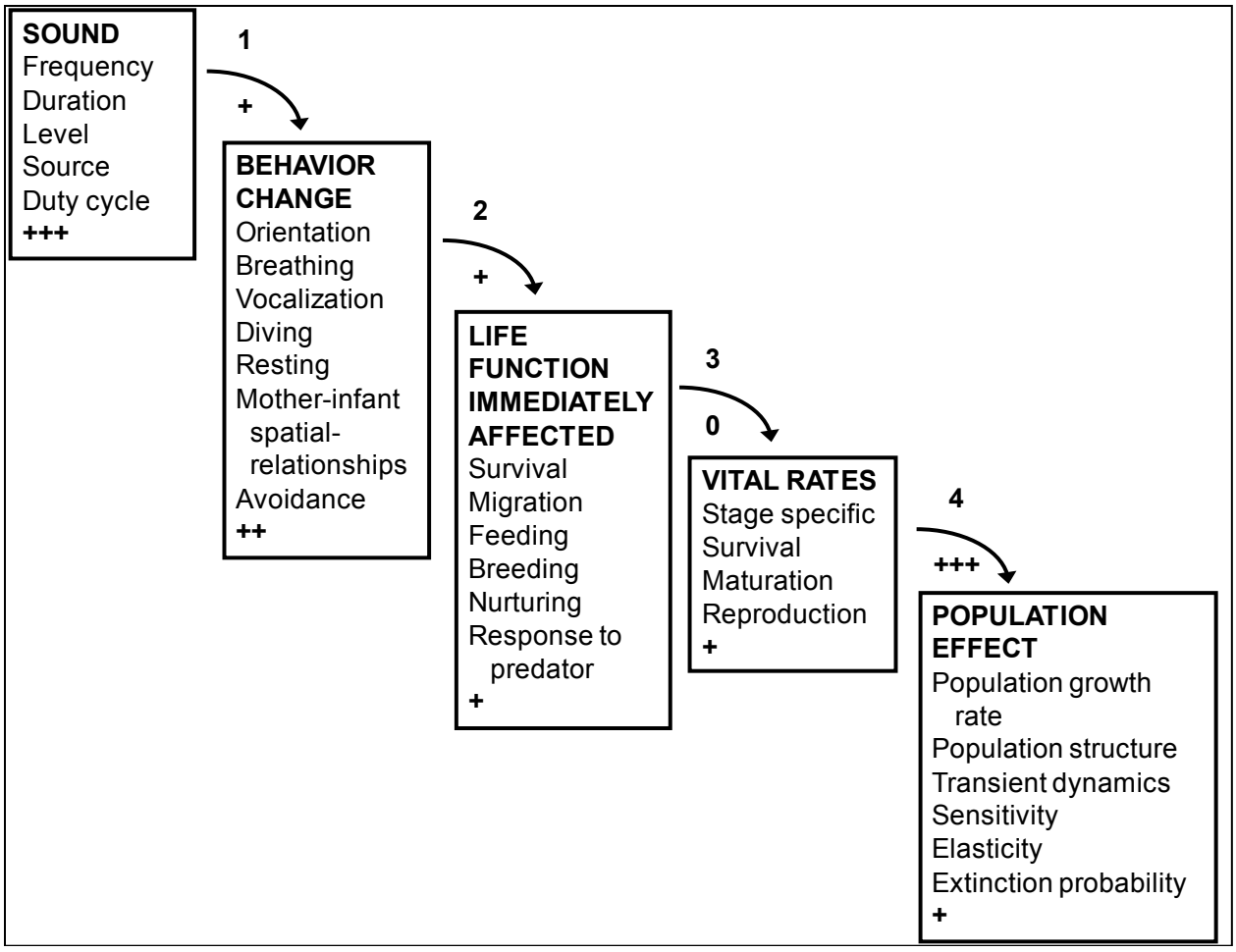

Figure VIII-3. The conceptual PCAD model describes several stages required to relate acoustic disturbance to effects on a marine mammal population. It identifies five groups of variables related by transfer functions (e.g., describing how sounds of a given frequency affect the vocalization rate of a given species of marine mammal under specified conditions). Each box lists variables with observable features (sound, behavior change, life function immediately affected, vital rates, and population effect). In most cases, the causal mechanisms of responses are not known. For example, survival is included as one of the life functions that could be affected to account for such situations as the beaked whale strandings, in which it is generally agreed that exposure to sound leads to death. The causal steps between reception of sound and death are not well characterized, but the result is clear. The "+" signs at the bottom of the boxes indicate how well the variables can be measured. The indicators between boxes show how well the "black box" nature of the transfer functions is understood; these indicators scale from "+++" (well known and easily observed) to "0" (unknown) (National Research Council 2005).

The working group, a team of international researchers, has met five times. The first four meetings focused on development of quantitative mathematical relationships to fit the conceptual PCAD model for four species (or species groups) with varying life history strategies; i.e., elephant seals (*Mirounga* spp.), coastal bottlenose dolphins (*Tursiops* spp.), North Atlantic right whales (*Eubalaena glacialis*), and beaked whales (family Ziphiidae).

The working group last met in October 2011 in Washington, D.C. The Office of Naval Research and the Marine Mammal Commission held a symposium in conjunction with that meeting to describe their results to date.[3] After the symposium, the working group met to refine the PCAD framework to more accurately reflect the group's efforts, to discuss future directions for case studies, and to consider expanding the group by adding other types of expertise. At the end of 2011 the Office of Naval Research was planning to fund several efforts building on this topic in 2012 and beyond. It also was reviewing proposals to continue PCAD research under a revised name, population consequences of disturbance (PCOD) that more accurately reflects the group's efforts and will distinguish them from the National Research Council's original PCAD model.

Bureau of Ocean Energy Management

In 2010 and 2011 the Bureau of Ocean Energy Management (created from the former Minerals Management Service) contributed more than $4 million annually toward research related to marine mammals and sound. In particular, it directed resources toward behavioral response experiments to assess the effects of seismic surveys on humpback whales in Australian waters. Among other things, the multi-year Australian study will evaluate the effectiveness of ramping-up seismic activities, which involves slowly increasing the source level of an airgun array as a warning to marine mammals in the area, thereby giving them an opportunity to move away before the airgun array reaches its full operating level. Through the National Oceanographic Partnership Program, the Bureau also co-funded the development of acoustic technology to detect, classify, and locate marine mammals based on their vocalizations. In the near future the technology should be invaluable as a supplement to visual mitigation and monitoring methods.

In addition, in 2010 and 2011 the Bureau was supporting several studies in the Gulf of Mexico to assess sperm whale responses to sound, the potential effects of sound on sperm whale foraging, and differences in behavior between sperm whales in relatively industrialized versus non-industrialized areas of the Gulf. Determining the population-level effects of sound on marine mammals generally requires strong baseline information regarding the distribution, abundance, and trends of the potentially affected populations. In 2011 the Bureau contributed to a large-scale study of the 38 purported stocks of bottlenose dolphins in the Gulf of Mexico to determine their genetic characteristics and habitat-use patterns. The study may provide useful information on the effects of the 2010 Deepwater Horizon oil spill, but it also should provide better baseline data in the event of future spills or large-scale threats to the Gulf of Mexico marine ecosystem. As described in Chapter III, personnel from the Bureau's headquarters and Gulf of Mexico regional office spent many months investigating spill effects and assisting in mitigation efforts. The spill's impact on resident marine mammals remains a substantial concern.

Similar concerns apply in other marine ecosystems. In Alaska, the Service supported several studies on marine mammals and bowhead whales in the Chukchi Sea. It also supported a synthesis of Arctic research to integrate various types of studies and thereby improve understanding of Arctic ecosystems. In the Arctic, the Bureau plans to continue long-term studies of the migration and feeding habits of polar bears, bowhead whales, ice seals, and walrus in the Chukchi and Beaufort Seas using satellite-tracking devices, aerial surveys, and passive acoustic monitoring. There, too, the studies will provide important baseline information for understanding potential effects of energy development.

Beginning in 2010, the Bureau, Navy, National Marine Fisheries Service, and Fish and Wildlife Service co-funded joint stock assessment surveys along the Atlantic coasts of the United States and Canada and seaward on the continental shelf. This effort, the Atlantic Marine Assessment Program for

[3] Available at http://www.mmc.gov/announcement_archive.shtml

Protected Species (AMAPPS), involves aerial- and vessel-based surveys conducted annually (and in some cases seasonally) for marine mammals and other protected resources. The Bureau will use the resulting data to make better environmental impact assessments of proposed and constructed offshore renewable energy projects. Should oil and gas development occur again on the U.S. Atlantic outer continental shelf (U.S. federal waters), the AMAPPS data will help the bureau assess possible environmental impacts associated with exploration and development activities.

National Science Foundation

From 2010 through 2011 the National Science Foundation directed a total of $4.6 million towards marine mammal research with about $2.2 million of this directed to the study of potential effects of sound on marine mammals. The Foundation supports research-based marine geophysical surveys and archives all visual monitoring data collected during survey activities (Figure VIII-4). Those data are publically accessible through the OBIS-USA,[4] OBIS-SEAMAP[5] and the National Oceanographic Data Center[6] websites. The Foundation also is supporting or has supported—

Figure VIII-4. The National Science Foundation's R/V Marcus Langseth used primarily for marine geophysical surveys. (Photo courtesy of Lamont-Doherty Earth Observatory)

- development of data standards for studies of the abundance, distribution, and habitat use of protected marine species;
- use of passive acoustics to monitor marine mammals year-round in the Bering Strait;
- modeling of long- and short-term marine mammal population trends in the Gulf of Mexico using passive acoustic monitoring data following the oil spill; and
- studies to improve signal processing, detection, and classification of marine mammals based on their vocalizations, including studies funded through the National Oceanographic Partnership Program:
  - development of an active and passive acoustic system to detect, classify, and locate marine mammals using a high-resolution towed array;
  - development of an autonomous marine mammal passive acoustic monitoring system; and
  - expanding metadata management and processing of acoustic data in OBIS SEAMAP.

National Oceanic and Atmospheric Administration

The National Marine Fisheries Service's Office of Science and Technology supports the Ocean Acoustics Program, a modest program of research on human-generated sound and its effects in the marine environment. The program's limited funds were dispersed internally to other National Oceanic and Atmospheric Administration offices and externally through multiagency grants issued through the National Oceanographic Partnership Program. In Fiscal Year 2010 the program supported research on—

- development of a "suitcase"(i.e., a small and mobile) acoustic system to detect beaked whales;
- the effects of anthropogenic sound on the foraging patterns of southern resident killer whales;
- evaluation of large vessel impacts on large whales in response to new and emerging traffic patterns in the Santa Barbara Channel;
- acoustic monitoring of marine mammals and anthropogenic sound in the high Arctic;

[4] http://www.usgs.gov/obis-usa/
[5] http://seamap.env.duke.edu
[6] http://www.nodc.noaa.gov

- monitoring vocally-active species and mapping sound in the Stellwagen Bank National Marine Sanctuary;
- characterizing potential impacts of sound produced during construction and operation of alternative energy activities on the outer continental shelf (with Cornell University); and
- evaluating potential effects of satellite tagging on Gulf of Maine humpback whales (with the Provincetown Center for Coastal Studies).

In FY2011 the program supported research on—

- Cook Inlet and Bristol Bay beluga whale foraging behavior and exposure to anthropogenic sound;
- use of the ocean observing system for large-scale monitoring and sound mapping;
- large vessel impacts on large whales in response to new and emerging traffic patterns in the Santa Barbara Channel (Figure VIII-5);
- a controlled exposure study of pinniped responses to anthropogenic sound;
- the effects of vessel noise on foraging in southern resident killer whales;
- the potential effects of satellite tagging Gulf of Maine humpback whales (with the Provincetown Center for Coastal Studies); and
- land- or ship-based real-time recognition and location of marine mammals (with Cornell University).

Figure VIII-5. A blue whale diving close to the shipping lanes in the Southern California Bight. (Photo courtesy of John Calambokidis)

The Service's Office of Protected Resources participates in a variety of acoustic-related activities and reviews to investigate aspects of marine animal acoustic communication, hearing, and the effects of sound on the behavior and hearing of marine mammals and other protected species. The office is developing acoustic exposure policy for NOAA, including development of marine mammal acoustic guidelines and providing technical analysis for the agency's incidental take authorizations and biological opinions involving anthropogenic sound. The office supports research in a variety of areas to address critical data needs, and is leading efforts to develop a global passive-acoustic monitoring network in marine environments.[7]

The Office of Protected Resources also conducts an annual Open Water Meeting (OWM) to review research, mitigation and monitoring activities associated with oil and gas development in Alaskan Arctic waters. When activities such as oil and gas exploration or production occur in Arctic waters, and have the potential to affect the availability of a marine mammal species or stock for subsistence use, a monitoring plan for those activities must undergo an independent review. The annual OWM serves as a forum to share the results of monitoring activities from the previous year, as well as present monitoring plans for activities proposed in the upcoming year. The OWM also serves as an opportunity for Alaska Natives and other parties to provide input on previous and upcoming monitoring plans. The Commission actively participated in these meetings in 2010-2011 and served on the 2010 Peer Review Panel to evaluate proposed monitoring methods.[8]

[7] http://www.nmfs.noaa.gov/pr/acoustics/
[8] http://www.nmfs.noaa.gov/pr/permits/openwater.htm

Other research

Private industry, foreign governments and various non-governmental organizations also are studying the effects of underwater sound on marine mammals. Sponsors include the oil and gas industry, foreign navies, and national or international environmental agencies (e.g., International Council for the Exploration of the Sea, European Science Commission, the United Kingdom's Joint Nature Conservation Committee).

Joint industry research: Individual oil and gas companies have invested in research and monitoring of potential effects of sound on marine mammals. Examples include monitoring the effects of oil and gas development on the western population of gray whales in the nearshore waters off Sakhalin Island, Russia, and monitoring the effects of offshore drilling at the Northstar facility in the Beaufort Sea.[9] Since 2008, ConocoPhillips, Shell, and Statoil have joined in a consortium to support research related to environmental assessment, including marine mammal noise exposure, in the northeast Chukchi Sea. In 2010 and 2011, Olgoonik-Fairweather operated the Chukchi Sea and Environmental Studies Program, an extensive and multi-disciplinary program of research with a specific focus on both marine mammal visual surveys, to assess the distribution, movements, and abundance of marine mammals and to assess the underwater acoustic ecology in the offshore oil and gas lease areas.[10]

In addition, a consortium of oil and gas companies also have established and maintained the E&P Sound and Marine Life Joint Industry Programme, organized by the International Association of Oil and Gas Producers in London. The program began in 2005 with a review of data gaps, regional regulations, relevant international treaties and laws, potential funding partners, and existing research programs on sound and its effects on marine animals. It supports studies of sound source characterization and propagation, physical and physiological effects and hearing, behavioral reactions and biologically significant effects, mitigation and monitoring, and the development of research tools.[11] Examples of the kinds of projects undertaken by the program include characterizing the sounds produced by a 3-D airgun array and developing a passive acoustic mitigation system called PAMGUARD. It also has contributed to the development of new technology to reduce sound levels and monitor and mitigate potential sound effects. For the first five years after inception, the program contributed about $8 million per year for research. Funding in 2010 and 2011 was about half of that level at about $3.8 million each year.

Cumulative effects: In 2010 BP America Production Company, Inc., and the University of California Santa Barbara convened a working group to develop standardized, practical methods for assessing the cumulative effects of anthropogenic underwater sound on marine mammals. The working group brings together expertise on acoustics, marine and terrestrial mammalogy, quantitative analysis and risk assessment, hearing physiology, and assessment of cumulative effects. The group met four times in 2010 and 2011 and developed a case study by modeling the soundscape of anthropogenic activities and sound pressure levels received by migrating bowhead whales during the 2008 open-water season near the Northstar facility. The group also began development of a more qualitative assessment of cumulative effects. The next (and potentially final) meeting of the working group is planned for the summer of 2012.

Regulatory activities

The Commission reviewed 42 analyses for proposed regulatory actions in 2009, 36 in 2010, and 50 in 2011. The analyses focused almost entirely on the potential impacts of human-generated sound on marine mammals and the marine environment (Table VIII-1). The annual variation is related to preparation for Navy training and testing activities, an increasing number of proposed coastal construction projects (e.g., piers, bridges, roads, alternative energy structures), and an increasing number of proposed seismic surveys, particularly in the Arctic. The Navy's five-year authorizations for training and testing activities

[9] http://www.sakhalinenergy.com/en
[10] Reports of their work can be found at http://www.chukchiscience.com/StudytheScience/tabid/215/Default.aspx
[11] http://www.soundandmarinelife.org

Table VIII-1. Regulatory documentation reviewed by the Marine Mammal Commission in 2010 and 2011. ANPR = Advanced Notice of Public Rulemaking, DEA = Draft Environmental Assessment, EIS = Environmental Impact Statement, NOI = Notice of Intent, DEIS = Draft Environmental Impact Statement, ICMP = Integrated Comprehensive Monitoring Program, CATEXs = Categorical Exclusions, DPEIS = Draft Programmatic Environmental Impact Statement, DSEIS = Draft Supplemental Environmental Impact Statement, DSOEIS = Draft Supplemental Overseas Environmental Impact Statement

Action proponent	Proposed action	Regulatory documentation	Commission letter date	*Federal Register* notice (date, issue:page)
California Department of Transportation	Construction activities for retrofit of the Dumbarton Bridge in San Francisco Bay	101(a)(5)(D)	11-Jan-10	4-Dec-09 74:63724
California Department of Transportation	Construction activities for retrofit of the Antioch Bridge in San Francisco Bay east of the confluence of the Sacramento and San Joaquin Rivers	101(a)(5)(D)	20-Jan-10	21-Dec-09 74:67856
U.S. Air Force	Eglin Air Force Base–underwater detonations and gunnery at the Naval Explosive Ordnance Disposal School in the Gulf of Mexico	101(a)(5)(A) ANPR	16-Feb-10	15-Jan-10 75:2490
U.S. Navy	Gulf of Alaska–mid- and high-frequency active sonar sources, explosive and non-explosive practice munitions, high-explosive underwater detonations, vessel movements, and aircraft overflights in the Temporary Maritime Activities Area	101(a)(5)(A) ANPR	1-Mar-10	3-Feb-10 75:5576
Lamont-Doherty Earth Observatory	Marine geophysical survey in waters of the Commonwealth of the Northern Mariana Islands	101(a)(5)(D)	29-Mar-10	25-Feb-10 75:8652
National Marine Fisheries Service Alaska Region	Construction activities for replacement and repair of the fur seal research observation tower and walkway on St. Paul Island, Alaska	101(a)(5)(D)	29-Mar-10	10-Mar-10 75:11123
National Marine Fisheries Service	Offshore exploration activities (e.g., seismic surveys and exploratory drilling) by the oil and gas industry in the U.S. Chukchi and Beaufort Seas off Alaska	EIS NOI	10-Apr-10	8-Feb-10 75:6175

Action proponent	Proposed action	Regulatory documentation	Commission letter date	*Federal Register* notice (date, issue:page)
Washington State Department of Transportation	Construction activities for replacement of Manette Bridge in Bremerton, Washington	101(a)(5)(D)	21-Apr-10	22-Mar-10 75:13513
Shell Offshore, Inc.	Open-water offshore exploratory drilling at the Torpedo and Sivulliq prospects in Camden Bay, Beaufort Sea, Alaska	101(a)(5)(D)	24-May-10	19-Apr-10 75:20418
U.S. Army	Fort Richardson–live-fire exercises at Eagle River Flats, Alaska	DEIS	14-Jun-10	17-Mar-10 75:12735
Neptune LNG LLC	Commissioning, operation, and maintenance and repair activities for the offshore liquefied natural gas facility (Neptune Deepwater Port) in Massachusetts Bay	101(a)(5)(D)	16-Jun-10	6-May-10 75:24906
Lamont-Doherty Earth Observatory	Marine geophysical survey at Shatsky Rise in the northwest Pacific Ocean	101(a)(5)(D)	21-Jun-10	21-May-10 75:28568
Shell Offshore, Inc.	Open-water offshore marine seismic survey in the Beaufort and Chukchi Seas, Alaska	101(a)(5)(D)	21-Jun-10	18-May-10 75:27708
U.S. Marine Corps	Cherry Point Range Complex–air-to-surface and surface-to-surface bombing, strafing, special weapons (laser systems), gunnery, and mine-laying exercises in Pamlico Sound, North Carolina	101(a)(5)(D)	30-Jun-10	8-Jun-10 75:32398
Alaska Department of Transportation and Public Facilities and the Aleutians East Borough	Construction activities for a new airport, access road, and hovercraft landing area on Akun and Akutan Islands, Alaska	101(a)(5)(D)	2-Jul-10	8-Jun-10 75:32497
Statoil USA E&P, Inc.	Marine geophysical survey in the Chukchi Sea, Alaska	101(a)(5)(D)	8-Jul-10	8-Jun-10 75:32379
U.S. Navy	Pt. Mugu Naval Air Station–Vehicle launch activities on San Nicolas Island, California	101(a)(5)(A) Monitoring plan	30-Jul-10	
U.S. Geological Survey	Marine geophysical survey in the northern Beaufort Sea and Arctic Ocean	101(a)(5)(D)	2-Aug-10	8-Jul-10 75:39336

Action proponent	Proposed action	Regulatory documentation	Commission letter date	*Federal Register* notice (date, issue:page)
Bluewater Wind LLC	Construction activities for installation of meteorological data collection facilities off the coasts of Delaware and New Jersey	101(a)(5)(D)	6-Aug-10	22-Jul-10 75:42699
Excelerate Energy, LP, and Tetra Tech EC, Inc., on behalf of Northeast Gateway Energy Bridge, LLC, and Algonquin Gas Transmission, LLC	Operation and maintenance activities for the Northeast Gateway liquid natural gas port facility and the associated pipeline in Massachusetts Bay	101(a)(5)(D)	6-Aug-10	20-Jul-10 75:42071
U.S. Navy	Naval activities at all 12 major training and testing range complexes	101(a)(5)(A) ICMP	16-Aug-10	
Exploratorium	Construction activities for relocation of the Exploratorium in San Francisco Bay	101(a)(5)(D)	16-Aug-10	22-Jul-10 75:42691
National Oceanic and Atmospheric Administration Restoration Center, Southwest Region	Construction activities for a tidal wetlands project at the Elkhorn Slough National Estuarine Research Reserve in northern Monterey County, California	101(a)(5)(D)	18-Aug-10	20-Jul-10 75:42121
Washington State Department of Natural Resources	Construction activities for removal of derelict piling and associated structures in Puget Sound, Washington	101(a)(5)(D)	2-Sept-10	12-Aug-10 75:48941
Scripps Institution of Oceanography	Marine geophysical survey in the eastern tropical Pacific Ocean	101(a)(5)(D)	28-Sept-10	3-Sept-10 75:54095
Knik Arm Bridge and Toll Authority in conjunction with the Department of Transportation's Federal Highway Administration	Construction activities for installation of the Knik Arm Bridge in Alaska	101(a)(5)(A) ANPR	7-Oct-10	8-Sept-10 75:54599
U.S. Navy	Pt. Mugu Naval Air Station–Vehicle launch activities on San Nicolas Island, California	101(a)(5)(A) Letter of Authorization	20-Oct-10	24-Sept-10 75:58365

Action proponent	Proposed action	Regulatory documentation	Commission letter date	*Federal Register* notice (date, issue:page)
National Oceanic and Atmospheric Administration Restoration Center, Southwest Region	Construction activities for a tidal wetlands project at the Elkhorn Slough National Estuarine Research Reserve in northern Monterey County, California	101(a)(5)(D)	22-Oct-10	5-Oct-10 75:61432
Bureau of Ocean Energy Management, Regulation, and Enforcement	Outer continental shelf activities including exploration, development, and production plans for proposed oil and gas activities	CATEXs	8-Nov-10	8-Oct-10 75:62418
U.S. Air Force	Eglin Air Force Base–underwater detonations and gunnery at the Naval Explosive Ordnance Disposal School in the Gulf of Mexico	101(a)(5)(A)	9-Nov-10	1-Oct-10 75:60694
U.S. Navy	Gulf of Alaska–mid- and high-frequency active sonar sources, explosive and non-explosive practice munitions, high-explosive underwater detonations, vessel movements, and aircraft overflights in the Temporary Maritime Activities Area	101(a)(5)(A)	18-Nov-10	19-Oct-10 75:64508
U.S. Navy	Silver Strand Training Complex–underwater detonation and elevated causeway system training exercises near San Diego Bay	101(a)(5)(D)	18-Nov-10	19-Oct-10 75:64276
National Science Foundation and U.S. Geological Survey	Marine geophysical surveys worldwide	DPEIS	24-Nov-10	8-Oct-10 75:62433
Bureau of Ocean Energy Management, Regulation, and Enforcement	Oil and gas lease sale 193 and associated marine seismic survey activities in the Chukchi Sea	DSEIS	6-Dec-10	5-Oct-10 75:61511
California Department of Transportation	Construction activities for replacement bridge of the east span of the San Francisco–Oakland Bay Bridge in San Francisco Bay	101(a)(5)(D)	30-Dec-10	13-Dec-10 75:77617
National Science Foundation	Marine geophysical survey off Costa Rica in the Pacific Ocean	DEA	30-Dec-10	

Action proponent	Proposed action	Regulatory documentation	Commission letter date	*Federal Register* notice (date, issue:page)
Bureau of Ocean Energy Management, Regulation, and Enforcement	Remaining lease sales in the Western and Central Planning Areas in the Gulf of Mexico for the 2007–2012 leasing program	DSEIS NOI	3-Jan-11	10-Dec-10 16-Dec-10 75; pages 69122 and 70023
St. George Reef Lighthouse Preservation Society	Construction activities for restoration of lighthouse off coast of Crescent City, California	101(a)(5)(D)	14-Jan-11	22-Dec-10 75:80471
U.S. Fish and Wildlife Service	Research activities during polar bear captures in the Chukchi Sea	101(a)(5)(D)	14-Jan-11	4-Jan-11 76:330
Bureau of Ocean Energy Management, Regulation, and Enforcement	Seismic surveys conducted by ION Geophysical Corporation in the Beaufort and Chukchi Seas	DEA	24-Jan-11	
Alaska Aerospace Corporation	Launch activities at Kodiak Launch Complex in Alaska	101(a)(5)(A)	24-Jan-11	23-Dec-10 75:80773
Neptune LNG LLC	Commissioning, operation, and maintenance and repair activities at its offshore liquefied natural gas facility in Massachusetts Bay	101(a)(5)(A)	4-Feb-11	21-Dec-10 75:80260
U.S. Navy	Naval Base Kitsap–test pile program in Bangor, Washington	101(a)(5)(D)	28-Feb-11	25-Jan-11 76:4300
U.S. Navy	Naval activities at all major training and testing range complexes	101(a)(5)(A) revised ICMP	4-Mar-11	
Lamont-Doherty Earth Observatory	Marine geophysical survey in waters of the eastern tropical Pacific Ocean near Costa Rica	101(a)(5)(D)	7-Mar-11	4-Feb-11 76:6430
U.S. Navy	Naval Base Kitsap–construction activities during repair of an explosive handling wharf in Bangor, Washington	101(a)(5)(D)	7-Mar-11	4-Feb-11 76:6406
Bureau of Ocean Energy Management, Regulation, and Enforcement	Remaining lease sales in the Western and Central Planning Areas of the Gulf of Mexico for the 2012–2017 leasing program	DSEIS NOI	28-Mar-11	9-Feb-11 76:7228

Action proponent	Proposed action	Regulatory documentation	Commission letter date	*Federal Register* notice (date, issue:page)
Alaska Oil and Gas Association	Exploration, development, and production activities for the oil and gas industry in the Beaufort Sea and adjacent northern coast of Alaska	101(a)(5)(A)	11-Apr-11	11-Mar-11 76:13454
Sonoma County Water Agency	Construction and maintenance activities in association with estuary management at the Russian River near Jenner, California	101(a)(5)(D)	18-Apr-11	18-Mar-11 76:14924
Alaska Department of Transportation and Public Facilities and the Aleutians East Borough	Construction activities for a new airport, access road, and hovercraft landing area on Akun and Akutan Islands, Alaska	101(a)(5)(D)	2-May-11	1-Apr-11 76:18232
U.S. Geological Survey	Marine geophysical survey in waters of the central Gulf of Alaska	101(a)(5)(D)	2-May-11	1-Apr-11 76:18167
United Launch Alliance	*Delta Mariner* operation, cargo unloading, and harbor maintenance activities at South Vandenberg Air Force Base, California	101(a)(5)(D)	6-May-11	19-Apr-11 76:21862
National Marine Fisheries Service	Issuance of a public display permit for the placement of releasable, rehabilitated California sea lions at the Institute for Marine Mammal Studies in Gulfport, Mississippi	DEA	11-May-11	11-Apr-11 76:19976
Lamont-Doherty Earth Observatory	Marine geophysical survey in waters of the western Gulf of Alaska	101(a)(5)(D)	6-Jun-11	6-May-11 76:26255
Monterey Bay National Marine Sanctuary	Permitting commercial firework displays within the Sanctuary waters of California	101(a)(5)(D)	20-Jun-11	20-May-11 76:29186
U.S. Geological Survey	Marine geophysical survey in waters of the central-western Bering Sea	101(a)(5)(D)	21-Jun-11 & 8-Jul-11	8-Jun-11 76:33246
Statoil USA E&P Inc.	Open-water shallow hazards survey in the Chukchi Sea	101(a)(5)(D)	23-Jun-11	24-May-11 76:30110
Cher-Ae Heights Indian Community of the Trinidad Rancheria	Construction activities during reconstruction of the Trinidad Pier in California	101(a)(5)(D)	23-Jun-11	18-May-11 76:28733

Action proponent	Proposed action	Regulatory documentation	Commission letter date	*Federal Register* notice (date, issue:page)
PRBO Conservation Science	Research activities to monitor seabirds and pinnipeds at Southeast Farallon Island, Año Nuevo Island, and Point Reyes National Seashore, California	101(a)(5)(D)	24-Jun-11	25-May-11 76:30311
U.S. Navy	Virginia Capes and Jacksonville Range Complexes–development, testing, and evaluation of weapons systems, explosive and non-explosive practice munitions, high-explosive underwater detonations, vessel movements, and aircraft overflights	101(a)(5)(A) Interim final rule	27-Jun-11	26-May-11 76:30552
U.S. Geological Survey	Marine geophysical survey in waters of the central-western Bering Sea	101(a)(5)(D)	21-Jun-11	8-Jun-11 76:33246
Bureau of Ocean Energy Management, Regulation, and Enforcement	Marine seismic surveys sponsored by the oil and gas industry for geological and geophysical exploration on the Outer Continental Shelf in the Gulf of Mexico	101(a)(5)(A) ANPR	14-Jul-11	14-Jun-11 76:34656
BP Exploration (Alaska) Inc.	Production, drilling, and emergency training activities at the Northstar facility in the Beaufort Sea	101(a)(5)(A)	5-Aug-11	6-Jul-11 76:39706
University of Alaska Geophysics Institute	Marine geophysical survey in waters of the Chukchi Sea and Arctic Ocean	101(a)(5)(D)	10-Aug-11	14-Jul-11 76:41463
Bureau of Ocean Energy Management, Regulation, and Enforcement	Issuance of commercial wind leases and site characterization activities on the Atlantic Outer Continental Shelf offshore of New Jersey, Delaware, Maryland, and Virginia	DEA	11-Aug-11	12-Jul-11 76:40925
U.S. Air Force	Eglin Air Force Base–air-to-surface gunnery missions in the Gulf of Mexico Test and Training Range	101(a)(5)(D)	18-Aug-11	20-Jul-11 76:43267

Action proponent	Proposed action	Regulatory documentation	Commission letter date	*Federal Register* notice (date, issue:page)
Excelerate Energy, LP, and Tetra Tech EC, Inc., on behalf of Northeast Gateway Energy Bridge, LLC, and Algonquin Gas Transmission, LLC	Operation activities for the Northeast Gateway liquid natural gas port facility in Massachusetts Bay	101(a)(5)(D)	22-Aug-11	21-Jul-11 76:43639
Scripps Institution of Oceanography	Marine geophysical survey in waters of the western tropical Pacific Ocean	101(a)(5)(D)	29-Aug-11	29-Jul-11 76:45518
Port of Vancouver	Construction activities for a bulk potash handling facility on the Columbia River in Vancouver, Washington	101(a)(5)(D)	19-Sept-11	19-Aug-11 76:51947
U.S. Navy	Surveillance Towed Array Sensor System Low Frequency Active sonar–training, testing, and routine military operations in non-polar waters worldwide	101(a)(5)(A) ANPR	30-Sept-11	30-Aug-11 76:53884
Bureau of Ocean Energy Management, Regulation, and Enforcement	Issuance of commercial wind leases and site characterization activities on the Atlantic Outer Continental Shelf offshore of Rhode Island and Massachusetts	DEA	3-Oct-11	18-Aug-11 76:51391
Washington State Department of Natural Resources	Construction activities for removal of derelict piling and associated structures in Puget Sound, Washington	101(a)(5)(D)	10-Oct-11	12-Sept-11 76:56172
Cape Wind Associates	Marine geophysical and geotechnical surveys in Nantucket Sound off Massachusetts	101(a)(5)(D)	17-Oct-11	14-Sept-11 76:56735
U.S. Navy	Surveillance Towed Array Sensor System Low Frequency Active sonar–training, testing, and routine military operations in non-polar waters worldwide	DSEIS/DSOEIS	17-Oct-11	19-Sept-11 76:51972
Lamont-Doherty Earth Observatory	Marine geophysical survey in waters of the central Pacific Ocean	101(a)(5)(D)	19-Oct-11	19-Sept-11 76:57959
Apache Alaska Corporation	Marine 3D seismic survey in Cook Inlet, Alaska	101(a)(5)(D)	21-Oct-11	21-Sept-11 76:58473

Action proponent	Proposed action	Regulatory documentation	Commission letter date	*Federal Register* notice (date, issue:page)
U.S. Army Corps of Engineers	Construction activities for the Brannan Street Wharf at Pier 36 in San Francisco, California	101(a)(5)(D)	21-Nov-11	26-Oct-11 76:66274
U.S. Navy	Virginia Capes, Cherry Point, and Jacksonville Range Complexes–training activities, primarily underwater detonations with time-delay firing devices	101(a)(5)(A) Letters of Authorization	7-Dec-11	7-Nov-11 76:68734
Shell Offshore, Inc.	Open-water offshore exploratory drilling at the Torpedo and Sivulliq prospects in Camden Bay, Beaufort Sea, Alaska	101(a)(5)(D)	9-Dec-11	7-Nov-11 76:68974
Shell Offshore, Inc.	Open-water offshore exploratory drilling at the Burger prospects in the Chukchi Sea, Alaska	101(a)(5)(D)	9-Dec-11	9-Nov-11 76:69958
U.S. Navy and Air Force	Naval activities at all 12 major training and testing range complexes and air force activities at Vandenberg Air Force Base	101(a)(5)(A)	12-Dec-11	15-Nov-11 76:70695
U.S. Navy	Marine geophysical survey in the southwestern Indian Ocean	101(a)(5)(D)	13-Dec-11	21-Nov-11 76:71940
U.S. Marine Corps	Cherry Point Range Complex–air-to-surface and surface-to-surface bombing, strafing, special weapons (laser systems), gunnery, and mine-laying exercises in Pamlico Sound, North Carolina	101(a)(5)(D)	13-Dec-11	18-Nov-11 76:71535
U.S. Navy	Hawaii Range Complex–training activities, primarily underwater detonations with time-delay firing devices	101(a)(5)(A) Letters of Authorization	14-Dec-11	17-Nov-11 76:71322
U.S. Army Corps of Engineers	Confined underwater blasting and dredging in the Port of Miami, Florida	101(a)(5)(D)	19-Dec-11	18-Nov-11 76:71517
Lamont-Doherty Earth Observatory	Marine geophysical survey in waters of the Northern Marianas Islands	101(a)(5)(D)	22-Dec-11	14-Dec-11 76:77782

were scheduled to expire in 2014 and in 2010 and 2011 it had begun preparations for the 2014 to 2019 period.

The Commission's primary aim in reviewing those analyses is to determine if—

- the means of taking have been accurately described;
- the taking will involve only small numbers of the affected species and stocks (not applicable to military readiness activities);
- the taking will have no more than a negligible impact on those species and stocks;
- the taking will not have an unmitigable adverse impact on the availability of those species and stocks for Alaska Native subsistence purposes; and
- the authorizing Service has required mitigation and monitoring measures to ensure that the taking will have no more than the least practicable impact on those species and stocks and their habitat.

Mitigation measures are intended to reduce or eliminate the potential impacts of proposed sound-generating activities. Monitoring measures are used for two purposes. First, monitoring may be an essential component of mitigation measures (i.e., monitoring to determine if and when airguns must be powered down or shut down to avoid effects on a marine mammal in a safety zone). Second, monitoring measures provide a basis for estimating the actual number of marine mammals taken and the nature/severity of those takes. Two types of harassment zones are monitored: (1) safety zones, which are intended to avoid the potential for injury (i.e., Level A harassment) and (2) buffer zones, which are intended to avoid the potential for biologically significant changes in marine mammal behavior (i.e., Level B harassment). Behavioral effects would be important if they reduce the probabilities of survival or reproduction of the affected animals. Examples include separation of female-calf pairs, disruption of social groups essential for foraging or reproduction, or displacement from prime habitat.

All mitigation and monitoring measures are compromised by various shortcomings (e.g., visual observation generally is not effective at night or during inclement weather). To address those problems the Commission generally recommends that mitigation and monitoring measures be applied in a precautionary manner (i.e., use maximum- versus mean-sized safety zones), that multiple measures be used to compensate for the shortcomings of any single measure (i.e., combine visual and acoustic monitoring), and that the action proponent and the authorizing Service collect the data needed to improve the measures over time (i.e., collect data or conduct experiments to assess the accuracy of sound propagation models or the utility of ramp-up procedures).

The more common mitigation and monitoring measures include requirements to—

- avoid activities in important areas (e.g., breeding or feeding areas, migration corridors, pinniped rookeries) or during important periods (e.g., pupping season for pinnipeds, calving season for cetaceans);
- use sound attenuation devices (e.g., bubble curtains and block cushions) to reduce source levels (e.g., during pile-driving activities);
- conduct in-situ measurements of sound propagation to verify and, if necessary, adjust Level A and B harassment zones to ensure that they are providing adequate protection;
- use Service-approved observers to monitor the Level A and B harassment zones visually before, during, and after activities (Figure VIII-6);
- use passive acoustic monitoring to detect marine mammals acoustically;
- use ramp-up, delay, and shut-down procedures when marine mammals are or may be within an area in which they could be taken by the proposed activities;
- reduce vessel speed and increase aircraft altitude in the presence of marine mammals; and
- report injured and dead marine mammals to the Service and local stranding network and suspend activities, if appropriate.

Many of the Commission's recommendations have focused on the efficacy of visual monitoring because of its importance to standard mitigation and monitoring measures. For example, the Commission has recommended that the authorizing Services justify their preliminary determinations that proposed monitoring programs will be sufficient to detect all marine mammals within or entering the identified Level A and B harassment zones. Such justifications should (1) identify those species that the responsible Service believes can be detected with a high degree of confidence using visual monitoring only under the expected environmental conditions, (2) describe detection probability as a function of distance from the vessel, (3) describe changes in detection probability under various sea state and weather conditions and light levels, and (4) explain how close to the vessel marine mammals must be for observers to achieve high nighttime detection rates. A great deal more work is needed to improve mitigation and monitoring measures.

Figure VIII-6. A protected species observer monitoring for marine mammals from an observation tower on board the R/V Langseth. (Photo courtesy of lifeonshatsky.blogspot.com/2010/07/intro-to-mmo-marine-mammal-observers.html)

The Services also normally stipulate that, when sound sources have been powered down because a marine mammal has been detected near or within a proposed Level A harassment zone, the activity cannot resume until the marine mammal is outside the zone—i.e., the animal is observed to have left the zone or has not been seen or otherwise detected within the zone for 15 minutes in the case of small odontocetes and pinnipeds and 30 minutes in the case of mysticetes and large odontocetes, including sperm, pygmy sperm, dwarf sperm, and beaked whales. The Commission has repeatedly recommended that the National Marine Fisheries Service require extended clearance times to cover the maximum dive times of the species likely to be encountered in the study area prior to resuming activities after both power-down and shut-down procedures. It also has recommended that, if a marine mammal has been observed in the Level A harassment zone, ramp-up be required after the specified clearance times rather than allowing sound sources to be initiated at full power after shorter timeframes (e.g., 6-12 minutes). The Service has not yet implemented those recommendations.

For some activities, the estimated Level A and B harassment zones are quite large (tens of kilometers) and an accurate assessment of the number of animals taken has been impossible. To address the uncertainty in these cases, the Commission has recommended that the authorizing Service, action proponent, and relevant funding agency develop, validate, and implement a monitoring program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal taking and the number of marine mammals taken. A number of tools are available for this purpose, including using stationary passive acoustic arrays, additional watercraft and aircraft during the activity to supplement visual monitoring, or conducting surveys in the action area before and after the proposed action. Some methods may not be practicable for certain proposed actions (e.g., those that are to be conducted only once or those occurring in remote areas where few marine mammals will be encountered). Other proposed activities warrant more attention if they occur in areas where large numbers of marine mammals may occur, some of the marine mammals may be endangered or threatened, or the activities will be repeated frequently and are more likely to cause long-term or permanent impacts (e.g., seismic surveys used to support oil and gas development and production).

In 2010 and 2011 the Commission also continued its practice of recommending that the authorizing Service and action proponent analyze and compare data obtained from visual and acoustic monitoring

methods to characterize their respective strengths and weaknesses and determine how they might best be used together. In addition, the Commission continued to emphasize in its recommendations that the Services and action proponent collect and analyze data pertaining to ramp-up procedures to determine their effectiveness. In 2010 the Joint Industry Programme and the Bureau of Ocean Energy Management initiated a study entitled "Behavioural Response of Australian Humpback Whales to Seismic Surveys" and, among other things, the study will examine the effectiveness of ramp-up procedures with regard to this species.

During the fall of 2010, the Commission hosted a meeting with attendees from the National Marine Fisheries Service, Fish and Wildlife Service, National Science Foundation, U.S. Geological Survey, Lamont-Doherty Earth Observatory, and Scripps Institution of Oceanography to discuss the effectiveness of the various mitigation and monitoring measures used during geophysical surveys. As a result, the Commission and the National Marine Fisheries Service plan to investigate better ways to use observer data for determining takes authorized by incidental harassment authorizations. In support of that effort, the Commission has participated in numerous meetings related to the development of a central database that would store marine mammal and related sound data. Until a central database is developed, the National Science Foundation is compiling monitoring data collected during geophysical surveys into a single internal database. However, those data must be checked for quality before they can be analyzed. In addition, the applicants plan to collect data on the impediments caused by mitigation and monitoring requirements. Those data should be helpful in designing better mitigation and monitoring measures.

In some instances, amending standard mitigation and monitoring measures during an activity is necessary when those activities pose undue risk to marine mammals. In March 2011, several long-beaked common dolphins were found dead following a Navy mine neutralization training exercise that used time-delay firing devices at the Silver Strand Training Complex in California. Time-delay firing devices allow divers to set explosive charges and move away before they detonate, but once activated, they cannot be paused or cancelled without risks to the divers. After the dolphin incident, the Navy suspended its use of time-delay firing devices in its training exercises pending review and changes to the letters of authorization for its range complexes. It also worked with the Service to develop more robust mitigation and monitoring measures designed to prevent similar incidents in the future. The Commission commends the Navy and Service for their efforts. At the same time, however, the Commission continues to question the efficacy of the revised mitigation measures.

The Navy and Service proposed to use various monitoring schemes (i.e., using two vessels, three vessels, or two vessels and a helicopter positioned equidistant apart and monitoring in a circular path) and to increase the size of the buffer zones to account for the possible movements of marine mammals after time-delay firing devices are activated but before the explosives detonate. The new buffer zones were based on (1) the size of the modeled safety zones, (2) the duration of the delay before detonation, (3) an average swim speed for delphinids of 3 knots, and (4) an additional buffer to account for animals that may be transiting at speeds faster than the average. The Commission disagreed with the Navy and Service regarding the revised measures for two main reasons. First, the safety zones were estimated using an unvalidated model rather than empirical measurements. Therefore, the Commission recommended that the Service require the Navy to (1) measure empirically the propagation characteristics of the blast (i.e., impulse, peak pressure, and sound exposure level) from the various charge weights used in the exercises and (2) use that information to establish appropriately sized safety and buffer zones. Second, the Commission did not believe that the use of 3 knots as an average swim speed is appropriate for the species likely to occur at the various range complexes. Accordingly, the Commission recommended that the Service require the Navy to re-estimate the sizes of the buffer zones using the average swim speed of the fastest-swimming marine mammal that occurs in the areas within the complex where time-delay firing devices would be used. To date, the Service has not implemented either recommendation but the Commission continues to believe the mitigation measures should be amended accordingly.

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Chapter IX

MARINE MAMMAL HEALTH AND STRANDING RESPONSE

The 1992 amendments to the Marine Mammal Protection Act directed the Secretary of Commerce to establish a Marine Mammal Health and Stranding Response Program. The amendment was largely in response to the stranding of hundreds of bottlenose dolphins (*Tursiops truncatus*) along the U.S. Atlantic coast in 1987 and 1988. Congress intended the program to (1) facilitate the collection and dissemination of reference data on the health of marine mammals and health trends of marine mammal populations in the wild; (2) correlate the health of marine mammals and marine mammal populations in the wild with available data on physical, chemical, and biological environmental parameters; and (3) coordinate effective responses to unusual mortality events.

The 1992 amendments also directed the Secretary of Commerce to—

- establish an expert working group to provide advice on measures necessary to better detect and respond appropriately to future unusual mortality events involving marine mammals;
- develop a contingency plan for guiding responses to such events;
- establish a fund to compensate people for certain costs incurred in responding to unusual mortality events;
- develop objective criteria for determining when sick and injured marine mammals have recovered and can be returned to the wild;
- continue development of the National Marine Mammal Tissue Bank; and
- establish and maintain a central database for tracking and accessing data concerning marine mammal strandings.

Marine Mammal Health and Stranding Response Program

In February 2009 the National Marine Fisheries Service completed a programmatic environmental impact statement for its health and stranding program.[1] The statement's analyses were focused on—

- issuance of final guidance for "Policies and Best Practices for Marine Mammal Stranding Response, Rehabilitation and Release";
- issuance of a new Endangered Species Act/Marine Mammal Protection Act permit to authorize the program to take marine mammals while responding to stranding events involving endangered marine mammal species, disentangling marine mammals from fishing gear and marine debris, conducting bio-monitoring projects, and importing and exporting marine mammal tissue samples;
- continuation of current program operations, including response, rehabilitation, release, and research activities involving marine mammals, as well as renewal and authorization of stranding agreements and related Service activities; and
- continuation of the John H. Prescott Marine Mammal Rescue Assistance Grant Program.

[1] Available at http://www.nmfs.noaa.gov/pr/health/eis.htm

The programmatic statement evaluated three alternatives - no action, status quo, and preferred - based on six key considerations. Under the preferred alternative, the National Marine Fisheries Service would—

- establish stranding agreement criteria and a template for such agreements;
- recommend that carcasses of chemically euthanized animals be transported off-site for disposal;
- issue new stranding response authorizations, continue to authorize rehabilitation activities, and implement new standards for rehabilitation facilities;
- issue new stranding agreements, continue release activities, and implement final release criteria;
- continue the current activities of the disentanglement network on the East Coast but modify those on the West Coast, and implement disentanglement guidelines and training prerequisites; and
- issue a new Endangered Species Act/Marine Mammal Protection Act permit to include current and future bio-monitoring and research activities.

Unusual mortality events

The Marine Mammal Protection Act defines an unusual mortality event as "a stranding that is unexpected, involves a significant die-off of any marine mammal population, and demands immediate response." Such events may have important implications for the status of the affected marine mammal stock(s), but also may serve as an important indicator of the health of the marine ecosystem.

The Office of Protected Resources in the National Marine Fisheries Service administers the unusual mortality event program, including events involving species managed by the Fish and Wildlife Service, and posts reports on these events on its website.[2] Managing stranding responses is difficult, particularly when large numbers of strandings occur over a short period of time, the cause or causes are not readily apparent, a variety of analyses must be conducted, and response activities require coordination of numerous response organizations and laboratories. The numbers reported here should be considered approximate, provisional, and contingent on a final update and verification by the Service.

The following are summaries of 12 unusual mortality events under investigation at the end of 2011, beginning with those events that were identified as such before 2010. Once declared, an unusual mortality event is considered “open” as long as strandings continue at an unusually high rate or until sufficient time has passed with a reduced number of strandings to determine that the event is over. At this time the working group is consulted to determine if the event should be declared “closed,” which does not mean that the cause has been determined.

Unusual mortality events beginning before 2010

The following were declared to be unusual mortality events before 2010 and were still under investigation at the end of 2011.

Virginia bottlenose dolphins: Between April and June 2009 the National Marine Fisheries Service received reports of more than 41 dead, stranded bottlenose dolphins along the Virginia coast. Of these, 34 were found in May, and many of those were in an advanced state of decomposition. The Service declared this to be an unusual mortality event on 1 July 2009 because the number of strandings was high relative to observed strandings in previous years. The working group recommended several studies/analyses to determine the cause of these strandings: stomach contents to identify prey and test for biotoxins; genetic assessment of stock identity; cytology, microbial, viral, and bacterial/fungal screening on pericardial fluid and cerebral spinal fluid to look for evidence of pathology and pathogens; ocean current hind-casting to determine the origin of carcasses; review of active fisheries operating in the mid-Atlantic area to assess potential for interactions; vessel aerial surveys 10+ km from shore to locate additional carcasses floating

[2] Available at http://www.nmfs.noaa.gov/pr/health/mmume/

offshore; and investigation of environmental parameters including changes in water temperature, shifts in prey species, and presence of harmful algal blooms. No new mortalities were reported associated with this event in 2010 or 2011, the investigative team is working on finalizing the summary report and a request for closure is expected in 2012.

California harbor porpoises: From January 1998 through December 2010, 495 harbor porpoises (*Phocoena phocoena*) stranded along the central California coast. From 1998 to 2006, the mean number of porpoises stranding per year was 27. In the summer/fall of 2007 stranding increased to 35 porpoises and remained high through 2008 and 2009, with 84 and 86 animals stranding in these years, respectively. Strandings decreased by the end of 2010. No single cause of mortality explained the increase in strandings. Trauma, including intra-specific aggression and fishery interactions, was the most common cause of death. Domoic acid toxicosis was documented for the first time in this species. The increase in strandings could reflect changes in porpoise distribution or abundance locally rather than an epizootic disease. The stranding and pathology data will be summarized and submitted to the journal "Aquatic Mammals" for publication. Closure of this event will be requested in 2012.

Bottlenose dolphins in Texas: Between February and March 2008 at least 111 bottlenose dolphins, 1 unidentified dolphin, and one melon-headed whale (*Peponocephala electra*) stranded along the Texas coast, with the majority of strandings in Galveston and Jefferson counties. This event was similar to one in 2007 in location and time of year, high proportion of neonate strandings (42 percent), and high proportion of carcasses that were moderately to severely decomposed. Seventy-five samples were sequenced at the NOAA Marine Mammal Genetics Laboratory and were determined to be from dolphins of the coastal morphotype. Water samples contained okadaic acid and, on 7 March 2008, officials in Texas closed some bays to shellfish harvesting because of the presence of *Dinophysis* sp., a toxic alga that causes diarrhetic shellfish poisoning in humans. On 20 March 2008 the National Marine Fisheries Service declared the dolphin deaths to be an unusual mortality event. Responders conducted necropsies on 39 carcasses. Three of eight dolphins sampled had domoic acid and okadaic acid detected in their digestive tract. This was the first time okadaic acid was detected in a marine mammal. One of six animals tested positive for brevetoxins, although the concentration was low and may have indicated background (or common) levels. This was the first documentation of exposure to three distinct classes of harmful algal toxins during a single marine mammal mortality event (Fire et al. 2011). Although the concentration of each individual toxin was considered to be low, the impact of multiple toxin exposure is unknown. Samples were collected for viral and toxicology analysis, but, unfortunaltely, those samples were lost during Hurricane Ike in September 2008 (Heidi Watts, personal communication). The cause of the event remains undetermined.

Cetaceans in California: Between April 2007 and September 2008 at least 51 common dolphins (*Delphinus delphis*), 31 harbor porpoises, 5 bottlenose dolphins, 4 gray whales (*Eschrichtius robustus*), 2 sperm whales (*Physeter macrocephalus*), 1 minke whale (*Balaenoptera acutorostrata*), 1 Risso's dolphin (*Grampus griseus*), and 1 unidentified small cetacean stranded along the California coast. Investigators attribute most of the strandings to domoic acid, a toxin that is produced by diatoms of the genus *Pseudo-nitzschia* and that causes amnesic shellfish poisoning in humans. However, 5 of the 51 common dolphins had gunshot wounds. Since the 1990s domoic acid has caused the death and stranding of many cetaceans and pinnipeds along the California coast. Cetacean mass-stranding events were documented in 2002, 2003, 2007, and 2008. These events are referred to as "repeat events" for bureaucratic reasons; that is, to avoid consuming the limited resources available for responding to unusual and more novel mortality events. However, the Commission has argued that they still should be considered unusual inasmuch as they are indicative of a disturbed ecosystem. Whether classified as unusual mortality events or repeat events, they are important biological and ecological phenomena indicative of marine ecosystems under stress. For that reason, the Commission believes that the Service and responders should continue to investigate and document these events. At the end of 2011, this event was still officially open.

Alaska sea otters: As described in the Commission's 2007 annual report, the frequency of sea otter (*Enhydra lutris*) strandings in southcentral Alaska began to increase in 2000, or perhaps earlier. Until 2006 the annual number of strandings ranged from 16 to 67. However, in the summer of 2006 the rate

exceeded one stranding per day in Cook Inlet's Kachemak Bay and on 24 August 2006 the Service declared the strandings to constitute an unusual mortality event. From 2006 to 2008 the annual number of strandings was between 99 and 111. The total strandings reported in 2002 through 2008 were 449. Some of the increase in 2006-2008 may reflect increased effort to find and recover dead and stranded animals, particularly in the more populated areas near Homer and around Kachemak Bay. By the end of 2009 responders had recovered more than 336 carcasses and conducted partial or full necropsies on 304 of them, including 64 cases for which final histopathology reports have been completed. The investigating team found evidence of vegetative endocarditis and signs of sepsis in 52 percent of the 64 cases that were subjected to full histopathological exams. The team identified the bacteria *Streptococcus bovis* complex or *Streptococcus infantarius* subsp. *coli* in these cases. Prime-age, adult males constituted an unexpectedly large portion of the carcasses. Most of the stranded otters were from the southcentral Alaska stock, particularly Kachemak Bay, but about 10 percent were from the southwest stock, which is listed as threatened under the Endangered Species Act. The working group considered this event to be ongoing during 2010 and 2011 and the investigation team continued its assessment and monitoring activities.

Mortality events declared in 2010

In 2010 the working group recommended that the Service declare unusual mortality events for the following species.

Northern Gulf of Mexico cetaceans: Beginning in February 2010 the number of reported cetacean strandings increased in the Gulf of Mexico. Most of the cetaceans were bottlenose dolphins. The working group was initially consulted in March 2010 regarding an increase in strandings in Lake Pontchartrain and it was reviewing information on elevated strandings in the wider northern Gulf when the Deepwater Horizon fire and oil spill occurred on 20 April 2010. Between 1 February and 29 April 2010 a total of 114 cetaceans stranded. From 30 April to 2 November 2010 a total of 122 cetaceans stranded or were reported dead offshore. From 2 November to the end of 2011 an additional 390 cetaceans stranded (Table IX-1).

The strandings in January – April 2011 included unusually high numbers of bottlenose dolphin young of the year, particularly in Alabama and Mississippi, including calves born prematurely, calves stillborn, and apparently full-term calves (<115cm in length) that died shortly after birth (Figure IX-1).

Determining the cause(s) of this unusual mortality event has proven to be a challenge and many tests for common causes, such as harmful algal blooms, have produced negative results. However by the end of 2011, the investigators had tested 21 dolphins for *Brucella*, with five (two adults and three fetuses) testing positive. The positive results were from dolphins stranded off the Louisiana, Mississippi, and Alabama coasts between June 2010 and February 2011. The cause(s) of death for the 16 dolphins testing negative for *Brucella* are still under investigation. The investigators also are looking at additional samples from more dolphins and those results are expected in 2012. At the end of 2011 this event was still officially open and the investigation ongoing.

Florida bottlenose dolphins: Between July and September 2010, a total of 26 bottlenose dolphin carcasses were reported in the St. John's River in Florida. The strandings were coincident with algal blooms, fish kills, foam on the water, and a dredging operation. At the end of 2011 this event was still open and the investigation ongoing.

Table IX-1. Stranded cetaceans from Franklin County, Florida, to the Texas/Louisiana border by month (National Marine Fisheries Service)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average (2002-2009)	6.6	6.9	17.9	11.5	5.3	3.6	4.1	3.5	4.0	4.0	2.6	3.8
Total 2010	5	11	62	41	40	30	10	19	17	6	11	13
Total 2011	25	62	72	39	20	23	17	30	16	26	19	17

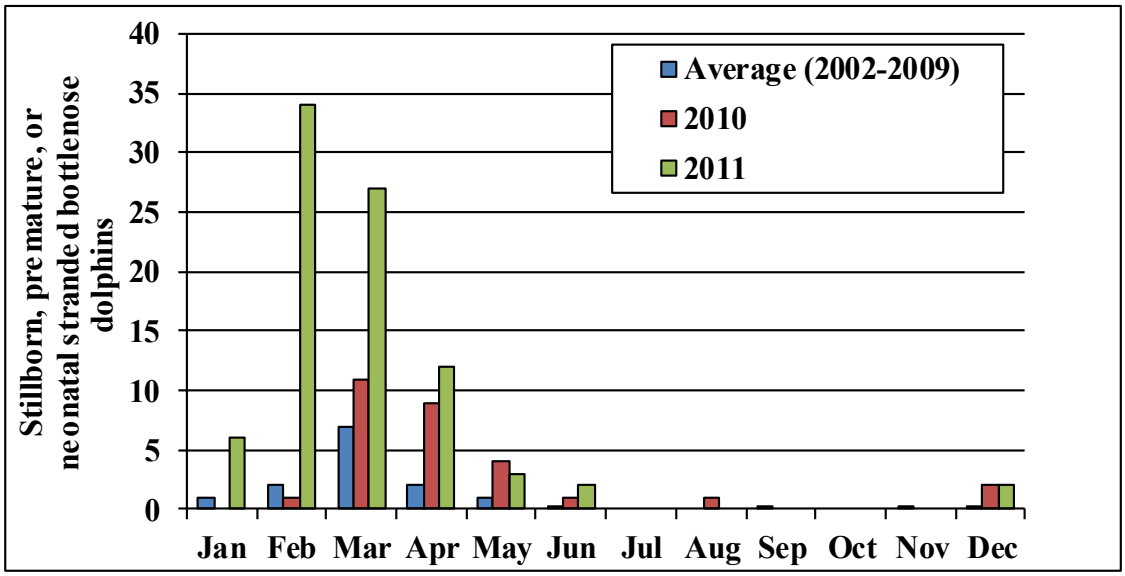

Figure IX-1. Stranded "young of the year" bottlenose dolphins from Franklin County, Florida, to the Texas/ Louisiana border with reported actual or estimated whole carcass lengths less than 115 cm (partial carcasses excluded). (Source: National Marine Fisheries Service)

Florida manatees: Between 11 January and 9 April 2010, a total of 480 manatee carcasses were reported and verified and cold stress was considered the cause of death for 252 of these. The number of deaths was particularly high in the central-east and southwestern regions of Florida. Fifty-eight percent of the deaths attributed to cold stress were calves. A total of 118 adults died (from all causes) during the event. Because the number of deaths was high relative to the total abundance of Florida manatees (about 5,000), this event had a measurable impact on the population status. The Service declared the event closed on 8 April 2011.

Mortality events declared in 2011

In 2011 the working group recommended that the Service declare unusual mortality events for the following species.

Florida manatees: Cold weather and low water temperatures in early 2011 resulted in another period of high manatee mortality. Given the similarities with the previous year's event, the deaths were again declared an unusual mortality event, although the working group recommended that the Fish and Wildlife Service develop guidelines for determining when mortality from cold periods might be characterized as repeat events. As was the case in 2010, the additional deaths in 2011 (at least 112 deaths related to cold) also had a substantial, measurable effect on the status of this population.

South Carolina bottlenose dolphins: Between February and April 2011 the number of bottlenose dolphins stranding along the coast of South Carolina increased. Twenty-five dead, stranded dolphins were documented including 9 females, 11 males, and 5 individuals of unknown sex. All age classes of bottlenose dolphins stranded, but the majority were adults (n = 10) or sub adults (n = 9). Most of the strandings occurred in Charleston County and Beaufort County. Stranding records for South Carolina from 2002 to 2010 show an average of 4.78 bottlenose dolphin strandings for the month of March and 3.67 bottlenose dolphin strandings for the month of April. The 2011 strandings include 13 dolphins in March and 9 in April, both well above the average. Although the number of animals stranding had decreased by the end of 2011, the event was officially still open and the investigation into the cause of the event was ongoing.

New England pinnipeds: Between 1 September and 17 October 2011 stranding networks documented a total of 128 dead, stranded harbor seals (*Phoca vitulina*) along the New England coast. Most were young of the year (less than six months old). Many were in good body condition, which suggests that malnutrition was not the problem. Instead, they had similar skin lesions (ulcerative dermatitis), indicating some other cause. Samples were being analyzed at the end of 2011 and the event remained open.

Arctic pinnipeds and walrus: Since mid-July 2011, more than 60 dead and 75 diseased seals, mostly ringed seals, were reported in Alaska. Walruses with similar clinical symptoms also were reported in Alaska and Chukotka (Russia), although walrus deaths had not been reported by the end of 2011. The cause, distribution, and severity of the disease, and its population effects, are not known. NOAA Fisheries declared this an unusual mortality event on 16 December 2011. NOAA Fisheries and the U.S. Fish and Wildlife Service continue to work with network members, biologists, and hunters to identify sick animals and to collect biological samples to determine the cause. Throughout this event, contact between seals and hunters or field research personnel have not resulted in reports of human illness. Whether the diseased animals pose a health threat to humans or other animals has yet to be determined. At the end of 2011 samples were being analyzed and the event remained open.

Prescott Grant Program

The Marine Mammal Rescue Assistance Act of 2000 amended Title IV of the Marine Mammal Protection Act and instructed the Secretaries of Commerce and the Interior to conduct a competitive grant program to be known as the John H. Prescott Marine Mammal Rescue Assistance Grant Program. The program, which is subject to the availability of appropriations, provides financial awards for participants of marine mammal stranding networks to carry out related activities including recovery and treatment of stranded marine mammals, collection of data from living and dead stranded marine mammals, and payment of operational costs directly associated with those activities. Individual awards may not exceed $100,000 and may extend no longer than three years. An applicant may receive no more than two awards per annual competition.

The National Marine Fisheries Service administers the grant program for species under its management jurisdiction. The Fish and Wildlife Service has neither requested nor received Prescott funds since the program's inception in 2001. The National Marine Fisheries Service, on the other hand, consistently has requested Prescott funds and awarded Prescott grants. For fiscal year 2010 technical and merit review panels evaluated 76 eligible proposals and selected 42 for funding. The National Marine Fisheries Service distributed $3.7 million among those 42 projects and three additional grants to the National Fish and Wildlife Foundation for use in emergencies.

For fiscal year 2011 technical and merit review panels evaluated 72 eligible proposals and selected 40 for funding. The National Marine Fisheries Service distributed $3.7 million among those 40 projects. In October 2011 the National Marine Fisheries Service closed their solicitation for proposals for grants to be awarded in fiscal year 2012 and received 71 eligible proposals.

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Chapter X

RESEARCH AND CONSERVATION ACTIVITIES

The Marine Mammal Protection Act requires that the Marine Mammal Commission continually review research programs conducted or proposed under the Act. The Act authorizes the Commission to undertake or cause to be undertaken studies that it deems necessary or desirable for marine mammal conservation and protection. To that end, the Commission convenes meetings and workshops to review, plan, and coordinate marine mammal research. The Commission also awards grants for studies to characterize threats to marine mammals and their habitats and identify possible solutions or mitigation measures. In its research-related activities, the Commission seeks to facilitate and complement activities of the National Marine Fisheries Services, the Fish and Wildlife Service, and other federal agencies while avoiding unnecessary duplication of research.

Workshops and Planning Meetings

During 2010 and 2011 the Commissioners, members of the Committee of Scientific Advisors on Marine Mammals, and Commission staff participated in and helped to organize meetings and workshops on a variety of topics. Among other things, the Commission—

- contributed to response and assessment activities related to the BP *Deepwater Horizon* oil spill by—
  - assisting the National Oceanic and Atmospheric Administration (NOAA) at the Mobile, Alabama, Incident Command Center;
  - assisting post-spill surveys for marine mammals, including aerial surveys conducted from Mobile, Alabama, and vessel surveys for bottlenose dolphins from Pascagoula, Mississippi;
  - discussing spill response and scientific research efforts with senior officials at the Unified Command Center in New Orleans and the Incident Command Centers in Mobile, Alabama, and Houma, Louisiana;
  - participating in earlier meetings and subsequent weekly teleconference calls with state and federal trustees to discuss research needs and assessment of damages to marine mammals and sea turtles from the *Deepwater Horizon* spill;
  - testifying on spill effects on marine mammals in a June 2010 oversight hearing before the House Natural Resources Committee's Subcommittee on Insular Affairs, Oceans and Wildlife;
  - hosting a multi-agency meeting on *Deepwater Horizon* spill response and assessment activities related to marine mammals;
  - developing a research plan to assess the long-term effects of the spill on marine mammals in the Gulf of Mexico;
  - providing comments on Gulf ecosystem restoration at the Washington, DC, public scoping meeting in April 2011 for the Programmatic Environmental Impact Statement development process;
  - participating in health assessments of bottlenose dolphins in Barataria Bay, Louisiana, in August 2011;
  - participating in a November 2011 symposium hosted by the National Aquarium in Baltimore, Maryland, to discuss the Natural Resource Damage Assessment process; and

    - presenting lessons learned and participating in a panel discussion of the Deepwater Horizon oil spill at the Society for Marine Mammalogy's 19th Biennial Conference on the Biology of Marine Mammals (November 2011).
- provided comments to the Interagency Coordination Committee on Oil Pollution Research on research needed to better prevent and respond to oil spills, especially in the Arctic, and on assessment of the impacts of oil spills on marine mammals;
- met with officials from the Bureau of Ocean Energy Management, Regulation, and Enforcement in 2010 regarding research and management needs related to oil and gas operations in the marine environment and their potential impacts on marine mammals; attended meetings on the Bureau's 2012–2017 oil and gas leasing program; and in 2011 attended meetings of the Bureau's Scientific Advisory Committee and Safety Advisory Committee;
- met with NOAA's Office of Response and Restoration to discuss NOAA's role in oil spill response, assessment, and restoration;
- attended meetings and workshops on alternative energy sources including the Bureau of Ocean Energy Management, Regulation, and Enforcement's Atlantic Wind Energy Workshop in July 2011; the Fish and Wildlife Service's Wind Energy Guidelines Advisory Committee meeting; and a meeting of the Project Advisory Committee for the University of Rhode Island's initiative to develop environmental protocols and modeling tools to support ocean energy from renewable sources;
- conducted its own review of the effects of *Deepwater Horizon*, and oil and gas exploration and extraction, at the Commission's 2011 annual meeting in New Orleans, Louisiana;
- attended the Arctic Open Water meeting regarding ongoing and planned oil and gas activities in the Arctic and associated mitigation and monitoring plans to limit their impacts on Arctic and sub-Arctic marine mammals;
- attended and supported a review of the status of marine mammals in Russian waters at the 6th International Conference on Marine Mammals of the Holarctic;
- met with the Indigenous Peoples' Council for Marine Mammals, and representatives from the National Marine Fisheries Service, Fish and Wildlife Service, and Congressional offices regarding co-management of subsistence harvests of marine mammals in Alaskan waters;
- held discussions with and attended the annual meeting of the Alaska Eskimo Whaling Commission in preparation for the annual International Whaling Commission meeting in 2011;
- participated as part of the U.S. delegation to the 62nd Annual Meeting of the International Whaling Commission in Agadir, Morocco (2010) and the 63rd Annual Meeting of the International Whaling Commission, Isle of Jersey, United Kingdom (2011);
- attended meetings on coastal and marine spatial planning, including a special session at the 2011 National Conference on Science, Policy and the Environment;
- attended and made multiple presentations at the Society for Marine Mammalogy's 19th Biennial Conference on the Biology of Marine Mammals, with a thematic emphasis on cumulative effects of threats to marine mammals;
- participated in a series of workshops to develop practical methods for assessment of cumulative effects of anthropogenic underwater sound on marine mammals, sponsored by BP and the National Center for Ecological Analysis and Synthesis;
- attended an April 2010 workshop in Woods Hole, Massachusetts, on gas kinetics, marine mammal physiology and management of oxygen and nitrogen, and scientific uncertainty about the risk that Navy sonar poses to diving marine mammals;
- participated in a July 2010 workshop jointly sponsored by the Navy, NOAA, and the Bureau of Ocean Energy Management, Regulation, and Enforcement on improving monitoring techniques, determining biologically significant effects of sound exposure, and analyzing cumulative effects of Navy operations on marine mammals;
- attended a training workshop on underwater acoustics for biologists and conservation managers;

- participated in meetings to review the marine mammal monitoring measures used by the Navy on its range complexes as part of its Tactical Training Theater Assessment and Planning Program;
- attended the Second International Conference on the Effects of Noise on Aquatic Life, convened in Cork, Ireland, in August 2010;
- participated in a series of workshops sponsored by the Office of Naval Research to develop a framework for assessing the population-level consequences of acoustic disturbance (PCAD) to marine mammals, and helped to sponsor a symposium in October 2011 to share the working group's results and findings;
- attended the 162nd Meeting of the Acoustical Society of America in San Diego, California, which focused on research on shipping noise in the marine environment and other sound-related issues;
- hosted an interagency meeting on mitigation and monitoring measures associated with geophysical surveys;
- attended a meeting on the development of a science plan for an international "quiet ocean" experiment to document the significance of sound in the ocean and conduct comprehensive research on its effects on marine organisms; the meeting was co-hosted by the Scientific Committee on Oceanic Research and the Partnership for Observation of the Global Oceans;
- attended meetings of the Atlantic Marine Assessment Program, a multi-agency effort to coordinate aerial and shipboard assessments of marine species in the western North Atlantic Ocean;
- attended the April 2010 national conference on marine mammal and sea turtle stranding response;
- met with the National Marine Fisheries Service's Marine Mammal Health and Stranding Response Program to help develop strategic plans to guide this program;
- helped sponsor and participated in a 2010 workshop to investigate the causes of high mortality of southern right whales at their calving and nursing grounds off Peninsula Valdés, Argentina;
- helped sponsor and participated in a 2011 workshop in Buenos Aires, Argentina, on population assessment of and threats to southern right whales;
- attended a stranding response and training workshop for Spanish-speaking countries of the Caribbean to help facilitate an integrated stranding response program;
- attended the Sixth Meeting of the Contracting Parties to the Protocol Concerning Specially Protected Areas and Wildlife in the Wider Caribbean Region, held in Jamaica in October 2010;
- attended and made presentations at the Second International Conference on Marine Mammal Protected Areas, convened in Martinique in November 2011;
- reviewed the draft revised Hawaiian Humpback Whale National Marine Sanctuary Management Plan;
- conducted a scientific review of the effects of mariculture operations on Pacific harbor seals in Drake's Estero, Point Reyes National Seashore, California;
- attended and helped sponsor the Fourth International Science Symposium on Biologging, which focused on the use of biologging telemetry in marine animal research and conservation;
- participated in a 2011 workshop in Monterey, California, on the development of a new system for tagging and tracking sea otters;
- helped support research and conservation efforts for the endangered Mediterranean monk seal by providing a research grant, and participating in meetings with Congressional staff, a round table discussion hosted by the Embassy of Greece, and a presentation at the Smithsonian for the general public;
- participated in a 2010 expert workshop sponsored by the United Nations Environment Programme and Convention on Migratory Species to develop a strategic plan and standardized protocols for assessing dugong population status, distribution, and threats in regional projects conducted throughout its range;

- helped prepare the Conservation Action Plan for the Gangetic Dolphin as part of a 2010 working group convened under the International Union for Conservation of Nature's Cetacean Specialist Group;
- participated in a 2010 workshop to improve integration of research programs and conservation actions in Chinese waters for the Chinese white dolphin or Indo-Pacific humpbacked dolphin (*Sousa chinensis chinensis*);
- participated in and gave the keynote address at the American Cetacean Society's 12th International Conference, the theme of which was "Whales 2010: Inspiring a new decade of conservation;"
- participated in a 2010 review sponsored by the Consortium for Ocean Leadership of current ocean observing systems and their capacity for assessing marine biodiversity;
- attended and gave the keynote address at the Third Annual Meeting of the Association for Environmental Studies and Sciences in June 2011 in Burlington, Vermont; and
- attended, made presentations, and received a Distinguished Service Award at the Society for Conservation Biology's 24th Annual Meeting/International Congress for Conservation Biology, convened in July 2010 in Edmonton, Alberta, Canada.

In addition, Commission staff attended or participated in meetings of several interagency committees, teams, and working groups focused on marine mammal research and management issues. These included—

- recovery or special management teams convened to address recovery issues for the Hawaiian monk seal and the Florida manatee;
- take reduction teams (or their subgroups) convened to reduce takes of false killer whales, Atlantic large whales, bottlenose dolphins, and Gulf of Maine harbor porpoises, and by Atlantic pelagic longline fisheries;
- scientific review groups convened under the Marine Mammal Protection Act to review annual updates of stock assessments and marine mammal-fishery interactions, as well as a February 2011 workshop on Guidelines for Assessing Marine Mammal Stocks to consider revisions to the guidelines for preparing stock assessment reports and applying the potential biological removal framework;
- Subcommittee on Ocean Science and Technology plus its Interagency Working Groups on Ocean Partnerships, including the Biodiversity Ad Hoc Committee; Harmful Algal Blooms, Hypoxia, and Human Health; and the Interagency Ocean Observation Committee, formerly the Interagency Working Group on Ocean Observations;
- the Interagency Ocean Observation Committee's Data Management and Communications Steering Team, Data Partners Criteria Working Group, and Modeling and Statistics Team;
- the Interagency Arctic Research Policy Committee;
- the Interagency Coordinating Group on Acoustics;
- the Interagency Marine Debris Coordinating Committee;
- the Interagency Coordinating Committee for the Papāhanaumokuākea Marine National Monument;
- the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve Advisory Council;
- the Working Group on Marine Mammal Unusual Mortality Events; and
- the interagency liaisons discussing permitting issues regarding scientific research, enhancement, and public display; Institutional Animal Care and Use Committees and animal welfare guidelines; and related issues of concern.

Commission-Sponsored Research Projects

The Marine Mammal Commission supports research to further the purposes of the Marine Mammal Protection Act. As funding allows, the Commission convenes workshops and awards grants for research to identify, characterize, and minimize threats to marine mammals and their habitats. Research ideas originate from within the Commission, from unsolicited proposals submitted by scientists outside the Commission, and from responses to Commission requests for proposals. Since it was established in 1972, the Commission has funded more than 1,000 projects ranging in amounts from several hundred dollars to $150,000. Final reports of most Commission-sponsored studies are available from the National Technical Information Service or directly from the Commission. For a full list of all Commission sponsored projects that resulted in publications during 2010 and 2011 see Appendix B.

Commission-sponsored research projects funded in 2010

During 2010 the Commission conducted two formal reviews of unsolicited proposals, with evaluations and recommendations by the Committee of Scientific Advisors on Marine Mammals and funding decisions made by the Commissioners. For the first review, which occurred following a January submission deadline, the Commission received and evaluated 19 proposals and selected five for funding, with grant awards totaling approximately $174,000. For the second review, in June, the Commission evaluated 16 proposals and selected seven for funding, totaling approximately $280,100. In 2010 the Commission also awarded 10 other grants totaling $126,000, some of which provided small amounts of funding for timely research related to the *Deepwater Horizon* incident and for international projects to increase information about poorly known, endangered species. Another grant contributed toward publication costs for *Right Whale News*, a quarterly newsletter distributed electronically to people engaged in conservation of the North Atlantic right whale and its habitats. The Commission also continued support of *SireNews*, a semiannual newsletter dedicated to reporting on manatee and dugong research and conservation efforts worldwide. Brief descriptions of other projects funded in 2010 follow.

Passive acoustic monitoring in response to the *Deepwater Horizon* incident in the Gulf of Mexico (The Regents of the University of California, University of California San Diego): The Marine Mammal Commission funded this project to help assess the effects of the *Deepwater Horizon* oil spill on marine mammals inhabiting the Gulf of Mexico. The funding was for the deployment of a high-frequency acoustic recording package (HARP) to monitor the sound field in the area of maximum surface oil, approximately 5 to 10 miles down current from the leaking well. The instrument was fixed at about 1000 meters and recorded continuously for approximately 100 days. It detected vocalizations and echolocation clicks from sperm whales, pygmy and dwarf sperm whales, Bryde's whales, beaked whales, delphinids, and other small cetaceans. The Commission's support covered deployment and recovery of the HARP and preliminary analyses of the recorded data.

A workshop on estimating abundance of estuarine populations of bottlenose dolphins (National Fish and Wildlife Foundation, National Marine Fisheries Service, and Southeast Fisheries Science Center): Bay, sound, and estuary stocks of bottlenose dolphins (*Tursiops truncatus*) are common along the U.S. Atlantic and Gulf of Mexico coasts. Currently, the National Marine Fisheries Service has identified nine such stocks along the Atlantic coast and 32 in the northern Gulf of Mexico. The abundance estimates for all but three of these stocks are more than five years old. Investigators often use small-boat line-transect surveys to estimate abundance for estuarine stocks, but those surveys do not work well when the topography is complex and the waters are turbid. Investigators also may use photo-identification and mark-recapture techniques, although those techniques also are subject to constraints. In addition, dolphins observed in estuarine waters may include both members of the resident population and transient animals. Because of these and other complications, assessment methods vary considerably, which makes it difficult to compare abundance and other stock parameters. For this grant, the investigator convened a January 2011 workshop to develop best practices for estimating abundance of bottlenose dolphin

populations in the southeast United States. Workshop objectives included (1) establishing consistent definitions and terminology of resident and transient animals, (2) defining best practices in mark-recapture survey design and improving understanding of design constraints for different environments, and (3) evaluating mark-recapture analytical tools for their appropriateness in these complex environments. Participants included experts from various offices within the National Marine Fisheries Service, academia, and non-governmental organizations. The investigator and participants co-authored a NOAA Technical Memorandum summarizing workshop discussions, reviewing mark-recapture methods for estimating small cetacean abundance, and presenting workshop findings and best practices. Participants also identified a number of future research and assessment needs. One of those needs was addressed in a subsequent workshop to standardize photo-analysis methods. That workshop was held in November 2011 at the Society for Marine Mammalogy's 19th Biennial Conference on the Biology of Marine Mammals.

Development of criteria for assessing marine mammal status using population viability analysis (Montana State University, Bozeman, Montana): This project seeks to develop more objective, quantitative criteria for listing decisions under the Endangered Species Act and related legislation. The investigator is developing a standardized Bayesian framework for population viability analyses (PVAs) to assess risk. The framework will use all pertinent data available for a species with informative priors adjusted according to the amount and quality of those data. The investigator also will attempt to define a standard for the critical population level at which a particular species should be classified as endangered. The investigator has reviewed and created a database of all PVAs used to list marine mammals, turtles, and freshwater fish species, characterized current practices for PVAs, developed a web-accessible format for the review database, and is developing standards for guiding PVAs to be used in future listing decisions.

Facilitating effective polar bear conservation: Developing a pan-Arctic, integrated polar bear research and monitoring plan (Conservation of Arctic Flora and Fauna International Secretariat, Borgir, Nordurslod, Iceland): Polar bears (*Ursus maritimus*) inhabit extreme, remote environments and are difficult and costly to study. The IUCN's Polar Bear Specialist Group recognizes 19 polar bear populations; of these, poor or no trend data exist for 11 populations, fair trend data exist for five, and adequate scientific trend data exist for only three. At their 2009 meeting in Tromso, Norway, the Parties to the 1973 Agreement on the Conservation of Polar Bears called for coordinated monitoring of the remaining populations. The Marine Mammal Commission responded to that call by funding a proposal to develop a circumpolar plan for research and monitoring of polar bear populations. The investigator commissioned a background paper to provide an overview of current knowledge and in February 2011 convened a group of scientists (e.g., polar bear, climate and sea ice, and seal experts) and local resource users to formulate the plan. The background paper was developed under supervision of the IUCN's Polar Bear Specialist Group and published by the Circumpolar Biodiversity Monitoring Program of the Arctic Council's Conservation of Arctic Flora and Fauna working group. Workshop and plan objectives included: forming a hypothesis-driven conceptual model for research and assessment, establishing reference and secondary polar bear populations for targeted research and monitoring, identifying standard parameters to be investigated for all populations, determining optimal sampling schemes for the parameters, developing a suite of indicators to facilitate reporting of population status, developing a data management scheme, building models to predict future population trends and responses to disturbance, suggesting new research and monitoring approaches and methods, and developing a realistic schedule for plan implementation. After peer review by the Polar Bear Specialist Group and additional review by the Arctic Council, the plan is expected to be published in the scientific journal *Ursus*.

Assessing changing habitats of ice-dependent marine mammals of Beringia (University of Virginia, Charlottesville, Virginia): Climate disruption is having and will continue to have major impacts on Arctic marine mammals and marine ecosystems. Sea ice is declining and its characteristics are changing. The changes have important implications for a number of species and populations including walrus, polar bear, ringed seal, bearded seal, ribbon seal, and spotted seal. This study is aimed at characterizing the changes in ice properties and the consequences for these species with regard to their

foraging, resting, molting, and reproductive patterns. The study involves GIS-based analyses of satellite imagery of monthly sea ice concentrations and sea ice features at varying resolutions; tracking specific ice floes; observations of marine mammals and sea ice habitats recorded from the *Healy* in 2006 through 2009; benthic sampling of the shelf to assess the food supply for walrus; interviews of local subsistence hunters regarding their observations of change; analysis of weather and hunting logbooks; and finally, integration and synthesis of these data. The investigators will apply concepts of landscape ecology to assess the "seascape," relating the natural history of ice-dependent pinnipeds to their sea ice environments at different spatial scales.

Compilation and analyses of photographs of Irrawaddy dolphins in the Mekong River (Isabel Beasley, Carlton, Tasmania, Australia): The Irrawaddy dolphin (*Orcaella brevirostris*) inhabits rivers and shallow coastal waters in northern Australia, Indonesia, and southeastern Asia. It is at risk of extinction throughout much of its range. In Asia, freshwater Irrawaddy dolphins occur in Songkhla and Chilka Lakes and three major river systems – the Mahakam, Ayeyarwady, and Mekong Rivers. The investigator studied the Mekong River Irrawaddy dolphin population in Cambodia from 2001 to 2007. Much of the data from that research not yet been compiled and analyzed, but doing so is considered essential to the conservation of this species and population. To that end, the Marine Mammal Commission provided funding for (1) development of a photo-identification catalog for Irrawaddy dolphins in the Mekong River based on images collected from 2001 through 2007 and matching of the catalog with a similar catalog developed by the Cambodia Mekong Dolphin Conservation Program of the World Wildlife Fund, (2) preparation of a separate photographic catalog and analysis of dead dolphins observed in the Mekong from 2001 through 2005, and (3) reporting the findings to the World Wildlife Fund and IUCN's Cetacean Specialist Group.

Genetic status of the critically endangered Mediterranean monk seal (*Monachus monachus*) (Hellenic Society for the Study and Protection of the Monk Seal, Athens, Greece): With fewer than 600 seals, the Mediterranean monk seal species (*Monachus monachus*) is one of the most endangered pinnipeds in the world. Its populations have been severely diminished or exterminated by hunting, interactions with fishermen, coastal development, and at least one mass mortality event. Scientists know little about its biology and ecology because of its cryptic behavior and secluded habitat. The largest population includes 300 to 350 animals and inhabits secluded coastal caves and sandy beaches in the northeastern Mediterranean Sea, mainly in Greek and Turkish territories. The investigators for this study proposed a genetic study for this population, as called for in the "National Strategy and Action Plan for the Conservation of the Mediterranean Monk Seal in Greece 2009–2015." Study objectives include determining the best type of samples for genetic analyses and the most effective preservation techniques, identifying a sufficient number of polymorphic microsatellite loci for conducting finer-scale analyses, evaluating the efficacy of an existing method for determining the sex of individual seals, assessing genetic diversity using mitochondrial and nuclear DNA, examining the genetic consequences of a possible recent reduction in population size and determining whether a population bottleneck exists, and improving understanding of the population's spatial structure by identifying stocks and potential management units. The project will provide important baseline information and should help guide decision-making by Greek authorities responsible for protecting this endangered species.

Attaining a marine biodiversity observation network (Consortium for Ocean Leadership, Washington, DC): In May 2010 seven U.S. federal agencies, including the Marine Mammal Commission, sponsored a workshop to develop a plan for a marine biodiversity observing network. Workshop objectives were to review the status of current biodiversity observing systems and existing sampling technologies and techniques, assess other potential sources of information on biodiversity, and recommend options for enhancing federal capacity for addressing data shortfalls. Participants included representatives from the seven sponsoring agencies plus 35 invited scientists with expertise spanning a range of disciplines. Presentations and discussions focused on (1) integrating across multiple levels of biodiversity from intra-specific (i.e., genetic) to community- or habitat-based, (2) linking biodiversity to abiotic environmental variables, (3) investigating environmental forcing factors and the importance of biogeography, and (4) maintaining adaptive monitoring strategies to address new or unforeseen questions.

The final report will include the steering committee's assessment of monitoring actions that can be accomplished with existing infrastructure and technology, the steps required to build a better biodiversity observing network, and the benefits of doing so.

Seeking the mating ground of the North Atlantic right whale in the Gulf of Maine (New England Aquarium, Boston, Massachusetts): Scientists and managers responsible for conserving the critically endangered North Atlantic right whale (*Eubalaena glacialis*) can describe a portion of its migration route and have identified five critical habitat areas, but do not know the winter distribution of a large proportion of the population. Genetic analyses indicate that (1) the population includes a number of males not identified in photo-identification catalogues, (2) a number of adult females with calves use habitat outside the main summer nursery area in the Bay of Fundy, and (3) two-thirds of the known population has not been located during winter months despite comprehensive monitoring in Cape Cod Bay and on calving grounds off the southeast United States. Given these observations, the unidentified wintering areas likely are essential for survival and recovery of the species. Recent surveys observed right whale aggregations in the Gulf of Maine area southwest of the Jordan Basin during winter months, leading scientists to hypothesize that this may be a mating ground for the species. The investigators are testing this hypothesis using ship-based surveys to obtain (1) photographs for individual identification, life history information, examination of scars and body and skin condition for visual health assessment; (2) skin biopsy samples to establish the relationship of whales sampled and parentage of past and future calves; (3) fecal samples for studies of reproductive hormones; and (4) data on vessel traffic and types of fixed fishing gear in the area.

Southern right whale stranding response and health monitoring at Península Valdés, Argentina (Ocean Alliance, Inc., Lincoln, Massachusetts): The Southern Right Whale Health Monitoring Program is a joint effort of government agencies, non-profit organizations, and individuals who monitor the status and health of southern right whales (*Eubalaena australis*) at Península Valdés, Argentina. The program was established in 2003 to promote systematic monitoring of southern right whale strandings and deaths at this site, which is an important nursery ground for the right whale population. In 2008 the Commission provided a grant to help build monitoring and response capacity and it provided additional support in 2010 because of continued high mortality. Mortality peaked in 2005 and then nearly doubled each year from 2007 through 2009. In 2009 the Scientific Committee of the International Whaling Commission recommended continuous monitoring of the population. It then convened a workshop in Puerto Madryn to consider potential causes of the unusual mortality events. This grant supports continued monitoring, data collection, and analysis by the health monitoring program. Specific objectives include maintaining the stranding network, surveying Península Valdés beaches at specific intervals, examining each dead whale that is found or reported, conducting necropsies whenever possible and performing extensive tissue sampling, collecting and analyzing water samples for harmful algal blooms as is feasible and exporting samples for analyses, maintaining and updating the database and collections, analyzing data and assessing results, and collaborating with government agencies and officials responsible for managing right whales and their habitat.

Photo-identification catalog of killer whales of the Russian Far East (North Pacific Wildlife Consulting, LLC, Anchorage, Alaska): Scientists know little about killer whales (*Orcinus orca*) in the Russian Far East or their role as predators of Steller sea lions (*Eumetopias jubatus*). The U.S. Revised Recovery Plan for the Steller Sea Lion requires that population trends must be stable to increasing in five of the seven sub-regions of the western distinct population segment before it can be delisted under the Endangered Species Act. The Russian Far East is one of the seven sub-regions, which means that monitoring of Steller sea lions and interactions with killer whales in this area is essential. In recent decades North Pacific Wildlife Consulting has documented and archived killer whale sightings in the Russian Far East, collected biopsy samples for genetics and contaminants research, and archived acoustic records to identify dialects and pod associations. It has over ten thousand photographs, and with support from the Commission, has begun to develop a photo-identification catalog of all identifiable killer whales in eastern Kamchatka, the Kuril Islands, the Commander Islands, and the Sea of Okhotsk. The catalog will be in both Russian and English. The investigators will print and distribute one hundred copies of the

catalog to known whale researchers in the region and make an electronic version available on the company's website.

Translating the monograph "Cetaceans of the Southern Hemisphere: Biology and prospects for population recovery" (North Pacific Wildlife Consulting, LLC, Anchorage, Alaska): Whaling fleets from the Union of Soviet Socialist Republics, Japan, and other nations killed as many as 50,000 whales per year through the mid-twentieth century. Beginning with the 1949–1950 whaling season, Soviet fleets falsified data submitted to the International Whaling Commission regarding the number of whales taken annually. Dr. Yuri Mikhalev was a member of the science crew and a whale observer on numerous Soviet whaling expeditions in the Southern Ocean and adjacent Indian Ocean during the period from 1964 through 1975. Among other things, he kept records of the number of whales killed by species, their distribution, and certain biological traits. He subsequently compared his records with those submitted by the Soviet Union to the International Whaling Commission. He developed a monograph entitled: "Cetaceans of the Southern Hemisphere: Biology and the prospect of population recovery" to document the information he had collected. The Commission provided a previous grant to support publication of his monograph in Russian. This grant will support translation of the text from Russian into English to ensure that his information is available to a wider audience.

Support for translation services at the Sixth International Conference of Marine Mammals of the Holarctic (North Pacific Wildlife Consulting, LLC, Anchorage, Alaska): Russia hosts a biennial conference on marine mammals of the Holarctic. The conference has become the largest gathering of marine mammal scientists in Russia. It provides a unique opportunity to share the results of recent marine mammal and ecosystem studies, including the ecological effects of climate disruption across the region. The 2010 conference, held in Kaliningrad, was the sixth in the series and marked the 10th anniversary of the inaugural conference. More than 200 participants from 13 countries attended and made 170 presentations about research on various marine mammal species and threats to their survival. The Marine Mammal Commission provided support for real-time translation of these presentations and for translation of the conference proceedings to increase access to this information.

Support of the Fifth International Marine Debris Conference (Ocean Conservancy, Washington, DC): Marine debris is a pervasive and growing threat to many animals, including seabirds, sea turtles, and marine mammals, especially seals and sea lions. The debris ranges from pieces of plastic and soda cans to derelict fishing gear and abandoned vessels. It can entangle or smother marine life or serve as a vector for invasive species. Animals also may ingest the debris, which can lead to internal injuries, intestinal blockages, loss of nutrition, starvation, and death. International cooperation is necessary to address this issue and resulting impacts, prevent or reduce levels of debris entering the oceans, and raise public awareness. Four international marine debris conferences explored this issue between 1984 and 2000. NOAA and the United Nations Environment Programme (UNEP) convened the Fifth International Marine Debris Conference in Hawaii in March 2011 to mark the 25th year of reduction and assessment efforts. The Ocean Conservancy partnered with these organizations to help organize the conference and coordinate funding. The Marine Mammal Commission provided support to defray travel costs for students and professionals who otherwise would not have been able to attend. Conference goals were to exchange information on the latest research initiatives, methods, and results; share lessons learned regarding strategies and best practices for reducing and preventing debris-related impacts; promote international learning and strengthen international cooperation; and discuss innovative ideas, such as market incentives and communications strategies to expand successful approaches.

The whale pump: Marine mammals and primary productivity in the Bay of Fundy (University of Vermont, Burlington, Vermont): For this grant the investigators proposed to examine the "whale pump" hypothesis that, during the spring and summer, marine mammals transfer nutrients upward in the water column and concentrate them near the surface in the Bay of Fundy and Grand Manan Basin. They contend that the transfer may sustain the relatively high productivity of those areas, with numerous implications for the surrounding ecosystems. They proposed to collect fecal samples from whale feeding aggregations and pinniped haul-out areas; analyze the samples to determine concentrations of ammonium, particulate organic nitrogen, and nitrogen stable isotopes; and conduct incubation time-course

experiments to determine rates at which plankton re-assimilate the nitrogen in suspended fecal matter. Data obtained from the laboratory analyses will provide a first approximation of the nitrogen budget in areas where whales aggregate, and may lead to development of a more generalized model of the whale pump over a range of ecosystems. Depending on the results, this research could expand understanding of the various ecological roles of marine mammals.

Quantifying the effects of human interactions on spinner dolphins in resting bays in Hawaii, and assessing the effectiveness of time area closures as a proposed mitigation approach (Duke University, Durham, North Carolina): After foraging offshore at night, spinner dolphins (*Stenella longirostris*) in Hawaii return to inshore waters during the day where they socialize, rest, and hide from predators. Tourism and other human activities are increasing in those sheltered waters and may be affecting dolphins' resting periods, with potential population-level effects. The investigators for this study are collaborating with the National Marine Fisheries Service's Pacific Islands Regional Office and Fisheries Science Center to evaluate the potential effects of exposure to human activity on Hawaiian spinner dolphins. This grant provides partial funding for year one of a three-year research effort to collect baseline data on dolphin local abundance, distribution, and behavior at four sites on the Island of Hawaii: Kealakekua Bay, Makako Bay, Honaunau Bay, and Kauhako (Ho'okena) Bay. The investigators will (1) conduct boat-based photo-identification surveys of the dolphins in the four bays, estimate their abundance using capture-recapture methods, describe their movement patterns, and assess their habitat use; (2) deploy passive acoustic recording devices in these bays; and (3) use theodolite tracking and scan sampling to collect data on activity states of focal groups of dolphins, study their fine-scale movements and surface behavior, and track movements in relation to specific vessels. If possible, the investigators also will conduct fieldwork at a "low-traffic" site off the Kalaupapa Peninsula on Molokai. The Service will use the data to inform potential management approaches such as time-area closures.

Condition of gray seal pups from a rapidly growing breeding population on Muskeget Island, Massachusetts (University of New England, Biddeford, Maine): Bounties in Maine and Massachusetts nearly extirpated the gray seal (*Halichoerus grypus*) population from U.S. waters in the first half of the twentieth century. Their populations have increased significantly under the protections of the Marine Mammal Protection Act. The species' largest and southernmost breeding population is on Muskeget Island in Nantucket Sound. At that site, the number of pups grew from five in 1988 to more than 2,000 in 2008. Within the past few years, scientists have initiated various studies on gray seal recolonization dynamics, genetics, diet and foraging ecology, breeding behavior, disease, and entanglement in fishing gear. Continued assessment of this expanding population is necessary to obtain the information needed for its management. The investigator plans to flipper tag, obtain measurements of, and collect biological samples from approximately two hundred weaned gray seal pups during January 2011. Specific objectives include improving abundance estimates by re-sighting tagged animals and using mark-recapture models, describing pup movements following the post-weaning fast, comparing the condition of weaned pups with those weaned in previous years and at other locations, and assessing the prevalence of various pathogens and parasites that may affect the health of these seals.

Monitoring and predicting abundance of endangered and threatened marine mammal populations (Dr. L. Lee Eberhardt, Kennewick, Washington): Predicting future population trends and forecasting abundance is one of the major foci of work related to endangered species. Most assessments have focused on predictions of long-term abundance and projections of population status, or population viability analyses, from 20 or 30 years to 100 years into the future. Although management agencies also must be concerned with the more immediate future, very little work has focused on shorter-term forecasts for endangered and threatened species. The investigator proposes to develop a method for producing short-term (one to 10 year) projections from predictions or trend lines for endangered or threatened marine mammal populations. The investigator will use data that are readily available from large vertebrate populations, with emphasis on marine mammals. Due to the limited number of appropriate long (25 to 30 year) datasets, the investigator may use simulations to inform and develop parameters including variances. Projection analyses will stem mainly from count data rather than from estimates of reproductive and survival rates. The investigator will test the application of various types of equations and

models, both parametric and non-parametric, although he likely will rely most heavily on the former as certain non-parametric methods are not useful for small sample sizes. In addition to developing short-term predictions, the investigator proposes to assess whether longer-term (20 to 30 year) population projections are useful. The anticipated outcome of this project is refinement of an approach to project trends for endangered and threatened species and thereby guide management actions.

Support for the Second Annual Meeting of the Association for Environmental Studies and Sciences (Association for Environmental Studies and Sciences, c/o Soirée, Portland, Oregon): The Association for Environmental Studies and Sciences was established in 2008 to provide a forum for scholars and scientists to promote better understanding of the human-environment relationship by integrating science, policy, management, ethics, history, and other relevant disciplines. The association seeks to provide its members with the latest environmental information and tools to strengthen research, improve teaching, and encourage innovative approaches to problem-solving. It offers a newsletter on its website and in 2011 plans to launch its flagship journal, published by Springer, as an outlet for peer-reviewed, multi-disciplinary work on leading environmental research and management issues. It also convenes formal annual meetings or conferences, its second being the June 2010 conference held at Lewis and Clark College in Portland, Oregon. The theme of the 2010 conference was "many shades of green," reflecting the growing diversity of the environmental movement and spread of "green" thinking into new and varied disciplines. The conference organizers sought to increase representation of marine mammal- and marine habitat-related information and conservation issues in the presentations and panel discussions. The Marine Mammal Commission provided partial support for attendance by students interested in the conservation of marine mammals or the conservation, health, and stability of marine ecosystems.

Prospects for breeding poorly known species of small cetaceans in captivity (Dr. Barbara E. Curry, Escondido, California): Captive breeding is an important conservation tool for many endangered species. Its utility for small cetaceans, however, is not clear. Captive breeding was considered for the baiji (*Lipotes vexillifer*), for example, but was not implemented successfully—the baiji now is considered extinct. Experiences with this and other species indicate that reliable live-capture and husbandry techniques must be developed before attempting to use captive breeding to conserve an endangered species. Techniques for assisted reproduction and reintroduction also are necessary if the species is to be returned to the wild. The investigators for this grant will review the history of attempts to capture, maintain, and breed poorly known species of small cetaceans in captivity. This review will consider assisted reproductive technologies that have been applied to other small cetacean species. The investigators will evaluate this information and consider the prospects for using captive breeding to conserve critically endangered small cetacean species, including the vaquita (*Phocoena sinus*), Asian Ganges and Indus river dolphins (*Platanista* spp.), and river-dwelling subpopulations of the Irrawaddy dolphin (*Orcaella brevirostris*).

Commission-sponsored research projects funded in 2011

In 2011 the Commission conducted one formal review of unsolicited proposals. The Committee of Scientific Advisors on Marine Mammals evaluated 25 proposals and the Commissioners selected eight for funding. In addition, the Commission awarded 12 other grants for proposals received throughout the year, including those for gear testing and development to reduce bycatch of the critically endangered vaquita, and for a National Research Council study to assess the current state of science on oil and gas operations and capabilities for response under Arctic conditions. The grants funded by the Commission in 2011 totaled just over $400,000. One of these awards was directed to the Society for Marine Mammalogy to support graduate student travel to the 19th Biennial Conference on the Biology of Marine Mammals, convened in Tampa, Florida. Another contributed toward publication costs for *Right Whale News*, a quarterly newsletter distributed electronically to people interested in efforts to study and conserve the North Atlantic right whale and its habitats. The Commission also continued support for *SireNews*, a semiannual newsletter dedicated to manatee and dugong research and conservation efforts worldwide. The following are brief descriptions of other projects funded in 2011.

Cooperative research between U.S. and Mexican agencies to develop a vaquita-safe shrimp trawl for use in the Upper Gulf of California (Joint: National Marine Fisheries Service's Southeast Fisheries Science Center's Harvesting Systems Unit, Pascagoula, Mississippi, and World Wildlife Fund Gulf of California Program, Mexico): The vaquita (*Phocoena sinus*) resides in the upper reaches of Mexico's Gulf of California. It is critically endangered, with only 150 to 250 individuals remaining. It has been decimated by entanglement in fishing gear, primarily artisanal gillnets targeting blue shrimp (*Litopenaeus stylirostris*). To reduce vaquita bycatch, the Mexican Instituto Nacional de Pesca (INAPESCA) has been evaluating alternative fishing gear, the most promising being trawl gear that can be pulled by pangas (i.e., small watercraft 7 to 11 m in length). INAPESCA developed a small trawl made of state-of-the-art materials to minimize drag and allow vessels to tow a larger net. The Harvesting Systems Unit of the National Marine Fisheries Service's Southeast Fisheries Science Center began collaborating with INAPESCA on vaquita-safe trawl research and, based on that Unit's experience, it recommended an alternative trawl design. The Commission provided support to the Harvesting Systems Unit for field tests with INAPESCA of the two nets off the Mississippi coast in the Gulf of Mexico and in the Gulf of California. The Commission also provided support to the World Wildlife Fund-Mexico to facilitate the field tests in the Gulf of California. At the end of 2011 the parties were still analyzing the data, but the preliminary results indicate that the alternative, cheaper design was also effective at catching shrimp and appears to be a viable alternative to the gillnets currently in use.

Responding to oil spills in Arctic environments (National Research Council, National Academy of Sciences, Washington, DC): *Deepwater Horizon* in April 2010 was a stark reminder of the difficulty of responding to an oil spill. Those difficulties will be even more pronounced in the Arctic, where oil and gas development is underway. The Arctic is an especially sensitive area with a distinct set of challenges – remoteness, low temperatures, seasonal darkness, and the presence of ice. An oil spill, whether from a blowout, pipeline leak, or vessel accident, poses considerable risk to Arctic communities and ecosystems. The National Research Council proposes to assess the current state of the science relevant to oil spill response and environmental assessment in the Arctic region, with emphasis on potential impacts in U.S. waters. It will establish a committee with members from universities, federal government laboratories, the private sector, and/or non-governmental organizations. Committee members shall possess expertise in oil spill response and mitigation, including response and recovery technologies, physical oceanography, ice conditions, Arctic ecology and natural resources, marine engineering, maritime transportation, and marine safety and risk assessment. The Commission is one of several agencies providing support for this two-year study. The committee will focus on (1) oil spill scenarios, (2) preparedness, (3) response and clean-up, and (4) strategies for establishing environmental baselines. It will map cumulative activities and identify potential "hot spots" for a spill in U.S. or adjacent waters, describe various factors such as oil type, possible volume and trajectory of spills, location and proximity to communities and important natural resources, etc. It also will outline preventative steps that might be taken to avoid a spill. The preparedness assessment will include a description of anticipated operating conditions, evaluation of current hydrographic and charting data for higher risk areas, assessment of infrastructure for operating in these conditions, identification of gaps within existing agreements for international cooperation and capacity for supplying response infrastructure, etc. For response and clean-up, the committee will evaluate the effectiveness and drawbacks of current response methods used in Arctic conditions; assess the potential for separating and recovering spilled oil from water, ice, rocks, and sediment; assess the utility of existing and emergent technologies to detect, map, track, and project trajectories of spills under anticipated operating conditions; and evaluate the effectiveness of oil dispersal, removal, and recovery technologies according to specified criteria. Finally, the Committee will characterize the types of baseline information needed prior to an oil spill, identify resources at risk for priority consideration in developing protection strategies, and identify sampling and monitoring priorities for establishing baseline conditions and evaluating post-spill impacts. Results of the study should aid in developing oil spill response plans to ensure that prevention, containment, and response strategies will reduce the environmental risks of increasing oil and gas development in the Arctic.

Development of a booklet on marine mammal guidelines for the Bering Strait Region, Alaska (University of Alaska Fairbanks, Fairbanks, Alaska): The Bering Strait is an important seasonal feeding area and biannual migration corridor for marine mammal species and populations. Peoples of the Bering Strait region rely heavily on the sea for subsistence resources, and Alaska Natives depend on several marine mammal species for consumptive, cultural, and economic needs. The Bering Strait also is the sole transit corridor for vessel traffic through the Arctic to the Pacific Ocean. Shipping activity in the Arctic is increasing as ice melts from global climate disruption. Other marine-based industries, including tourism and commercial fisheries, are increasing or likely to do so in the foreseeable future. Such factors likely will lead to increased human-marine mammal interactions, including many with species listed as endangered or threatened, or currently undergoing status review under the Endangered Species Act. It is difficult for residents that commonly use marine mammals in various ways, and visitors who may encounter these species, to access a single source of information that describes the laws and regulations that govern those interactions. Three different federal agencies are responsible for management, research, and law enforcement pertaining to the various marine mammal species, and distance to the coastal rural communities of the Bering Strait region impedes communication. The Commission is supporting an effort to compile a comprehensive description of the current status of marine mammal species in the Bering Strait region as well as a description of regulatory requirements for their management. The investigator will develop a booklet that includes information on basic life history; stock assessments; agencies responsible for management, enforcement, research activities; harvest restrictions; salvage; local ordinances; reporting requirements; co-management organizations; agency contacts; defense of life; requirements for possessing edible portions and selling or transferring edible portions for consumption; wildlife viewing; strandings and incidental take and response protocols; handicrafts and requirements for buying/selling and exporting/importing to other countries; industrial activity; scientific research; use for educational purposes; safety protocols; and a history of state and federal regulations and management. The investigator anticipates printing approximately 5,000 booklets, making them publicly available, and distributing them to at least eight local communities. The intent is to help Alaska Natives in the Bering Strait region to understand marine mammal research and management efforts, encourage their participation in that management, and enhance communication with the appropriate management authorities.

Ecological and socioeconomic aspects of small cetacean and artisanal fishery interactions in Southeast Asia (Regents of the University of California, San Diego – Scripps Institution of Oceanography, La Jolla, California): Irrawaddy dolphins (*Orcaella brevirostris*) inhabit tropical and subtropical estuarine and fresh waters (including certain rivers) of the Indo-Pacific, from the Philippines and islands of the Indonesian Archipelago south to northeastern Australia and west to northeastern India in the Bay of Bengal. Their distribution is discontinuous and they occur in small, fragmented populations. No range-wide survey of this species has been conducted and local and regional assessment efforts have been limited. Nonetheless, where the species has been studied (1) population sizes are low (animals numbering from 10s to low 100s, with only one exception), (2) their range has declined significantly, and (3) numerous risk factors threaten their persistence, especially habitat degradation and bycatch in gillnets.[1] The IUCN has identified and assessed five populations to date. The IUCN Red List of Threatened Species lists the overall species as vulnerable but each of the five populations as critically endangered. Indeed, the species is in danger of disappearing throughout much of its range. Duke University's Project GloBAL (Global Bycatch Assessment of Long-lived Species) recently began using a standardized questionnaire, or "Rapid Bycatch Assessment" to collect data on the impacts of artisanal fisheries on marine megafauna from local communities throughout various areas of the world. The investigator for this grant modified this assessment tool to develop a "Rapid Bycatch and Socioeconomic Assessment," which includes socioeconomic and cultural data in the assessment. The investigator will use this modified assessment tool to interview key informants (e.g., particularly knowledgeable fishers, fish buyers, and ecotourism guides). The investigator will then use that information to promote discussion of

[1] Available at http://www.iucnredlist.org/apps/redlist/details/15419/0

alternative fishery management strategies and better conservation measures for four populations of Irrawaddy dolphins in Southeast Asia (i.e., Malampaya Sound, Philippines; Guimaras, Philippines; Trat Province, Thailand; and the Mahakam River, Kalimantan, Indonesia). The goal of the project is to help quantify the extent of Irrawaddy dolphin bycatch in local fisheries, improve understanding of the biology and ecology of various Irrawaddy populations, and assess other threats faced by these populations within social, cultural, and ecosystem-based frameworks.

Ecology, status, fishery interactions, and conservation of coastal Indo-Pacific humpback and bottlenose dolphins on the west coast of Madagascar (Wildlife Conservation Society, Bronx, New York): The Wildlife Conservation Society has been assessing the status of coastal cetaceans and attempting to mitigate the effects of hunting in southwest Madagascar since 2004, following identification of the Anakao community's drive hunts on pods of spinner (*Stenella longirostris*), Indo-Pacific bottlenose (*Tursiops aduncus*), and Indo-Pacific humpback (*Sousa chinensis*) dolphins. The Society's research indicates that a number of coastal dolphin populations face a variety of threats, including directed hunting, fishery bycatch, and inadequate management. The Society began an education and awareness program in local villages, facilitated establishment of the community-based Anakao Association for the Protection of Whales and Dolphins, and promoted the development of local traditional laws fostering cetacean conservation. For this grant, the Society's specific objectives are to: (1) assess the abundance, status, distribution, and habitat preferences of Indo-Pacific bottlenose and humpback dolphin populations in northwest Madagascar; (2) assess the extent of interactions between artisanal fisheries and coastal dolphin populations in northwest Madagascar, for both directed hunting and incidental bycatch; and (3) implement outreach measures and a series of community workshops in four villages in the southwest of Madagascar to respond to identified threats, including the drive hunt. Fieldwork and analyses are planned for 2011 through 2014. The Commission is providing partial support, primarily for the first and second years.

"Mermaids of the Amazon": Using the Amazonian manatee as a flagship species for conservation in the Lower Rio Negro Region, Brazilian Amazon (Instituto de Pesquisas Ecológicas, Manaus, Amazonas State, Brazil): The Amazonian manatee (*Trichechus inunguis*) is endemic to the rivers and tributaries of the Amazon River system. The largest populations are in Brazil and others occur in Colombia, Peru, and eastern Ecuador. The species is classified as vulnerable on the IUCN Red List, is on Brazil's list of threatened species, and is included in Appendix I of the Convention of International Trade in Endangered Species of Wild Fauna and Flora. Hunting is the primary threat. Laws to protect Amazonian manatees have helped, but hunters from local communities still take them for subsistence and illegal trading. Scientists know little about their biology and ecology because they are cryptic and difficult to study in the dark, murky waters of the Amazon. The purpose of this grant is to further scientific knowledge of the species, especially in the Rio Negro region of Brazil, and encourage local people to participate in actions to conserve the manatee and its habitat. Specific objectives include identifying and mapping manatee habitat and recording environmental data (e.g., hydrologic data) associated with manatee presence, conducting monthly monitoring, and describing differences in habitat use in the wet and dry seasons. The investigators will test side-scan sonar for detecting Amazonian manatees, as has been used in Florida and Mexico to detect West Indian manatees. They also will organize a workshop with local community members to solicit traditional knowledge, identify important manatee habitat, identify threats, engage community members in conservation efforts, and promote understanding of the long-term benefits of protecting natural resources.

Establishing a model stranding network in India: Marine mammal necropsy and stranding response training (Madras Veterinary College, Tamil Nadu Veterinary and Animal Sciences University, Chennai, India): India's developing economy is rapidly consuming vital resources with inadequate consideration of sustainable fisheries practices and conservation of other marine resources including marine mammals. Twenty of the 25 cetacean species known to occur there are poorly known, although many appear to be decreasing at an alarming rate because of habitat destruction and modification and bycatch in fisheries. India's Ministry of Environment and Forests recently began efforts to implement a National Marine Species Conservation and Management Action Plan that will establish

marine protected areas and develop recovery plans for marine species. However, the plan does not include marine mammals. Under this grant the investigators convened a workshop to highlight the importance of marine mammals and their conservation and promote development of stranding response networks to gain scientific information about the marine mammal species occurring in India's waters. The workshop fulfilled a recommendation from the first ever (2010) marine mammal stranding workshop held in India, which was co-organized by India's Central Marine Fisheries Research Institute and the U.S. National Oceanic and Atmospheric Administration. The workshop convened under this grant consisted of two main parts: (1) a necropsy demonstration to train veterinary professionals and those with general interest and (2) capacity building for stranding and entanglement response, with working group discussions to refine the India Marine Animal Stranding Program Framework Guidance document and hands-on mock stranding exercises with scientific experts and participants primarily from the Tamil Nadu and Andhra Pradesh Districts of India. The workshop report will be provided to the Ministry of Environment and Forests and Principal Chief Conservator of Forests for potential implementation of recommendations at a regional scale. Other anticipated workshop outcomes include establishment of a local marine mammal stranding network in Chennai and surrounding areas, with designated coordinators, responders and personnel to rescue and rehabilitate marine mammals or perform necropsies and collect samples from marine mammals, plus designated labs to process samples. The investigators hope that this stranding network will serve as a model for replication in other parts of India.

Assessment of Lake Ladoga ringed seal population status and bycatch in commercial fisheries (Biologists for Nature Conservation, Saint Petersburg, Russia): The ringed seal subspecies endemic to Lake Ladoga (*Pusa hispida ladogensis*) is one of the few pinniped subspecies in the world to live permanently in a freshwater lake. It has declined from about 20,000 seals in the early 1900s to only 2,000 to 4,000 seals in 2001. The primary cause appears to be bycatch in fishing gear. Additional human-related threats include construction in coastal zones, use of motor boats in the summer and snowmobiles during the winter, and pollution and chemical contamination. Surveys of fishermen indicate that seal bycatch and depredation increased from 2004 to 2008. Under this grant, the investigators propose to conduct aerial surveys to estimate the current abundance of Ladoga ringed seals and their distribution, collect commercial fisheries data to assess current rates of seal bycatch, analyze data to determine possible spatial and temporal patterns in conflicts between the seals and commercial fishers, and recommend potential mitigation measures including sites for seasonal and permanent protected areas. Resulting information will be distributed to Russian and international governing institutions and other conservation authorities to encourage further research and conservation actions.

Support for the Marine Mammal Commission's global assessment of marine mammal conservation (Marine Conservation Institute, Bellevue, Washington): The Marine Mammal Commission is conducting a global assessment of marine mammals and threats to their survival. Results of the assessment will provide the Commission with information necessary to advise U.S. agencies regarding international marine mammal conservation. Results also will inform the global conservation community regarding the status of various species, and provide a basis for setting conservation priorities and directing limited resources. Under this grant, the Marine Conservation Institute will provide support for completing the global assessment. More specifically, it will help compile existing marine mammal assessments, assess threats to marine mammal species and their vulnerability to those threats, design and prepare for an expert workshop, and draft the workshop report and the assessment document.

Second International Conference on Marine Mammal Protected Areas: "Endangered spaces; Endangered species" (National Marine Sanctuary Foundation, Silver Spring, Maryland): The International Committee on Marine Mammal Protected Areas, a group of international experts dedicated to the conservation of marine mammals and their habitats, seeks to ensure that existing and new protected areas are designed to encompass important marine mammal habitat and that marine mammals are considered in current ocean zoning and marine spatial planning initiatives. Committee members have varied expertise and represent various geographic regions worldwide. The committee organized its initial conference in 2009 in Hawaii. A number of key initiatives emerged from that meeting, including the establishment of sister sanctuaries and protected area networks, and the completion of reports describing

successes and failures of efforts to protect marine mammal habitat. In 2011 the committee held a second conference, co-hosted by the U.S. National Oceanic and Atmospheric Administration and the French Agency for Marine Protected Areas (Agence des Aires Marines Protégées) on the French island of Martinique. The Commission supported travel to the meeting by representatives of developing countries. The meeting covered topics related to managing threats to endangered species within and outside protected areas, developing sirenian and river dolphin protected areas in Latin America and Asia, improving understanding of marine mammal critical habitat and hotspots, protecting critical habitat and migration routes using marine spatial planning and ocean zoning, managing local threats (e.g., bycatch, ship strikes), addressing broad ecosystem challenges (e.g., climate change, ocean noise), and enhancing legal/enforcement mechanisms through regional and global agreements.

Support of the Fourth International Science Symposium on Bio-logging (Institute for Marine and Antarctic Studies, University of Tasmania, Hobart, Tasmania, Australia): Marine mammals and other wildlife face increasing threats from global climate disruption, habitat loss and modification, and resource consumption by humans. Understanding the function of species and populations in ecosystems, their key habitats and resource requirements, and their capacity to adapt to changing environments is essential for conservation and ecosystem-based management. Applying electronic recording devices to animals, or bio-logging, is a valuable means of obtaining such information. The Commission provided partial support for the Fourth International Science Symposium on Bio-logging, convened in Hobart, Australia, in March 2011. The symposium was organized around five themes: inference of population dynamics from individuals; habitat modeling; conservation biology; fishery and biodiversity management applications; and study of Southern Ocean ecosystems. Symposium objectives were to (1) advance the use of bio-logging technology to understand the behavior, physiology, and ecology of animals and their use of the environment, and any potential changes resulting from climate disruption; (2) enhance understanding of key challenges, research, and developments at the frontier of bio-logging science; (3) promote diversity and originality in research, and cross-disciplinary partnerships in developing observation systems that integrate biological, ecological, physiological, and physical data; and (4) establish and nurture international cooperation. Literature relevant to the symposium will be published in a special issue of the journal Deep Sea Research Part II.

Support for the U.S. Integrated Ocean Observing System and the Integrated Ocean Observation Committee (Consortium for Ocean Leadership, Washington, District of Columbia): The U.S. Integrated Ocean Observing System is a national consortium of government and non-governmental organizations with environmental interests in open ocean, U.S. coastal, and Great Lakes ecosystems. Eighteen federal agencies, 11 regional associations, and numerous sectors participate. The Interagency Ocean Observation Committee is the federal interagency working group responsible for coordinating and guiding ocean observations, with an express focus on the U.S. Integrated Ocean Observing System. The committee is responsible for such things as determining required observation data variables, developing certification standards and compliance procedures for all non-federal assets, establishing protocols for data management and communications, identifying gaps in observation coverage, preparing annual and long-term plans, preparing an annual comprehensive budget, and developing an independent cost estimate for comparison with the U.S. government's cost estimate for building IOOS' initial capability to achieve core functions. In addition, the committee collaborates with the Executive Office's Ocean Policy Task Force and the Council on Environmental Quality to implement provisions of the National Ocean Policy. The Marine Mammal Commission contributed a small amount of funding to aid the committee in executing its mandated programmatic activities in 2011.

Symposium on Population Consequences of Acoustic Disturbance to Marine Mammals (Consortium for Ocean Leadership, Washington, DC): Anthropogenic sound may affect the behavior, distribution, vital rates, and population status of marine animals. The mechanisms by which such effects occur are clear conceptually, but the data needed to describe those effects in detail are not available for many species. The Office of Naval Research has sponsored an initiative to model the population-level effects of multiple sources of disturbance, including sound, on marine mammals. Under this initiative 30 researchers and professionals from 20 institutions and three continents have sought to develop a strategy

for characterizing the process by which disturbance results in population-level effects. In October 2011 the Office of Naval Research and the Commission co-sponsored a symposium to describe the process, findings, and implications of these modeling efforts to the wider marine community. This symposium was held at the Consortium for Ocean Leadership in October 2011. Objectives of the symposium were to (1) provide the justification for assessing the effects of anthropogenic sound on marine mammals and describe the working group's conceptual frameworks, (2) describe progress in translating the National Research Council's 2005 conceptual model of population-level consequences of sound into formal, species-specific, and ultimately transferable mathematical functions; and (3) illustrate progress with case studies of northern and southern elephant seals, coastal bottlenose dolphins, northern right whales, and beaked whales. The work presented in this symposium was intended to guide research and management efforts and project how marine mammals could respond to alternative scenarios of natural and human-caused environmental change.

Anthropogenic and physiological data reconstructed from whale earwax plugs (Baylor University, Waco, Texas): The investigators for this grant seek to develop new techniques that use marine mammals as ecosystem sentinels based on their long-term habitat preferences and distributions. The investigators are combining aging methods with a novel analytical approach to recover hormones and contaminants from cetacean earwax plugs and reconstruct lifetime cortisol and contaminants profiles for individual whales. Cetaceans excrete wax into their ear canals, where it accumulates during an individual's lifetime and forms an earwax plug. The plug is a keratin and lipid structure consisting of alternating early dark and light lamina and may be used to estimate age. The investigators are extracting lipophilic substances from the plugs and analyzing them to quantify levels of a wide range of historically and currently used contaminants as well as the stress hormone cortisol. The methods were developed using gray whale earwax plugs that the Smithsonian Institution donated from their collection. Work under this grant used a blue whale earplug donated by the Santa Barbara Museum of Natural History. The blue whale had died from a ship strike along the California coast in 2007 and the earwax plug was collected post-mortem. Proposed deliverables include one manuscript that reconstructs age-related profiles of the blue whale's exposure to contaminants and levels of corresponding stress hormones and a second manuscript that describes methods for measuring contaminants and hormones from mysticete earwax.

Support of the Third International Conference on Acoustic Communication by Animals (Acoustical Society of America, Melville, New York): In 2011 the Acoustical Society of America and Cornell University convened the Third International Conference on Acoustic Communication by Animals. The conference, held in Ithaca, New York, focused on animal detection, production, and use of sounds and the role of acoustic communication in animal evolution, ontogeny and learning, ecology, behavior, and social interactions. The conference sessions and presentations were organized according to bioacoustic communication concepts, rather than by taxonomic groups. Portions of the conference also focused on animal adaptation to life in complex acoustic environments and the application of new techniques to study such environments. Innovative technologies are providing a means to record sound in a wide variety of environments and at high sampling rates for extended periods of time. The conference discussed the emergent challenges resulting from such innovation, such as managing, analyzing, and interpreting extremely large datasets. The Marine Mammal Commission contributed funds to support student attendance at this conference and encourage involvement in this growing field.

Support for the Third Annual Meeting of the Association for Environmental Studies and Sciences (Association for Environmental Studies and Sciences, c/o University of Vermont Environmental Program, Burlington, Vermont): The Association for Environmental Studies and Sciences was established in 2008 to provide a forum for scholars and scientists to engage in multi-faceted understanding of the human-environment relationship through consideration of science, policy, management, ethics, and history. The association seeks to provide its members with the latest environmental information and tools to strengthen research, improve teaching, and encourage innovative approaches to problem-solving. It produces a newsletter on its website and recently launched its flagship journal, published by Springer, as an outlet for peer-reviewed, multi-disciplinary work on leading environmental research and management issues. It also convenes formal annual meetings or conferences,

its third being the June 2011 conference held at the University of Vermont in Burlington. The theme of the 2011 conference was "confronting complexity," as the human-environment relationship has become increasingly complex. The organizers sought experts to present marine and marine mammal-related content for this conference. They planned six sessions to discuss such content, including two on the modeling efforts by the working group on the population-level consequences of acoustic disturbance on marine mammals. The Marine Mammal Commission provided partial support for student registration and travel to the conference.

Survey of Federally Funded Marine Mammal Research and Conservation

The Marine Mammal Commission conducted an annual survey of federally-funded marine mammal research and studies from 1974 to 2000. In 2008 the Commission consulted with representatives of other federal agencies regarding re-initiation of the survey. It then solicited bids and worked with Washington Consulting Government Services, an Alion Science and Technology company, to develop a Web-based survey form and data collection system. The Commission refined this system in 2009, offered certain federal agencies opportunities to beta-test the survey, and prepared for the initial data request.

The Commission reinitiated the survey in 2010 with a focus on research and conservation efforts in fiscal year 2009. The survey requested information on the species, research topics and issues, and geographic regions studied, as well as the costs, sponsoring and performing agencies, offices, and organizations. In June 2010 it issued a formal request for such information to federal departments and agencies that may have supported marine mammal research or conservation during fiscal year 2009. In many cases, extra outreach efforts were necessary to determine the appropriate points of contact within each office and help familiarize respondents with the online system. The Commission tracked entries and allowed for a prolonged response period for this first data request to ensure as many responses as possible. The Commission closed this call for data in December 2010.

In 2011 the Commission collaborated with Washington Consulting to download and import the data collected into a usable format for conducting analyses, and worked to develop the report. The Commission also considered respondents' feedback on the system and data entry process, identified priorities to facilitate future data entry, and collaborated with Washington Consulting to implement these changes. Functional modifications include such things as the ability to recall and build on previously submitted project or program entries for similar efforts that are continued in subsequent years. Substantive changes also allow for collection of more specific data, including identifying species at the stock level for those stocks occurring within U.S. waters, and characterizing geographic or location information according to the global Large Marine Ecosystem framework. The system also asks whether datasets for a particular project are archived or otherwise made publicly available, and where those data reside. Due to the time required to implement the changes, the Commission decided to issue a simultaneous call for data for fiscal years 2010 and 2011. The Commission sent letters to this effect to agency heads and previous respondents in September 2010. The letters notified them of this plan and asked that they reserve these data to provide a complete response during the next call, planned for early 2012. At the end of 2011, the Commission was working to finalize both the draft report of fiscal year 2009 data and the modifications to the online system in preparation for the 2010–2011 data call.

Chapter XI

PERMITS AND AUTHORIZATIONS TO TAKE MARINE MAMMALS

The Marine Mammal Protection Act places a moratorium 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. The Act also allows certain exceptions, one providing for the issuance of permits by either the National Marine Fisheries Service or the Fish and Wildlife Service (depending on the species of marine mammals involved) to authorize the taking or importation of marine mammals for purposes of scientific research, enhancing the survival or recovery of a species or stock, or public display. Permits also are available for the taking of marine mammals in the course of educational or commercial photography. In addition, the Marine Mammal Commission reviews permit applications involving marine mammals as requested under the Antarctic Conservation Act, which is mandated to conserve and protect the native mammals, birds, and plants of Antarctica and the ecosystems of which they are a part. Permits under that Act are administered by the National Science Foundation. The Commission reviews all such permit applications, including amendment requests.

The Act also allows the National Marine Fisheries Service and the Fish and Wildlife Service to grant authorizations for scientific research that only involves taking by Level B harassment. In addition, the Act allows the Services to grant authorizations for the taking of small numbers of marine mammals incidental to activities other than commercial fishing, provided that the taking will have no more than a negligible impact on the affected stocks. The taking of marine mammals incidental to commercial fishing operations is authorized under separate provisions of the Marine Mammal Protection Act and is discussed in Chapter VIII.

Permits

Permits for scientific research, species enhancement, public display, and photography involve a four-step review process: (1) individuals or organizations submit permit applications to either the National Marine Fisheries Service or the Fish and Wildlife Service as appropriate to the listing status of the species and depending upon which agency has management authority for the species; (2) the Service conducts an initial review, publishes a notice of receipt of the application in the Federal Register inviting public review and comment, and provides the application to the Marine Mammal Commission; (3) the Commission, in consultation with its Committee of Scientific Advisors, reviews and provides its recommendation to the Service; and (4) the Service takes final action after consideration of recommendations and comments from the Commission and the public. If captive maintenance of animals is involved, the Service seeks the views of the Animal and Plant Health Inspection Service regarding the adequacy of facilities, animal husbandry and care programs, and transportation protocols**.**

The responsible agency can amend an issued permit if the proposed change meets the applicable statutory and regulatory requirements. The Services follow the same notice, review, and comment procedures as the original permit application if the amendment would extend the duration of the research beyond 12 months, result in the taking of additional numbers or species of animals, increase the type and number of takes or risk of adverse impact, or change or expand the location of the research. The Commission reviews all proposed amendments to permits unless they do not meet the previously stated

requirements and therefore are considered by either the National Marine Fisheries Service or the Fish and Wildlife Service to be of a minor nature.

During 2010, the Commission reviewed 29 permit applications submitted to the National Marine Fisheries Service and 15 permit applications submitted to the Fish and Wildlife Service. Of the applications received from the National Marine Fisheries Service, 21 were for scientific research or enhancement and 8 were for public display. Of applications received from the Fish and Wildlife Service, 10 were for scientific research or enhancement, 1 was for public display, and 4 were for commercial/educational photography. In addition, the Commission reviewed 16 permit amendment requests submitted to the Services (11 to the National Marine Fisheries Service and 5 to the Fish and Wildlife Service). In 2010 the Commission also reviewed three permit applications for research in the Antarctic that were submitted to the National Science Foundation for authorization under the Antarctic Conservation Act of 1978. In general, the Services and the National Science Foundation adopted the Commission's recommendations concerning these permit actions. The proposed activities, Commission's recommendations, and the agencies' responses to the Commission's recommendations are summarized in Appendix A.

During 2011, the Commission reviewed 31 permit applications submitted to the National Marine Fisheries Service and 7 permit applications submitted to the Fish and Wildlife Service. Of the applications received from the National Marine Fisheries Service, 26 were for scientific research or enhancement, 2 were for public display, and 3 were for commercial/educational photography. All seven of the applications received from the Fish and Wildlife Service were for scientific research or enhancement. In addition, the Commission reviewed 20 permit amendment requests submitted to the Services (16 to the National Marine Fisheries Service and 4 to the Fish and Wildlife Service). In 2011 the Commission also reviewed five permit applications and one permit amendment request for research in the Antarctic that were submitted to the National Science Foundation for authorization under the Antarctic Conservation Act of 1978. In general, the Services and the National Science Foundation adopted the Commission's recommendations concerning these permit actions. The proposed activities, Commission's recommendations, and the agencies' responses to the Commission's recommendations are summarized in Appendix A.

General authorizations for scientific research

Amendments to the Marine Mammal Protection Act enacted in 1994 enable the National Marine Fisheries Service and the Fish and Wildlife Service to streamline authorization of research that only involves taking by Level B harassment (i.e., any act of pursuit, torment, or annoyance that has the potential to disturb but not injure a marine mammal or marine mammal stock). The Services have granted such authorizations for between 6 and 19 research projects each year. In 2010 the National Marine Fisheries Service issued 12 letters of confirmation and amended one letter of confirmation under the general authorization. In 2011 the Service also issued 12 letters of confirmation, thereby minimizing delays associated with issuing permits. However, the general authorization does not apply to activities that may take threatened or endangered marine mammals, which remain subject to the additional permitting requirements of the Endangered Species Act. During the June 1999 testimony before the House Resources Committee Subcommittee on Fisheries Conservation, Wildlife, and Oceans, the Commission recommended that the general authorization be expanded to apply to all marine mammals. Such a proposal has yet to be included in the Marine Mammal Protection Act reauthorization bills submitted to Congress by the Secretary of Commerce and the Secretary of the Interior, because these agencies believe that amending the Endangered Species Act would be a more appropriate way to implement such a change.

Small-take authorizations

Section 101(a)(5) of the Marine Mammal Protection Act allows U.S. citizens to obtain authorization to unintentionally take small numbers of marine mammals incidental to activities other than commercial

fishing when those activities meet certain conditions. Applicants can utilize this provision when the number of animals likely to be affected is "small" and the impacts on the recruitment and survival of the affected species or stocks are likely to be negligible. All forms of incidental taking, including lethal taking, may be authorized by regulation under section 101(a)(5)(A). Section 101(a)(5)(D), added to the Act in 1994, provides a streamlined alternative to the rulemaking required to secure a small-take authorization, when the taking will be by Level B harassment only.

Regulations established under section 101(a)(5)(A) to authorize incidental taking of marine mammals must set forth permissible methods of taking and requirements for monitoring and reporting, as well as a finding that the taking will have a negligible impact on the recruitment and survival of the affected species or stocks. The Secretary may issue incidental take authorizations under section 101(a)(5)(A) for periods up to five years, with letters of authorization issued annually. For incidental harassment authorizations under section 101(a)(5)(D), the Secretary is to publish (within 45 days) a proposed authorization and notice of availability of the application for public review and comment in the *Federal Register*, 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 regarding the application. The Secretary may issue incidental harassment authorizations under section 101(a)(5)(D) for periods up to one year. Both types of authorizations may be renewed.

During 2010, the Commission reviewed 28 requests for small-take authorizations—6 under section 101(a)(5)(A) and 22 under section 101(a)(5)(D). In 2011, the Commission reviewed 42 requests for small-take authorizations—10 under section 101(a)(5)(A) and 32 under section 101(a)(5)(D). The proposed activities, Commission's recommendations, and the agencies' responses to the Commission's recommendations are summarized in Appendix A.

Appendix A

2010–2011 MARINE MAMMAL COMMISSION RECOMMENDATIONS AND AGENCY RESPONSES

2010

6 January 2010

To: National Marine Fisheries Service
Issue: Proposed changes to increase the transparency of regional fishery management councils, as intended by the Magnuson-Stevens Fishery Conservation and Management Act
Recommendation: The Commission recommended that the National Marine Fisheries Service require councils to make all background environmental and management-related documents available to the public in a timely fashion and provide the councils with any necessary technological assistance for posting all pertinent documents on the Internet.
Agency Response: The Service issued the final rule on 21 September 2010, consistent with the Commission's recommendation. The Service stated that the councils should not be technically constrained by posting documents on the Internet, but they will maintain copies of documents that are too large to be placed on their Web sites at the council offices for public viewing.

8 January 2010

To: National Marine Fisheries Service
Issue: Application for a research permit from Douglas Nowacek, Ph.D., to conduct behavioral observations, photo-identification, and suction-cup tagging on North Atlantic right whales during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service defer issuance of the permit until it has resolved National Environmental Policy Act issues concerning research on this species and has prepared the necessary environmental analyses.
Agency Response: The Service issued the permit on 6 July 2010, somewhat consistent with the Commission's recommendation. It prepared an environmental assessment that analyzed the impacts of issuing a permit to authorize the proposed activities on the human environment; subsequently a Finding of No Significant Impact was signed on 1 July 2010.

8 January 2010

To: National Marine Fisheries Service
Issue: Application to amend a research permit from James Harvey, Ph.D., to conduct pinniped research at The Marine Mammal Center, Sausalito, California
Recommendation: The Commission recommended approval, provided that the National Marine Fisheries Service verifies that the proposed research has been approved by the applicant's Institutional Animal Care and Use Committee (IACUC) and that the conditions contained in the current permit remain in effect.
Agency Response: The Service issued a permit amendment on 24 February 2010 for the applicant to increase the number of harbor seal pups taken annually in California but denied the request for temporary captivity of wild seals. It is unclear if the Service verified that the research was approved by the applicant's IACUC, which can occur only after the permit has

been modified.

11 January 2010
To: U.S. Fish and Wildlife Service
Issue: Application for a photography permit from John Downer, John Downer Productions, Ltd. to harass northern sea otters during filming activities in Kachemak Bay, Alaska
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service (1) issue the permit, provided that the permit specify the number of sea otters authorized to be harassed and (2) before issuing the permit, ask the applicant what additional species and numbers of marine mammals could be taken by harassment and either provide authorization for such species or refer the applicant to the National Marine Fisheries Service to obtain such authorization for species under that agency's jurisdiction.
Agency Response: The Service issued the permit on 23 February 2010, consistent with the Commission's recommendations. The Service also stipulated that the permit holder must ensure that other marine mammals are not in the area when he commences filming and that he must cease activities (including shutting down or landing any apparatus) if other marine mammals are encountered during filming.

11 January 2010
To: National Marine Fisheries Service
Issue: Application from the California Department of Transportation to take small numbers of harbor seals, California sea lions, and gray whales by harassment incidental to retrofitting the Dumbarton Bridge in southern San Francisco Bay
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, provided that monitoring and mitigation activities proposed in the Service's *Federal Register* notice are implemented.
Agency Response: The Service issued the incidental harassment authorization on 12 March 2010, consistent with the Commission's recommendation.

14 January 2010
To: Florida Fish and Wildlife Conservation Commission
Issue: Revised Draft Final Endangered and Threatened Species Listing Process Rule regarding a framework for protecting Florida species needing special conservation attention
Recommendation: The Commission recommended, among other things, that the Florida Fish and Wildlife Conservation Commission further revise the Listing Process Rule to (1) ensure that the meaning of "harass" in the definition of take encompasses activities likely to disrupt normal behaviors in ways that could reduce survival or reproduction and therefore have population-level effects; (2) avoid ambiguities regarding the point at which a federally designated endangered or threatened species is "scheduled" for removal from the federal list and clarify whether provisions for biological reviews apply to removals of such species from the state list; and (3) add provisions to establish appropriate time limits for completing each phase of the listing review process.
Agency Response: The Florida Commission adopted a final state rule on September 1 2010, consistent with most of the Commission's recommendations. However, it did not indicate a time frame for the state to complete its evaluation of public requests to list or remove species from the state list.

15 January 2010
To: National Marine Fisheries Service
Issue: Proposed rule and environmental assessment regarding measures to protect killer whales in Washington's inland waters

Recommendation: The Commission recommended that the National Marine Fisheries Service implement all regulations described in its 29 July 2009 *Federal Register* notice to increase protection of killer whales, particularly the endangered southern resident stock, from vessel impacts in Washington's inland waters; analyze and include additional regulatory provisions to establish stand-by zones at some distance beyond the 200-yard approach limit and limit the number of vessels that can be present between that boundary and the 200-yard approach limit at any one time; consider and include safe operating procedures as part of any final rule governing vessel operations in the vicinity of killer whales in the inland waters of Washington State; adopt a regulatory speed limit of either 7 knots or, at a minimum, a "slow safe speed" requirement within 400 yards of killer whales; develop a monitoring plan to assess compliance with and evaluate the effectiveness of the vessel approach regulations included in the final rule and describe that plan in the associated preamble; include implementation of a "no-go" zone off the west coast of San Juan Island; and initiate discussions with Canada to develop comparable management strategies for killer whales throughout the inland waters of both Washington and British Columbia.

Agency Response: The Service issued a final rule on 16 May 2011, consistent with one of the Commission's recommendations. It prohibited most vessels from approaching killer whales closer than 200 yards in Puget Sound and other inland waters of Washington or from moving closer than 400 yards into the path of any killer whale. The Service rejected the Commission's recommendations to restrict speed within 400 yards of whales, establish a stand-by zone, and include safe operating procedures around whales due to administration and enforcement difficulties. It also deferred implementation of the no-go zone pending further analyses and did not address the recommendation to develop a plan for assessing compliance and effectiveness of the regulations.

15 January 2010

To: U.S. Fish and Wildlife Service
Issue: Application for a photography permit from Pontecorvo Productions, LLC. to take polar bears by harassment during filming activities in the Beaufort Sea area
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service defer further consideration of the permit until the following are clarified: time frame for setting up camp, location of the camp, distance from the den to the camp, how smells from the film crew will be minimized, and what, if any, protocols to respond to an aggressive bear will be implemented. In addition, the Commission noted that application does not, but should, discuss why the film crew could not establish its filming site close to a den but build its camp farther away and describe the methods and mitigation measures to be used when filming polar bears hunting seals.
Agency Response: The Service issued a permit on 26 February 2010, consistent with some of the Commission's recommendations. However, it is unclear if Pontecorvo Productions clarified the time frame for setting up camp and how they would respond to aggressive bears.

15 January 2010

To: U.S. Fish and Wildlife Service
Issue: Application for a research permit from Beth Shapiro to import from Canada blood and tissue samples taken from 125 polar bears between 1980 and 2008
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided the applicant obtains all necessary permits under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) before importing the samples.
Agency Response: The Service issued the permit on 5 March 2010, consistent with the Commission's recommendation.

15 January 2010
To: National Marine Fisheries Service
Issue: Application for a public display permit from Dolphin Quest Hawaii to import two captive-born adult male bottlenose dolphins from its sister facility, Dolphin Quest Bermuda, to its facility in Waikoloa, Hawaii
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the Service determine that the applicant's program for education or conservation is consistent with professionally recognized standards of the public display community and the applicant obtains all necessary permits under CITES before importing the animals.
Agency Response: The Service issued the permit on 23 February 2010, consistent with the Commission's recommendations.

20 January 2010
To: National Marine Fisheries Service
Issue: Application for a public display permit from SeaWorld, Inc., to import one male pilot whale that stranded in 2004 from Kamogawa SeaWorld in Chiba, Japan, to its facility in San Diego
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided it is satisfied that the whale in question stranded as a result of natural causes.
Agency Response: The Service issued the permit on 10 September 2010; however, neither the permit nor the *Federal Register* notice indicated if the animal stranded as a result of natural causes.

20 January 2010
To: National Marine Fisheries Service
Issue: Application from the California Department of Transportation to take small numbers of California sea lions and harbor seals by harassment incidental to retrofitting the Antioch Bridge, east of the confluence of the Sacramento and San Joaquin Rivers
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, provided that mitigation and monitoring measures proposed in the Service's *Federal Register* notice are implemented.
Agency Response: The Service issued the incidental harassment authorization on 5 April 2010, consistent with the Commission's recommendation.

27 January 2010
To: Naval Facilities Engineering Command Northwest
Issue: Draft Environmental Impact Statement/Overseas Environmental Impact Statement (DEIS) regarding proposed Navy activities in the Gulf of Alaska
Recommendation: The Commission recommended that the Navy (1) revise its DEIS to ensure that (a) all activities included under the no-action alternative have been evaluated, (b) the alternatives evaluated and presented to decision-makers and the public include a reduction in activity level, and (c) the scope of decision-making is not unnecessarily constrained; (2) resolve inconsistencies, omissions, and errors in the DEIS and either reissue it or use some other mechanism to allow decision-makers and the public to review and respond to the revised information; (3) withdraw the current section of the DEIS dealing with Cook Inlet beluga whales, conduct the essential analysis of impacts on this endangered stock, and reissue at least that section of the amended DEIS; (4) provide explicit and detailed descriptions of the measures that will be used to avoid risks to certain species or stocks of special concern; (5) expand the description of marine mammal habitat use in the Gulf of Alaska by reviewing information on species-specific distribution and movement patterns obtained from whaling records, scientific research, and other sources during the past century; (6) evaluate the anticipated effectiveness of mitigation and

monitoring measures; and (7) require vessel commanders to retain vessel logs and reports for a minimum of three years.

Agency Response: The Navy published a final environmental impact statement on 11 March 2011 and a record of decision on 19 May 2011, consistent with one of the Commission's recommendations. The Navy indicated that all activities under the no-action alternative were evaluated, a reduction in training activities would not meet the Navy's purpose and need to fulfill military readiness objectives, and the scope of the decision-making was not constrained in any way. The Navy also did not supplement its analysis of the action area for Cook Inlet belugas, because Cook Inlet is located far from the proposed action and not within the area for consideration of impacts. The Navy did work closely with marine mammal experts and the National Marine Fisheries Service on the analysis for species distribution and density estimates and believes that analysis is complete. In addition, the Navy specified its mitigation and protective measures in Chapter 5 of the DEIS and plans to evaluate the effectiveness of its mitigation and monitoring measures with the cooperation of the Service. Lastly, the Navy indicated that vessel logs would be retained for more than 30 days consistent with the Navy's record management procedures but did not specify if they would be retained for a minimum of three years.

29 January 2010

To: U.S. Fish and Wildlife Service

Issue: Application from Alaska SeaLife Center for renewal of its letter of authorization to assist U.S. Fish and Wildlife Service in the rescue, rehabilitation, and release of stranded northern sea otters and walruses and for an enhancement permit to authorize activities with respect to the threatened southwest Alaska distinct population segment of northern sea otters

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the authorization, provided that the Service, in consultation with the Animal and Plant Health Inspection Service, is satisfied that the applicant's plans and facilities for transporting and maintaining the requested animals are adequate to provide for their health and well-being.

Agency Response: The Service issued the letter of authorization and enhancement permit on 29 June 2010, consistent with the Commission's recommendation.

29 January 2010

To: National Marine Fisheries Service

Issue: Application for a research permit from Alaska SeaLife Center to acquire, possess, import, and export samples (i.e., teeth, hair, vibrissae, reproductive organs, skin, blood, urine, etc.) from up to 4,000 cetaceans and 5,000 pinnipeds

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the applicant (1) obtain all necessary permits under CITES before importing or exporting marine mammal parts and (2) document that each specimen was taken in accordance with the laws of the country of origin, that the taking was consistent with the requirements of the Marine Mammal Protection Act, and that specimens are being used only for bona fide scientific purposes.

Agency Response: The Service issued the permit on 19 March 2010, consistent with the Commission's recommendations.

4 February 2010

To: National Marine Fisheries Service

Issue: Status review for listing the insular population of false killer whales in Hawaii as endangered or threatened under the Endangered Species Act

Recommendation: The Commission recommended that the National Marine Fisheries Service ensure that, whenever possible, longline observers collect samples from all false killer whales caught in Hawaii and expedite genetic analyses of those samples; use all

available photo-identification records to evaluate associations among individual false killer whales in Hawaii and to provide a more powerful assessment of the likelihood of interbreeding between pelagic and insular populations; err on the side of caution by acting on the basis of the multiple-stock hypothesis unless the Service can make a strong case that the insular and pelagic whales are part of a single breeding population; either find this population to be a significant ecological and genetic component of the species, or provide a rationale for why the only known insular population of false killer whales in U.S. waters is not significant to the species; and include the shortline, kaka, and other fisheries likely to take members of the insular population within the scope of the Hawaiian False Killer Whale Take Reduction Team.

Agency Response: After a comprehensive review, the National Marine Fisheries Service determined that the Hawaiian insular false killer whale is a distinct population segment that qualifies as a species under the Endangered Species Act and proposed to list it as endangered. The Service did not propose to designate critical habitat at this time but did ask for comments in the 17 November 2010 *Federal Register* notice regarding a final listing rule and designation of critical habitat in the event the distinct population segment is listed. The Commission commented on 15 February 2011.

11 February 2010

To: National Science Foundation

Issue: Application to modify an authorization from Douglas P. Nowacek, Ph.D., to expand currently authorized research on humpback and minke whales

Recommendation: The Commission recommended that the National Science Foundation adopt a general policy to require that the permit holder or the applicant seeking authorization under the Antarctic Conservation Act to conduct research on marine mammals in areas subject to that Act also be the same applicant or permit holder seeking authorization under the Marine Mammal Protection Act, or if that is not possible, strengthen its coordination efforts with the National Marine Fisheries Service's permit division to determine precisely which researchers are authorized to conduct what activities, under what permit or permits and make that information available as part of the public comment process.

Agency Response: The Foundation issued the authorization modification on 17 February 2010. It is unclear if a general policy regarding consistency between authorized permit holders has been adopted.

17 February 2010

To: National Marine Fisheries Service

Issue: Proposed inclusion of non-strategic Hawaii insular and Palmyra Atoll stocks within the scope of the newly formed False Killer Whale Take Reduction Team

Recommendation: The Commission recommended that the National Marine Fisheries Service include the Hawaii insular and Palmyra Atoll stocks within the scope of the False Killer Whale Take Reduction Team; either include the Hawaii shortline and kaka fisheries within the scope of the False Killer Whale Take Reduction Team or work with the state of Hawaii to (1) consider ways to determine the characteristics and rates of interaction of shortline and kaka fisheries with false killer whales and (2) identify and implement measures to avoid such interactions; use the team to review the available information on the American Samoa stock of false killer whales and the associated longline fishery and develop a research agenda to guide the Service's investigation of interactions between them; and retain the option of adapting the team's scope and membership to address potential incidental false killer whale takes by the American Samoa longline fishery when the available information is sufficient for that purpose.

Agency Response: The National Marine Fisheries Service agreed to include the Hawaii Insular and Palmyra Atoll stocks of false killer whales within the scope of the team; but

declined at this time to include the Hawaii shortline and kaka line fisheries because of limited information regarding the fisheries and lack of documented interactions between those fisheries and marine mammals. The Service also declined to ask the team to address the American Samoa stock of false killer whales or the American Samoa longline fishery but indicated it would consider adapting the team's scope and membership, should information become available indicating that incidental takes from the American Samoa stock of false killer whales are at unsustainable levels.

3 March 2010

To: National Marine Fisheries Service
Issue: Proposed designation of critical habitat for the endangered Cook Inlet stock of beluga whales under the Endangered Species Act.
Recommendation: The Commission recommended that the National Marine Fisheries Service adopt its proposal to designate all waters and coastal areas of Cook Inlet used by beluga whales north of 60° 25' N as critical habitat for the beluga. In addition, the Commission recommended that the Service expand designation farther from shore to include all coastal waters less than 18 m in depth in the rest of the inlet as critical habitat, including waters on the eastern side; include areas in the lower portion of the inlet that must be available for reoccupation if and when the population increases; adopt a precautionary approach by declining to exercise its discretion to exclude any proposed critical habitat based on economic considerations; and provide Fort Richardson's integrated natural resources management plan to the public and, in the final rule, explain the basis for its conclusion that the plan provides benefits to the Cook Inlet beluga whale population.
Agency Response: The Service issued a final rule on 11 May 2011, consistent with some of the Commission's recommendations. The Service did not believe that sufficient justification existed for including additional areas in the lower inlet in the designation, because modeling had not identified those areas as having high habitat use values. It also declined to include any historically (but currently unoccupied) areas in the designation, because it did not believe that those areas are essential to the conservation of the species. In addition, the Service opted to exclude Fort Richardson from the designation, noting that the integrated natural resources management plan provided benefits to beluga whales by restricting personnel access to beluga whale habitat, incorporating mitigation measures designed to reduce the potential for harassment or injury of whales, and promoting research on beluga whale habitat use in and adjacent to the facility.

4 March 2010

To: National Marine Fisheries Service
Issue: Proposed implementing measures to restrict vessels that engage in illegal, unregulated, and unreported (IUU) fishing from entering U.S. ports
Recommendation: The Commission recommended that the National Marine Fisheries Service work closely with the Department of State to promote greater consistency in the definitions of "IUU fishing" and in the IUU deterrence and prevention measures authorized under different regional fishery management organizations; review current legislative authorities for imposing sanctions where the United States has enough evidence of IUU fishing by vessels not listed by any fishery management organization, or where the vessels' activities are in dispute, and, where any gaps in authority are identified, recommend amendments to close them; clarify specific steps to be taken to determine whether to deny port access to a specific vessel; provide notice and explanations for actions taken, whether access is denied or not; support ongoing U.S. Coast Guard efforts to eliminate the notification exemption for foreign vessels less than 300 gross tons; and convey to member nations of the Agreement on the International Dolphin Conservation Program the importance of creating a provisional IUU vessel list at the program's next annual meeting

in June 2010.
Agency Response: The Service issued a final rule on 27 October 2010, consistent with some of the Commission's recommendations. Specifically, the final rule clarified the procedures for denying port access to a specific vessel and agreed to provide notice and explanation for actions taken. However, with respect to the Commission's other recommendations, the Service noted that it was pursuing the issues or policies through other means.

5 March 2010
To: National Marine Fisheries Service
Issue: Application for an exempted fishing permit under provisions of the Atlantic Coastal Fisheries Cooperative Management Act to allow testing of fixed fishing gear with no vertical lines on Jeffrey's Ledge in the Gulf of Maine
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the experimental fishing permit but require the applicant to carry an independent, Service-approved observer to help record data and verify its accuracy and completeness. The Commission further recommended that the Service continue to seek funding to develop and test alternative fishing gear and practices to reduce the risks from conflicts between marine mammals and fishing gear.
Agency Response: The application was withdrawn due to confusion on the part of some Atlantic Large Whale Take Reduction Team members regarding the project.

11 March 2010
To: National Marine Fisheries Service
Issue: Proposed rule to revise guidelines for National Standard 2 of the Magnuson-Stevens Fishery Conservation and Management Act requiring use of the best scientific information available in fisheries conservation and management and to establish new guidelines for scientific peer review
Recommendation: The Commission recommended that the National Marine Fisheries Service include further direction in the guidelines for fishery managers to use scientific information at the ecosystem level; preserve the principles of relevance, inclusiveness, objectivity, transparency and openness, timeliness, verification and validation, and peer review in the final guidelines; emphasize the importance of evaluating uncertainty, identifying gaps in information, and recognizing the associated risks of moving forward with ill-conceived management actions; promote a more cautious interpretation of findings where uncertainty is high in order to ensure conservation of data-poor species, and provide an incentive to collect the necessary information; provide a minimum of 21 days to enable timely but more thorough external review and comment; continue to recognize the scientific and statistical committees as the scientific advisory bodies to the councils, include conflict of interest provisions in the final rule and ensure that they apply to all peer reviewers and committee members; require the Secretary to disclose the source of any information included in a stock assessment and fishery evaluation report and carry out a targeted peer review of new information included in the document; and require more thorough assessments of marine ecosystems in stock assessment and fishery evaluation reports.
Agency Response: The Service did not publish the final rule by the end of 2011 but plans to publish it in early 2012. However, the Service stated that the Commission's comments were very helpful.

26 March 2010
To: National Marine Fisheries Service
Issue: Application to authorize the incidental taking of humpback whales from the endangered central North Pacific stock in the Hawaii-based longline fisheries for a three-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service comply with section 101(a)(5)(E) of the Marine Mammal Protection Act, issue the incidental take authorization, and reexamine the criteria for authorizing the permit to determine whether it is still satisfied if the Service's five-year status review of humpback whales identifies a new stock structure.
Agency Response: The Service issued the incidental take authorization on 24 May 2011 for a period of three years, complying with section 101(a)(5)(E). The stock structure analysis had not been completed by the end of 2010; thus, a new stock structure has not been identified and criteria have not been re-examined.

29 March 2010 **To:** National Marine Fisheries Service
Issue: Application from the National Marine Fisheries Service Alaska Region to take small numbers of northern fur seals by harassment incidental to replacing and repairing the fur seal research observation towers and walkways on St. Paul Island
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, provided that mitigation and monitoring measures proposed in the Service's *Federal Register* notice are implemented and that field crews (1) clear all construction-related debris from each site when construction ends and (2) use bolts or other materials, rather than nails, so that structures that become decrepit in the future do not become hazardous to animals.
Agency Response: The Service issued the incidental harassment authorization on 16 April 2010, with one of the Commission's recommendations. However, the Service rejected the suggestion to use bolts instead of nails, noting that the construction project had been designed by a certified engineer and that the design met code, structural load/stress, and safety criteria with the use of nails.

29 March 2010 **To:** National Marine Fisheries Service
Issue: Notice of intent to prepare a recovery plan for the Cook Inlet beluga whale
Recommendation: The Commission recommended that the National Marine Fisheries Service use the conservation plan for the Cook Inlet beluga whale that it had published in October 2008 as a template for developing the recovery plan; promptly establish a recovery team to assist in developing and implementing the recovery plan; and use the conservation plan as the appropriate guide for its research and other conservation efforts pending recommendations of the recovery team and recovery plan.
Agency Response: At the end of 2010 the Service had established a recovery team that is assisting with preparation of a recovery plan.

29 March 2010 **To:** National Marine Fisheries Service
Issue: Application from Lamont-Doherty Earth Observatory to take small numbers of marine mammals by harassment incidental to a marine geophysical survey in waters of the Northern Mariana Islands
Recommendation: The Commission recommended that, before issuing the incidental harassment authorization, the Service provide additional justification for its preliminary determination that the planned monitoring program will be sufficient to confidently detect all marine mammals within or entering the identified safety zones; clarify when passive acoustic monitoring would not be used to detect marine mammals or when two observers would not be on duty and the conditions under which these otherwise required components of the monitoring program would not be considered practicable; extend the required monitoring period at start-up to at least one hour before the initiation of airgun activities and one hour before the resumption of airgun activities after a power-down because of a marine mammal sighting within the safety zone; and require that observers collect and

analyze data on the effectiveness of ramp-up as a mitigation measure.
Agency Response: The Service did not issue the incidental harassment authorization, because the planned geophysical survey was postponed until 2012. Lamont-Doherty Earth Observatory re-submitted the incidental harassment authorization application in 2011.

31 March 2010
To: U.S. Fish and Wildlife Service
Issue: Application for an enhancement permit from the U.S. Fish and Wildlife Service's Jacksonville Field Office to take Florida manatees for rehabilitation and post-release monitoring, to import rescued manatees from the Bahamas and the Virgin Islands, and to import and export biological specimens collected from rescued manatees
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the enhancement permit under the Endangered Species Act authorizing the identified activities, but that authorization under the Marine Mammal Protection Act be pursuant to section 109(h) rather than by means of an enhancement permit issued under section 104(c)(4) of that Act. If the Service decides to authorize the proposed activities under an enhancement permit, the Commission recommended that the Service fully document its rationale for determining that the requirements of section 104(c)(4) have been met.
Agency Response: The Service issued the permit on 30 August 2011, consistent with the Commission's recommendation.

5 April 2010
To: National Marine Fisheries Service
Issue: Application for a research permit from Florida Atlantic University to harass several species of cetaceans, including North Atlantic right whales, during aerial and vessel surveys to obtain data on marine mammals and sea turtles in the Straits of Florida and Gulf Stream Current
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit but defer authorization to harass right whales until the Service has resolved National Environmental Policy Act issues concerning research on this species and has prepared the necessary environmental analyses.
Agency Response: The Service issued the permit on 3 December 2010 but did not address the right whale issues.

9 April 2010
To: National Marine Fisheries Service
Issue: Intent to prepare an environmental impact statement to analyze the impacts of issuing incidental take authorizations to the oil and gas industry for the taking of marine mammals incidental to offshore exploration in the Chukchi and Beaufort Seas off Alaska
Recommendation: The Commission recommended that the National Marine Fisheries Service include the following in the environmental impact statement: a more robust approach that involves convening the responsible agencies, industries, and interested stakeholders to develop and implement a comprehensive assessment of ecosystem baseline conditions before oil and gas operations further progress; a means for coordinating seismic surveys in the Chukchi and Beaufort Seas to cause the least amount of seismic activity and resulting disturbance; and a mechanism to ensure coordinated efforts to integrate the biological, physical, and social information pertinent to oil and gas exploration and production into a framework for analyzing and modeling the resulting effects on Arctic marine ecosystems.
Agency Response: The Service did not issue a draft environmental impact statement by the end of 2011 but did submit it to the Environmental Protection Agency for publication in early 2012.

9 April
To: National Marine Fisheries Service

2010 **Issue:** Application for a research permit from Paul Ponganis to harass and tag up to five leopard seals a year (not to exceed 10 seals during five years) and to take up to one seal per year by accidental mortality during research activities to determine prey intake rates of leopard seals
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the research be suspended if more than one seal is accidentally killed during a field season or if five animals are killed during the five-year period and the applicant be required to obtain the necessary permits under the Antarctic Conservation Act.
Agency Response: The Service issued the permit on 17 June 2010, consistent with the Commission's recommendations.

12 April 2010 **To:** National Marine Fisheries Service
Issue: Application to amend a research permit from Andrew Read to harass up to 200 juvenile Arnoux's beaked whales annually and to tag up to five individuals annually in the Southern Ocean
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided the conditions contained in the original permit remain in effect.
Agency Response: The Service issued the permit amendment on 27 September 2010, consistent with the Commission's recommendation.

16 April 2010 **To:** National Marine Fisheries Service
Issue: Revised application for a research permit from the Office of Science and Technology to increase the number of marine mammals that may be harassed, tagged, and exposed to sound playbacks off southern California
Recommendation: The Commission recommended that the National Marine Fisheries Service defer issuance of the permit until the applicant verifies that the proposed research was approved by an IACUC. The Commission then recommended that the National Marine Fisheries Service issue the permit, provided that the Service withhold authorization for tagging any female cetacean accompanied by a neonate calf, withhold authorization to conduct controlled sound exposure experiments on focal groups that include a neonate calf, consult with the applicant to identify steps to monitor any animal injured or disoriented during playback experiments, require the investigator to suspend an activity if introduced sounds may have led to the serious injury or death of an animal, require any such suspension remain in effect until the Service gives the applicant okay to proceed, consult with the applicant to identify steps to recover and necropsy any animal that may have died due to activities, coordinate with others doing research on the same species in the same areas so as to avoid duplicative research and unnecessary disturbance of animals, verify that the proposed research has been approved by the applicant's IACUC, and ensure that the applicant obtains all necessary permits under CITES before importing or exporting marine mammal parts.
Agency Response: The National Marine Fisheries Service issued the permit on 6 July 2010, consistent with most of the Commission's recommendations. However, the Service did not stipulate if monitoring would occur for animals injured or disoriented during playback experiments or if carcass recovery would occur. It also is unclear if the research was approved by the applicant's IACUC.

21 April 2010 **To:** National Marine Fisheries Service
Issue: Application from the Washington State Department of Transportation to take small numbers of Pacific harbor seals, California sea lions, and gray whales by harassment

incidental to replacement of the Manette Bridge in Bremerton
Recommendation: The Commission recommended that the Service issue the incidental harassment authorization, provided that proposed mitigation and monitoring measures are implemented.
Agency Response: The Service issued the incidental harassment authorization on 29 June 2010, consistent with the Service's recommendation.

26 April 2010 — **To:** U.S. Fish and Wildlife Service
Issue: More Florida manatees died from cold exposure this past winter than during any year on record due to exceptionally cold temperatures and shutdown of a power company
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service immediately reconstitute the warm-water task force and re-establish a Florida manatee recovery team.
Agency Response: The Service decided not to reconstitute the warm-water task force nor re-establish a Florida manatee recovery team, but instead to hold a series of workshops on actions to protect warm water refuges at an undetermined future date.

26 April 2010 — **To:** U.S. Fish and Wildlife Service
Issue: Application for an enhancement permit and a letter of authorization from the Service's Caribbean Ecological Services Field Office for a rescue, rehabilitation, and release program for the Antillean manatee in Puerto Rico
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the enhancement permit under the Endangered Species Act, but that authorization of activities under the Marine Mammal Protection Act be issued pursuant to section 109(h) rather than section 104(c)(4) of the Act. If the Service decided to authorize the proposed activities section 104(c)(4) of the Act, the Commission recommended that the Service fully document its rationale for determining that the requirements of that section have been met.
Agency Response: The Service issued a permit on 8 August 2011, consistent with the Commission's recommendation.

26 April 2010 — **To:** U.S. Fish and Wildlife Service
Issue: Application for research permit from Robert Rockwell to import hair and scat samples from Canadian polar bears to study the western Hudson Bay population
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided the applicant obtains all necessary permits under CITES before importing marine mammal parts.
Agency Response: The Service issued the permit on 21 July 2010, consistent with the Commission's recommendation.

27 April 2010 — **To:** National Marine Fisheries Service
Issue: Application for research permit from the National Marine Mammal Laboratory to continue investigating the foraging ecology, habitat requirements, vital rates, and effects of natural and anthropogenic factors on pinnipeds in the north Pacific Ocean, Bering Sea, Arctic Ocean, and along the Alaska coast
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit as requested.
Agency Response: The Service issued the permit on 10 May 2010, consistent with the Commission's recommendation.

4 May 2010 — **To:** National Marine Fisheries Service
Issue: Application for a public display permit from the Louisville Zoo to import a female

South African fur seal from the Toronto Zoo
Recommendation: The Marine Mammal Commission recommended that the National Marine Fisheries Service issue the permit as requested.
Agency Response: The Service issued the permit on 29 June 2010, consistent with the Commission's recommendation.

4 May 2010 — **To:** National Marine Fisheries Service
Issue: Application for a public display permit from SeaWorld to import one male beluga whale from the Vancouver Aquarium to Sea World Texas
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit as requested.
Agency Response: The Service issued the permit on 5 November 2010, consistent with the Commission's recommendation.

4 May 2010 — **To:** U.S. Fish and Wildlife Service
Issue: Application for a photography permit from Sea Studios Foundation to harass up to 15 southern sea otters during filming for a wildlife documentary
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit as requested.
Agency Response: The Service issued the permit on 20 July 2010, consistent with the Commission's recommendation.

7 May 2010 — **To:** Minerals Management Service
Issue: Request for comments on the preliminary revised 5-year Outer Continental Shelf Oil and Gas Leasing Program for 2007–2012
Recommendation: The Commission recommended that the Minerals Management Service consider the potential impact on beluga whale habitat in the lower Cook Inlet before approving any activity in that area, work with the National Marine Fisheries Service to evaluate risks to the North Atlantic right whale before proceeding with sale offshore of Virginia, defer proceeding with lease sales in the central and western Gulf of Mexico until the current oil spill has been stopped and the Service is convinced that provisions will be made to prevent and/or respond more effectively to future spills, provide more details on methods used in its environmental sensitivity analysis to provide a stronger justification for the Secretary's proposed final program, and expand the directive to the U.S. Geological Survey to evaluate the resiliency of all U.S. marine ecosystems where oil and gas operations are being planned or conducted.
Agency Response: The Commission's comments were included in the Minerals Management Service's Revised OCS Oil and Gas Leasing Program for 2007–2012, issued in December 2010. However, it is unclear if any of the comments were addressed within the document.

10 May 2010 — **To:** National Marine Fisheries Service
Issue: Application for research permit from Becky Woodward to harass and tag a variety of cetacean species during the development and testing of two methods of attaching tags using peduncle belts
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided the applicant conducts the study in three phases, reports the results of each phase before being allowed to begin the next phase, and coordinates her research with other permit holders doing similar research in the area to avoid unnecessary disturbance of the animals.
Agency Response: The Service had not issued the permit by the end of 2011.

10 May 2010 **To:** U.S. Fish and Wildlife Service
Issue: Efforts to recover the Hawaiian monk seal
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service fund the hiring of a wildlife biologist for the Hawaiian Islands National Wildlife Refuge, increase the annual funding base for Midway Atoll National Wildlife Refuge by $3.6 million, provide the National Marine Fisheries Service logistic support for its Hawaiian monk seal recovery efforts, consider options to acquire a vessel to support operations related to Hawaiian monk sea recovery, and support the National Marine Fisheries Service's proposal to remove up to 20 Galapagos sharks at French Frigate Shoals to preserve the atoll's monk seal population.
Agency Response: The Service responded that funding levels will "at best remain stable in the near future," but would consider the Commission's input. The Service also fully supported removing up to 20 Galapagos sharks at French Frigate Shoals to preserve the monk seal population.

10 May 2010 **To:** National Ocean Service
Issue: Recovery and conservation of the Hawaiian monk seal and conservation of the humpback whale
Recommendation: With regard to the Papahānaumokuākea Marine National Monument and the Northwestern Hawaiian Islands Coral Reef Ecosystem, the Commission recommended that the Office of National Marine Sanctuaries continue working with the National Marine Fisheries Service to evaluate accumulation rates of net debris in northwestern Hawaiian Islands lagoons and to clean up marine debris and continue working with the Service to accomplish Hawaiian monk seal recovery goals in the northwestern Hawaiian Islands. The Commission further recommended that the Sanctuary Office support approval of the Monument's permit request by the Service to kill up to 20 Galapagos sharks at French Frigate Shoals during 2010 and provide the Service with support for deploying and retrieving seasonal monk seal field camp personnel and supplies in the northwestern Hawaiian Islands using the Monument's research vessel. With regard to the Hawaiian Islands Humpback Whale National Marine Sanctuary, the Commission recommended that the Office of National Marine Sanctuaries add conservation of Hawaiian monk seals to the Sanctuary's purposes and assist with or carry out non-regulatory tasks in the Hawaiian Monk Seal Recovery Plan.
Agency Response: The National Ocean Service responded that it would continue to use its staff, especially at Papahānaumokuākea Marine National Monument and the Hawaiian Island Humpback Whale National Marine Sanctuary, to assist with the protection and recovery of the Hawaiian monk seal. The Service also would seek public input on how the Sanctuary should be managed, possible new rules, boundary changes, and marine spatial planning. In addition, the Service indicated that the Monument would continue to support monk seal recovery efforts in the northwestern Hawaiian Islands, which would include marine debris removal, vessel use, and research related to interactions between Galapagos sharks and monk seals.

10 May 2010 **To:** National Marine Fisheries Service
Issue: Recovery of the Hawaiian monk seal
Recommendation: The Commission recommended that the National Marine Fisheries Service secure dedicated annual budgets at the $7.2 million level to promote the recovery of this long-lived, slow-growing species. The Commission also recommended that the Service (1) maintain deployment levels for northwestern Hawaiian Islands' field camps at the 2009 level for the foreseeable future; (2) provide the Pacific Islands Fisheries Science

Center sufficient resources to fill the position vacated by the retired computer technician and revamp the Hawaiian monk seal database so that it provides essential scientific and management information on a timely basis; (3) complete the ongoing worming trials for juvenile monk seals and analyze the results as soon as possible to determine if and how this approach might be more broadly applied; (4) consult with the Hawaiian Monk Seal Recovery Team and key recovery program partners to prepare a strategic Hawaiian monk seal translocation plan; (5) proceed with the proposed removal of up to 20 Galapagos sharks near monk seal pupping beaches at French Frigate Shoals; (6) work with agencies leading the effort to remove debris from the northwestern Hawaiian Islands and use a portion of its annual monk seal appropriation to support debris removal near monk seal pupping beaches; (7) consult with the Hawaiian Monk Seal Recovery Team and its multiple recovery partners to complete comprehensive, long-term main Hawaiian Islands research and management plans in the coming year; (8) provide the Pacific Islands Fisheries Science Center sufficient resources to dedicate at least one member of its staff to work fulltime to coordinate and help conduct all main Hawaiian Islands Hawaiian monk seal research activities under the plan; (9) work closely with the Hawaii Department of Land and Natural Resources to ensure development and approval of a section 6 Endangered Species Act grant application; (10) provide an additional staff position in the Pacific Islands Regional Office to work fulltime with volunteer networks on different islands in developing and organizing Hawaiian monk seal conservation activities; (11) continue to work with The Marine Mammal Center to develop a long-term health care facility for Hawaiian monk seals and take the lead for securing funding to cover operating costs; (12) contract with a professional public education firm to develop educational materials and work with agency partners to implement a cooperative, coordinated education and outreach program that is focused on key community segments likely to interact with seals and that will deliver a consistent and well-articulated conservation message; (13) immediately begin the contracting process to address community outreach needs; and (14) review the results of its aversive conditioning workshop and then fund studies to develop and test promising techniques to dissuade seals from becoming acclimated to people or frequenting areas that could place seals or people at risk.

Agency Response: The National Marine Fisheries Service responded that the 2011 funding level for monk seals will be similar to the requested level for 2010, but listed several of its accomplishments consistent with the Commission's recommendations: (1) entered all past data into the existing database and designed a new database structure to improve performance of the system; (2) conducted initial field trials related to deworming juvenile monk seals on Laysan Island; (3) identified a potential contractor to prepare a programmatic environmental impact statement to evaluate the impacts of translocating monk seals on the human environment; (4) received a permit from the Hawaii Land Board to remove up to 20 Galapagos sharks from the Papahānaumokuākea Marine National Monument; (5) continued to work with the Coast Guard, National Ocean Service, and other partners to support removal of marine debris in the northwest Hawaiian Islands and to take steps to prevent future debris build-up; (6) continued to work with The Marine Mammal Center to develop a network of monk seal health care facilities; (7) worked on drafting a monk seal research plan for the main Hawaiian Islands; (8) hired a volunteer response coordinator; (9) took steps to develop an outreach and education program to ensure a consistent message on promoting monk seal recovery; and (10) took steps to identify and evaluate techniques to modify the behavior of monk seals at risk of seeking interactions with humans in the main Hawaiian Islands.

11 May 2010

To: National Marine Fisheries Service

Issue: Managing marine mammals and marine ecosystems in U.S. waters of the Hawaiian

archipelago and Pacific Trust Territories

Recommendation: With regard to Pacific cetaceans, the Commission recommended that the National Marine Fisheries Service review its responsibilities, including developing an adequate budget for cetacean research and management in the Pacific Islands region, identifying strategies to strengthen cooperative partnerships with other agencies and groups in the Pacific region, and initiating or expanding international partnerships to coordinate research and management efforts with those having jurisdiction over waters in the central and western North Pacific Ocean. With regard to fishery interactions near the main Hawaiian Islands, the Commission recommended that the Service work with the state of Hawaii to develop an observer or other monitoring program to assess the interaction between marine mammals and Hawaii's kaka and short-line fisheries. With regard to fisheries throughout the central and western North Pacific Ocean, the Commission recommended that the Service's Office of Protected Resources and Office of International Affairs cooperate to track fisheries in international and foreign national waters of the central and western Pacific, assess the bycatch in those fisheries, and cooperate with regional fishery management organizations to reduce bycatch to safe levels.

Agency Response: The National Marine Fisheries Service responded that while many efforts are limited by available funds, it will add a cetacean assessment specialist to its staff, broaden its passive acoustic monitoring and surveying efforts, and hire more field personnel to train researchers in the Marianas, Guam, and American Samoa. The Service also proposed to add the Hawaii kaka line fishery as a Category III fishery in the 2011 List of Fisheries, directed the false killer whale take reduction team to consider the potential impacts of the Hawaii shortline and kaka line fisheries on false killer whales, and supported efforts in various Pacific Island countries to enhance bycatch data collection and analysis.

11 May 2010

To: National Park Service

Issue: The Hawaiian monk seal numbers fewer than 1,200 animals and is declining at a rate of 4.5 percent annually

Recommendation: The Commission recommended that the National Park Service sufficiently fund the Kalaupapa National Historical Park to continue and expand activities to monitor and promote the growth of its new Hawaiian monk seal colony.

Agency Response: The National Park Service responded that it intended to maintain funding for programs that monitor and support the growth of the new Hawaiian monk seal colony at Kalaupapa National Historical Park and would continue its well-developed partnerships with similar agencies. The Service also requested that the Marine Mammal Commission fund a summer student internship or seasonal worker or provide similar monetary assistance.

14 May 2010

To: National Oceanic and Atmospheric Administration (NOAA)

Issue: Development of a national policy to guide aquaculture in U.S. waters

Recommendation: The Commission recommended that NOAA (1) clarify that aquaculture operations do not constitute "fishing" for purposes of the Magnuson-Stevens Fishery Conservation and Management Act and recognize the need for a separate statutory and regulatory regime to govern aquaculture activities; (2) specify that aquaculture activities do not constitute commercial fishing operations for purposes of the Marine Mammal Protection Act; (3) exclude aquaculture facilities from coverage under section 118 of the Marine Mammal Protection Act and require those using high-powered acoustic devices or other deterrent devices likely to harass marine mammals to obtain incidental taking authorizations under section 101(a)(5) of the Act or confine any deterrence activities

to those authorized under section 101(a)(4) of the Act; (4) not rely entirely on section 101(a)(5) as the mechanism to consider and address possible impacts on marine mammals but adopt additional measures to consider and mitigate all possible effects on marine mammals; (5) develop standards and requirements for aquaculture facilities to limit discharge of aquaculture byproducts including fish or shellfish wastes, feeds, and antibiotics or other chemicals to levels determined to be safe for the affected biological communities; (6) craft its policy to ensure that the foods used for cultivated stocks are derived from sustainable sources that do not deplete the wild forage base for marine mammals or other marine species; (7) establish and uphold rigorous standards and requirements for design, construction, and maintenance of aquaculture facilities; (8) delay completion of its aquaculture policy until the coastal and marine spatial planning framework has been approved by the President and the Administration has confirmed that all aspects of its policy are consistent with the framework; (9) implement its aquaculture policy using the best available scientific information on the spatial distribution, movement, and habitat-use patterns of marine mammals; (10) include a clear description of the existing gaps in the scientific information needed to manage aquaculture, the research required to address those gaps, and the funding required to support the research; and (11) include a requirement that each permit under section 191(a)(5) include a monitoring program to detect and record the nature and number of direct interactions between facility operations and marine mammals.

Agency Response: NOAA responded that it wants to ensure that aquaculture is managed so that it complements its comprehensive strategy to maintain healthy and productive marine ecosystems and the mammals that depend on them. Its policy would cover all forms of marine aquaculture, focus on sustainability and the protection of ocean resources and marine ecosystems, address fisheries management issues, and enable U.S. aquaculture to create local jobs and supply domestic seafood. The protection of marine mammals also would be an integral part of the policy.

20 May 2010

To: National Marine Fisheries Service

Issue: Application for a research permit from the Alaska Department of Fish and Game to conduct research on several species of cetaceans in the Bering, Chukchi, and Beaufort Seas to study cetacean population abundance, stock structure, feeding areas, migration routes, and behavior relative to human disturbance

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the Service require that the investigators stop a tagging attempt if an animal exhibits a strong adverse reaction to such activities, require that an activity be suspended if it contributes to three or more animals being seriously injured or killed in any one year as a result of the research, ensure that researchers coordinate with others doing similar research to avoid unnecessary disturbance of the animals, and require the applicant to obtain all necessary permits under CITES before importing or exporting marine mammal parts.

Agency Response: The Service issued the permit on 21 May 2010 for the beluga and gray whale aspects of the research, consistent with all of the Commission's recommendations except suspending activities if three or more animals are injured or killed in any one year. The Service deferred authorization for bowhead and humpback whale aspects of the research, pending completion of consultation under section 7 of the Endangered Species Act. That portion of the permit was not issued by the end of 2011.

21 May 2010

To: National Marine Fisheries Service

Issue: Application for research permit from Daniel Costa to harass northern elephant seals during studies on growth, behavior, and reproduction

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that activities on the same species and in the same areas are coordinated to avoid unnecessary disturbance of the animals.
Agency Response: The Service issued the permit on 29 June 2010 but did not stipulate a coordination condition in the permit.

24 May 2010 **To:** National Marine Fisheries Service
Issue: Application from Shell Offshore, Inc., to take small numbers of cetaceans and pinnipeds by harassment incidental to offshore exploratory drilling at the Torpedo and Sivulliq prospects in Camden Bay, Beaufort Sea, Alaska
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization contingent upon the successful negotiation of a conflict avoidance agreement between Shell and the Alaska Eskimo Whaling Commission and affected whaling captains associations; develop more comprehensive conflict avoidance agreements involving other possibly affected communities; require Shell to suspend operations if a dead or seriously injured marine mammal is found near the operations and the death or injury could be attributed to the applicant's activities; revise its assessment of expected takes associated with the proposed activity by evaluating all aspects of Shell's operations; take a lead role pursuing objectives set forth in the expert panel review associated with the open-water meeting to improve ecosystem assessments and assessments of effects of oil and gas operations; develop means for tracking and enforcing Shell's implementation of monitoring and mitigation measures to ensure that they are executed as expected; and include in its environmental assessment an analysis of potential for an oil spill and Shell's ability to respond to such a spill.
Agency Response: The Service reported that Shell withdrew its incidental harassment authorization application.

26 May 2010 **To:** U.S. Fish and Wildlife Service
Issue: Proposed guidelines for safely deterring polar bears from damaging property or endangering people
Recommendation: The Commission recommended that, before adopting final deterrence for polar bears, the U.S. Fish and Wildlife Service consider less formal ways of implementing measures unless it has a compelling reason for regulations; consider expanding the proposed deterrence measures for polar bears to allow a person at risk to adopt a stepped approach in which all non-lethal measures would be available as alternatives to lethal taking; revise its proposed regulations to clarify who may take action to deter polar bears, under what circumstances, and the reasons for such taking; revise its preamble and proposed regulations to indicate that anyone may deter polar bears, provided they otherwise meet the criteria set forth in section 101(a)(4) and the implementing regulations; explain in the preamble the reason(s) why taking in accordance with the proposed rule would not require additional authorization under the Endangered Species Act; include the rationale or basis for all proposed deterrence measures in the preamble to the proposed rule rather than in the regulations; and provide additional justification for its determination that the proposed sound threshold of acoustic deterrent devices will not adversely affect polar bears.
Agency Response: The Service issued a final rule on 22 September 2010, consistent with some of the Commission's recommendations. The Service explained that it established regulations rather than less formal measures, because a regulation has the effect of law in any future interaction between the public and the Service on the issue of polar bear deterrence. It did not believe that a stepped approach that would allow the use of projectiles as a deterrent was appropriate, because the regulations are intended to apply to everyone,

regardless of their level of skill or training or familiarity with polar bear behavior. The Service indicated that public officials who had the necessary knowledge and expertise would be able to use more aggressive deterrence measures under other authorities.

1 June 2010

To: National Marine Fisheries Service
Issue: Long-term conservation of spinner dolphins in Hawaiian waters
Recommendation: The Commission recommended that the National Marine Fisheries Service secure funding and take steps to conserve spinner dolphins in Hawaii, including (1) assessing abundance and trends, distribution, movement, habitat-use patterns, productivity, and human-related threats for each recognized Hawaiian spinner dolphin stock; (2) strengthening and extending its Dolphin Smart program to include all islands where dolphin-watch tours are offered or where human-dolphin interactions routinely occur; (3) hiring a Dolphin Smart program coordinator; 4) increasing its enforcement presence in areas where interactions between dolphins and people occur, documenting potential cases of harassment, and providing documentation to the appropriate authorities for prosecution when a take has occurred; (5) providing funds to purchase, operate, maintain, and staff a vessel dedicated to enforcement of the Marine Mammal Protection Act and other pertinent statutes and regulations; (6) working with NOAA's Office of the General Counsel to examine the priorities assigned to enforcement of the various statutes under the agency's jurisdiction, including the Marine Mammal Protection Act; and (7) considering alternative sources of funding to support spinner dolphin conservation measures.
Agency Response: The National Marine Fisheries Service indicated that its Pacific Islands Regional Office and Fisheries Science Center have begun to assess the effects of human-related activities on spinner dolphins. The Service also has collaborated on funding a research partnership with Duke and Murdoch Universities to assess the effects of human activities on spinner dolphins along the Kona coast. Progress has been made in introducing the Dolphin SMART program in the Hawaiian Islands to reduce the potential for harassment of spinner dolphins, with the hope of expanding it to all the islands where dolphin tours are offered. The Service agreed with the Commission that increasing its on-water enforcement presence would be effective in reducing the potential for harassment where spinner dolphins and people are likely to encounter each other. Its enforcement activities would be augmented through partnerships with the state of Hawaii and the U.S. Coast Guard.

10 June 2010

To: National Marine Fisheries Service
Issue: Application for public display permit from the Chicago Zoological Society to import two captive-born bottlenose dolphins from Dolphin Quest Bermuda to the Brookfield Zoo
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the Service, in consultation with the Animal and Plant Health Inspection Service, is satisfied that the applicant's plans and facilities for transporting and maintaining the animals meet the requirements established under the Animal Welfare Act and are adequate to provide for the animals' health and well-being and is satisfied that the applicant's education program is acceptable and its message is consistent with policies of the Marine Mammal Protection Act.
Agency Response: The Service issued the permit on 15 July 2010, consistent with the Commission's recommendations.

10 June 2010

To: National Marine Fisheries Service
Issue: Application from the Georgia Aquarium to import two male, captive-born dolphins from Dolphin Experience, Ltd., Freeport, Grand Bahama Island, and three female captive-

born bottlenose dolphins from Dolphin Quest Bermuda
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the Service, in consultation with the Animal and Plant Health Inspection Service, is satisfied that the applicant's plans and facilities for transporting and maintaining the animals meet the requirements established under the Animal Welfare Act and are adequate to provide for the animals' health and well-being and is satisfied that the applicant's education program is acceptable and its message is consistent with policies of the Marine Mammal Protection Act.
Agency Response: The Service issued the permit on 15 July 2010, consistent with the Commission's recommendations.

10 June 2010 — **To:** National Marine Fisheries Service
Issue: Application for a research permit from the University of Florida to acquire, import and re-export, and maintain samples from all cetacean and pinniped species (except walrus) of both sexes and all age classes worldwide to study marine mammal diseases during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue permit, provided that the applicant be required to obtain all necessary permits under CITES before importing or exporting marine mammal parts and be required to collect and report information sufficient to document that each specimen was taken in accordance with the laws of the country of origin, that such taking was consistent with the requirements of the Marine Mammal Protection Act, and that specimens are being used only for bona fide scientific purposes. The Commission also recommended that the researchers who are not authorized to conduct research under this permit or who do not hold other valid research permits but wish to use specimens collected under this permit be required to obtain a permit or other appropriate authorization from the Service before obtaining such materials from the permit holder.
Agency Response: The Service issued the permit on 28 July 2010, consistent with the Commission's recommendations.

June 11 2010 — **To:** National Marine Fisheries Service
Issue: Application for a research permit from the National Marine Mammal Laboratory to harass, tag, and sample specified numbers of 33 species of marine mammals
Recommendation: The Commission recommended that the National Marine Fisheries Service defer issuance of the permit until the research protocol has been reviewed and approved by an IACUC, withhold authorization for any future amendment of the permit pending review and approval by an IACUC of all of the research activities covered by the permit and any proposed changes, and defer action on this permit as it pertains to North Pacific right whales until the Service has resolved how best to comply with the National Environmental Policy Act and has prepared the necessary environmental analyses. The Commission also recommended that before authorizing tagging activities involving calves and their mothers, the Service (1) ask the applicant how it intends to determine the age of calves; (2) be satisfied that the applicant has provided adequate justification for biopsy sampling and tagging non-neonate calves and females accompanied by such calves; and (3) be satisfied that post-tagging monitoring will be adequate to determine the impact of tagging on these animals and withhold authorization for biopsy sampling or tagging any female cetacean accompanied by a neonate calf. The Commission further recommended that the Service condition the permit to ensure that the proposed activities and those of other permit holders who might be carrying out research on the same species in the same areas are coordinated to avoid unnecessarily duplicative research and unnecessary disturbance of animals and to ensure all necessary permits under CITES have been

obtained before importing or exporting marine mammal parts.
Agency Response: The Service issued the permit on 24 April 2011, consistent with some of the Commission's recommendations. The Service did indicate that the application was received prior to 31 December 2009 and, thus, did not require the Service's IACUC assurance statement. All subsequent requests would be required to have IACUC review and approval. The Service also stated that it is not precluded from issuing permits while the environmental impact statement is being developed per the National Environmental Policy Act and its implementing regulations at 40 CFR Section 1506.1. Further, it is evaluating the applicant's request for right whale research to determine whether the action would result in significant impacts to the species or other portions of the environment. Lastly, the Service conditioned the permit to restrict biopsy sampling of females with neonate calves only for those cetaceans that are captured (i.e., beluga whales, Dall's porpoise, and harbor porpoise), but allow biopsy sampling of females with neonate calves for other species.

14 June 2010
To: U.S. Army
Issue: The U.S. Army's draft environmental impact statement for resumption of year-round firing opportunities at Fort Richardson, Alaska, using Eagle River Flats as a target for live-fire training exercises
Recommendation: The Commission recommended that the Army not pursue the use of Eagle River Flats, which is integrally connected to the core habitat of endangered Cook Inlet beluga whales, for year-round live-fire training exercises.
Agency Response: The Army had not issued a final environmental impact statement by the end of 2011. Ft. Richardson and Elmendorf Air Force Base merged in 2010. As such, the final environmental impact statement would include activities at both facilities and may be issued by the end of 2012.

16 June 2010
To: National Marine Fisheries Service
Issue: Application from Neptune LNG LLC to take small numbers of various species of marine mammals, including North American right whales, by harassment incidental to commissioning and operating its offshore liquefied natural gas facility in Massachusetts Bay
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, provided that the monitoring and mitigation measures proposed by the Service and the applicant are implemented to mitigate the risk of ships colliding with North Atlantic right whales and other cetacean species and provided that the new section 7 consultation on the project is completed and concludes that the proposed action is not likely to jeopardize the continued existence of the North Atlantic right, humpback, fin, sperm, sei, or blue whales.
Agency Response: The Service issued the incidental harassment authorization on 12 July 2010, consistent with the Commission's recommendations.

17 June 2010
To: NOAA
Issue: NOAA's ocean policy and management programs intended to prevent the extinction of Hawaiian monk seals and conserve cetacean stocks throughout the Pacific Region
Recommendation: The Commission recommended that NOAA and the National Marine Fisheries Service support the 2007 Revised Hawaiian Monk Seal Recovery Plan at the necessary funding levels identified in the Plan for the foreseeable future. The Commission further recommended that the National Marine Fisheries Service review its responsibilities for cetacean research and management in the Pacific Islands region, develop a plan and budget adequate to fulfill those responsibilities, identify strategies to strengthen cooperative partnerships with other agencies and groups that work in the Pacific region,

and initiate or expand international partnerships to coordinate research and management efforts in waters of the central and western Pacific Ocean.

Agency Response: NOAA responded that the National Marine Fisheries Service would request additional support for monk seal conservation through the budget process and that the Pacific Islands Regional Office and Fisheries Science Center have reviewed their responsibilities and will continue planning efforts to address them. Research and conservation concerns are being addressed through strengthened partnerships with other agencies and organizations. The Service also is preparing an action plan to guide international efforts for the conservation of marine mammals and other living marine resources and is working with international regional fishery management organizations on various issues.

21 June 2010

To: National Marine Fisheries Service

Issue: Application from Lamont-Doherty Earth Observatory to harass small numbers of marine mammals during a geophysical survey in the northwest Pacific Ocean

Recommendation: The Commission recommended that, before issuing the incidental harassment authorization, the National Marine Fisheries Service require the applicant to use location-specific environmental parameters to re-estimate exclusion zones and verify the estimates with field measurements prior to or at the beginning of the study and require the applicant to re-estimate exposures based upon location-specific environmental parameters and associated ensonified areas. The Commission also recommended that the Service (1) provide additional justification for its preliminary determination that the planned monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified exclusion zones; (2) clarify the qualifiers "when practical," "if practical," and "when feasible;" (3) propose to the Lamont-Doherty Earth Observatory that it revise its study design to add pre- and post-geophysical survey assessments as a way of obtaining more realistic baseline sighting rates for marine mammals and assessing impacts; (4) clarify the qualifier "ideally" and the conditions that it assumes would render the use of passive acoustic monitoring impracticable for supplementing the visual monitoring program; (5) extend the monitoring period to at least one hour before initiation of airgun activities and at least one hour before the resumption of airgun activities after a shutdown because of a marine mammal sighting within an exclusion zone; and (6) require that observations be made during all ramp-up procedures to gather the data needed to analyze and report on their effectiveness as mitigation. The Commission further recommended that the Service work with the applicant to correct discrepancies within the application and between the application and the Service's *Federal Register* notice and advise the applicant of the need to use the 160-dB re 1 µPa threshold for all cetaceans as currently used by the Service or to explain the basis for using another threshold.

Agency Response: The Service issued the incidental harassment authorization on 26 July 2010, consistent with some of the Commission's recommendations. The Service did not require the applicant to re-estimate exclusion zones and takes but did state that the applicant and the National Science Foundation have invested resources into calibration studies, and the Service believes the exclusion zones are appropriate based on the low density of marine mammals and remote, deep-water location of the survey. The Service did note that visual and passive acoustic monitoring should be sufficient to detect most marine mammals in the exclusion zones and that the applicant will observe for marine mammals during pre- and post-survey transit times. In regards to increasing the monitoring period to one hour, the Service states that monitoring is effective longer than 30 minutes due to pre-monitoring and the time required for ramp-up, observers monitor when airguns are not active in many cases, the majority of species are not submerged for more than 30 minutes,

vessels are moving, not stationary sources, and the recommendation would not increase effectiveness of observing marine mammals. Lastly, the Service indicated that data were to be collected during ramp-up procedures, but they are unlikely to result in statistically robust conclusions due to the dearth of data.

21 June 2010

To: National Marine Fisheries Service

Issue: Application from Shell Offshore to take small numbers of marine mammals by harassment incidental to a proposed open-water marine survey program in the Beaufort and Chukchi Seas, Alaska, during the 2010 Arctic open water season

Recommendation: The Commission recommended that the National Marine Fisheries Service require Shell and other operators to evaluate the effectiveness of the mitigation measures adopted and modify them accordingly, review the proposed monitoring measures to ensure that they require the gathering of information on all potentially important sources of noise and the complex sound field that the seismic survey activities create, work with Shell and its contractors to engage acknowledged survey experts to review the survey design and planned analyses to ensure they will provide relatively unbiased and reliable results, work with Shell to coordinate a comparative analysis of the results of vessel-based, aerial, and passive acoustic monitoring methods, develop a plan for collecting meaningful baseline information, and work with Shell to determine how the data collected during the proposed activities can be made available for other scientific purposes. The Commission also recommended that the Service require that Shell complement its vessel-based monitoring plan with towed passive acoustics to provide a more reliable estimate of the number of marine mammals harassed during the course of the proposed seismic survey, require Shell to engage in consultations with those Alaska Native communities that may be affected by the company's activities, seek to resolve any Alaska Native concerns through negotiations of a conflict avoidance agreement, and require Shell to halt its seismic survey and consult with the Service regarding any seriously injured or dead marine mammal when the injury or death may have resulted from Shell's activities.

Agency Response: The Service issued the incidental harassment authorization on 6 August 2010, consistent with some of the Commission's recommendations. The Service largely agreed with the Commission's mitigation and monitoring recommendations. The Service did require some measures from the Open Water meeting in the incidental harassment authorization and did require Shell to collect and analyze data from ramp-up procedures while other mitigation measures are being reviewed. The Service did not believe that towed passive acoustic monitoring was a mature technology to detect marine mammals and, therefore, did not require its implementation. The Service also requested sound source characteristics from Shell to evaluate the monitoring measures. Regarding subsistence use, the Service stated that Shell conducted a plan of cooperation meetings at numerous villages, would consult with local subsistence advisors, and would implement communication plans but would not sign the conflict avoidance agreement.

29 June 2010

To: National Marine Fisheries Service

Issue: Proposed alternatives for a draft environmental impact statement for managing the American lobster fishery in federal waters

Recommendation: The Commission recommended that the National Marine Fisheries Service initiate a new section 7 consultation and complete the associated biological opinion regarding the effects of lobster fishing on North Atlantic right whales before any new or amended American lobster management measures are approved, evaluate possible changes in fishing effort and fishing distribution as a result of the proposed alternative management measures in a new section 7 consultation, and then incorporate any information into the environmental impact statement. The Commission also recommended that the Service

expand all of the alternatives in the environmental impact statement to require that recipients of federal lobster fishing permits provide data and information on lobster fishing practices that are necessary and adequate to evaluate the risks of interactions with right whales and other large endangered whales and the effectiveness of related management actions.

Agency Response: The Service did not issue a proposed rule by the end of 2011, because the action was delayed temporarily to address a lobster recruitment failure determination in southern New England. The Service plans to issue a proposed rule in 2012.

30 June 2010

To: National Marine Fisheries Service

Issue: Application from the U.S. Marine Corps to take Atlantic bottlenose dolphins by harassment incidental to training exercises at the Cherry Point Range Complex in North Carolina

Recommendation: The Commission recommended that, before issuing the incidental harassment authorization, the National Marine Fisheries Service include in any authorization issued the time frame for which it is requested, require a detailed description of the environmental parameters and methods used to estimate the number of exposures and determine the safety zones, require the Marine Corps to either justify its use of the older bottlenose dolphin estimated density (i.e., 0.183 dolphins/km^2) for BT-11 from Read et al. (2003) or recalculate its estimated exposures based on the more recent data for both sites from Maher (2003), and require the Marine Corps to use either direct strike or dynamic Monte Carlo models to determine probability of ordnance strike. The Commission also recommended that the Service advise the Marine Corps that detailed mitigation, monitoring, and reporting requirements must be specified in application for the authorization before the application can be considered complete and withhold the authorization until the Marine Corps develops and is prepared to implement a plan to evaluate the effectiveness of monitoring and mitigation measures before beginning or in conjunction with conducting exercises covered by the proposed incidental harassment authorization. The Commission further recommended that the Service condition the authorization to require suspension of the exercises if a marine mammal is seriously injured or killed and the injury or death could be associated with those exercises.

Agency Response: The Service issued the incidental harassment authorization on 18 November 2010, consistent with some of the Commission's recommendations. The Service believed that the methods for determining safety zones and takes were adequate and fully described and that the Read et al. (2003) density was considered conservative, thus its use was justified. Furthermore, the Service did not agree that a different modeling approach was warranted for the issuance of the incidental harassment authorization. The Service and the applicant did develop more comprehensive mitigation, monitoring, and reporting requirements, which were included in the authorization. However, effectiveness of mitigation and monitoring measures were not addressed.

30 June 2010

To: Minerals Management Service

Issue: Intent to prepare an environmental impact statement for the Outer Continental Shelf Oil and Gas Leasing Program for 2012–2017

Recommendation: The Commission recommended that the Minerals Management Service work with the Department of Energy to develop a long-term national energy strategy and integrate its new five-year oil and gas leasing program into that strategy. It would include in its 2012–2017 environmental impact statement a clear description of the phases of oil and gas production and the infrastructure or equipment involved and a more detailed description of the data and methods used in its ecosystem sensitivity analysis to allow readers to follow the line of reasoning that leads to a particular conclusion. The

Commission also recommended that the Service consult with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Marine Mammal Commission to develop a set of standards for baseline information to be obtained prior to the initiation of new energy-related operations and expand Secretary Salazar's directive to the U.S. Geological Survey to evaluate the resilience of all U.S. marine ecosystems where oil and gas operations are being conducted, planned, or contemplated, and incorporate that information in the 2012–2017 environmental impact statement, if the evaluation can be completed in time. The Commission further recommended that the Service use the environmental consequences section of the document to integrate all the information in the preceding sections and systematically describe the risks associated with each phase of oil and gas development/production and each component of the related infrastructure.
Agency Response: The Bureau of Ocean Energy Management, formerly Minerals Management Service, issued a draft programmatic environmental impact statement in November 2011, consistent with none of the Commission's recommendations. It is unclear why the Bureau did not implement any of the Commission's recommendations, as it does not have to respond to comments at the notice of intent phase.

1 July 2010 **To:** U.S. Fish and Wildlife Service
Issue: Application to amend a research permit from the U.S. Geological Survey to conduct research on northern sea otters in southern Alaska and to import otter tissue samples from Russia, Canada, and Japan
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit amendment, provided that the conditions currently contained in the permit remain in effect.
Agency Response: The Service issued the permit amendment on 30 July 2010, consistent with the Commission's recommendation.

2 July 2010 **To:** U.S. Fish and Wildlife Service
Issue: Application for a research permit from the Natural History Museum of Los Angeles County to acquire, import, and export specimens from otters, manatees, dugongs, polar bears, and walruses
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that the applicant obtains all necessary permits under CITES before importing or exporting marine mammal parts, maintains detailed records indicating the source of each specimen and the circumstances under which it was collected, and periodically provides reports to the Service sufficient to demonstrate that each specimen was taken in accordance with the laws of the country of origin, was not taken in violation of the Marine Mammal Protection Act or other applicable U.S. laws, and was used only for bona fide scientific purposes.
Agency Response: The Service issued the permit on 19 October 2010, consistent with the Commission's recommendations.

6 July 2010 **To:** National Marine Fisheries Service
Issue: Application to amend a research permit from Terrie Williams, Ph.D., to conduct research on energetics and diving physiology of captive and rehabilitated marine mammals
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided that the proposed activities have been reviewed and approved by the permit holder's IACUC and the conditions contained in the original permit remain in effect.
Agency Response: The Service issued the permit amendment on 3 February 2011, consistent with the Commission's recommendations.

6 July 2010 **To:** National Marine Fisheries Service
Issue: Application for a public display permit from the Institute for Marine Mammal Studies to acquire up to eight stranded, rehabilitated California sea lions
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the Service require the applicant to obtain non-releasable sea lions, provided that such animals are available and suitable for the intended purpose, authorize transfer or retention of animals determined to be releasable only as a secondary option and only if non-releasable animals are not available or are determined by the Service, in consultation with the applicant, to be unsuitable for the applicant's purposes, and require a reasonable waiting period from the date of permit issuance to see if suitable, non-releasable animals become available before allowing the applicant to acquire releasable animals. The Commission also recommended that the Service consult with the Animal and Plant Health Inspection Service to ensure that the applicant's plans and facilities for transport and maintenance of the requested animals are adequate to provide for their health and well-being and to confirm that the probability is extremely low that these animals might be introduced into the Gulf of Mexico, even under the most severe weather conditions. The Commission further recommended that the Service require the applicant to provide a written justification explaining the need for a captive breeding program for California sea lions before such a program is authorized and ensure that the applicant's education program is acceptable.
Agency Response: The Service issued the permit on 5 October 2011, consistent with some of the Commission's recommendations. The Service has noted that the Institute remains on the list to obtain non-releasable sea lions and has encouraged the Institute to consider those sea lions for placement at its facility. The Service did include a one-year waiting period to obtain releasable sea lions as an alternative in its environmental assessment but did not condition the permit to require that waiting period in the permit. In addition, the Animal and Plant Health Inspection Service has confirmed that the Institute is licensed and has adequate space to house the requested number of animals. Lastly, the Service indicated that captive breeding and contingency plans are under the purview of the Animal and Plant Health Inspection Service; however, it is satisfied that the public display criteria have been met.

8 July 2010 **To:** National Marine Fisheries Service
Issue: Application to amend a research permit from Colleen Reichmuth, Ph.D., to add two non-releasable ringed seals, bearded seals, and spotted seals to the captive research program at Long Marine Laboratory in Santa Cruz, California
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided that the proposed activities have been reviewed and approved by the permit holder's IACUC and the conditions contained in the original permit remain in effect.
Agency Response: The Service issued the permit amendment on 8 September 2010, consistent with the Commission's recommendations.

8 July 2010 **To:** National Marine Fisheries Service
Issue: Application from Statoil USA E&P to take small numbers of marine mammals by harassment incidental to a marine seismic survey in the Chukchi Sea, Alaska
Recommendation: The Commission recommended that, before issuing the incidental harassment authorization, the National Marine Fisheries Service (1) clarify whether the 3-D and 2-D surveys will occur simultaneously or independent of one another and, if they will occur independently, recalculate the total exposed area and subsequent takes for the 2-

D surveys; (2) require Statoil to revise its study design to include expanded pre- and post-seismic survey assessments sufficient to obtain reliable sighting data for comparing marine mammal abundance, distribution, and behavior under various conditions; (3) require Statoil to collect data on the behavior and movements of any marine mammals present during all ramp-up and power-down procedures to help evaluate the effectiveness of these procedures as mitigation measures; (4) undertake or prompt others to undertake studies needed to resolve questions regarding the effectiveness of ramp-up and power-down as mitigation measures; (5) review the proposed monitoring measures and require the applicant to collect and analyze information regarding all the potentially important sources of sound and the complex sound field created by all of the activities associated with conducting the seismic survey; (6) require the applicant to collect information to evaluate the assumption that 160 dB is the appropriate threshold at which harassment occurs for all marine mammals that occur in the survey area; (7) determine, in consultation with Statoil, whether aerial surveys are safe to conduct and should be required and, if not, identify alternative monitoring strategies capable of providing reliable information on the presence of marine mammals and the impact of survey activities on the affected species and stocks; (8) require Statoil to supplement its vessel-based monitoring with towed passive acoustics to provide a more reliable estimate of the species and number of marine mammals taken during the proposed seismic surveys; and (9) require Statoil to halt its seismic survey and related activities and consult with the Service regarding any seriously injured or dead marine mammal when the injury or death may have resulted from Statoil's activities and resume only after steps are taken to avoid additional serious injuries or deaths.

Agency Response: The Service issued the incidental harassment authorization on 6 August 2010, consistent with some of the Commission's recommendations. The Service stated that the 2-D and 3-D surveys were independent and the take estimates for the 2-D survey were provided in the application. The Service believes that revising the study design is beyond the scope of the proposed action but relevant data will be collected before and immediately after the survey. Effectiveness of ramp-up has not been determined; animals are presumed to move away from a sound source that disturbs them. Statoil provided sound source characteristics to the Service. Finally, the Service stated that aerial surveys are impractical due to safety concerns and towed passive acoustic monitoring is not a mature technology. However, both types of monitoring may be considered in the future.

14 July 2010

To: National Marine Fisheries Service

Issue: Application to amend a research permit from Peter Tyack, Ph.D., to conduct research on cetaceans during a study of their behavior and responses to mid-frequency sound levels

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided the conditions currently contained in the permit remain in effect and that the Service withhold authorization for tagging any female cetaceans accompanied by a neonate and for conducting controlled sound exposure experiments on focal groups that include a neonate. The Commission also recommended that, prior to issuing the amendment, the Service require the permit holder to submit documentation indicating that the proposed research has been approved by an IACUC, address the discrepancy between the amendment request and the existing permit as to whether short-finned pilot whales are authorized to be taken in Cape Cod Bay, authorize Dr. Tyack to collect skin and blubber from short- and long-finned pilot whales in Cape Cod Bay, and extend the authorized studies to include the named species in the waters around Cape Hatteras.

Agency Response: The Service issued the permit amendment on 4 August 2010, consistent with most of the Commission's recommendations. However, the Service noted

that obtaining IACUC review and approval is not a Marine Mammal Protection Act permit issuance criterion and is the responsibility of the researcher.

16 July 2010 **To:** National Marine Fisheries Service
Issue: Application for a research permit from Michael Adkesson, D.V.M., Chicago Zoological Society, to import biological samples from live and dead South American fur seals during health assessments in Punta San Juan, Peru, during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the applicant obtains all necessary export permits under CITES before importing fur seal parts into the United States and periodically provides reports to the Service sufficient to demonstrate that each specimen was taken in accordance with the laws of the country of origin, was not taken in violation of the Marine Mammal Protection Act or other applicable U.S. laws, and is being used for bona fide scientific purposes only.
Agency Response: The Service issued the permit on 23 August 2010, consistent with the Commission's recommendations.

16 July 2010 **To:** National Marine Fisheries Service
Issue: Application for a research permit from the National Museum of Natural History to collect, import, export, and possess salvaged specimens or parts from cetaceans and pinnipeds
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the applicant obtains all necessary permits under CITES before importing or exporting marine mammal parts, maintains detailed records indicating the source of each specimen and the circumstances under which it was collected, and periodically provides reports to the Service sufficient to demonstrate that each specimen was taken in accordance with the laws of the country of origin, was not taken in violation of the Marine Mammal Protection Act or other applicable U.S. laws, and is being used only for bona fide scientific purposes.
Agency Response: The Service issued the permit on 18 November 2010, consistent with the Commission's recommendations.

27 July 2010 **To:** National Marine Fisheries Service
Issue: Application to amend a research permit from James Harvey, Ph.D., to surgically implant radio transmitters into harbor seals in California, Oregon, Washington, and Alaska during biological and ecological research
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided that the proposed activities were approved by the permit holder's IACUC and the conditions contained in the original permit as amended remain in effect.
Agency Response: The Service issued the permit amendment on 25 August 2010, consistent with the Commission's recommendations.

27 July 2010 **To:** National Marine Fisheries Service
Issue: Application for a research permit from Bruce Mate, Ph.D., to take gray whales by deliberate harassment and other marine mammals by incidental harassment for acoustic research in Oregon during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the proposed activities have been reviewed and approved by the permit holder's IACUC.
Agency Response: The Service issued the permit on 2 November 2010 and noted that

obtaining IACUC review and approval is not a Marine Mammal Protection Act permit issuance criterion and is the responsibility of the researcher.

30 July 2010

To: National Marine Fisheries Service
Issue: Request to amend its marine mammal monitoring plan from the U.S. Navy for missile launch activities on San Nicolas Island, California, through 2014
Recommendation: The Commission recommended that the National Marine Fisheries Service use rulemaking to revise section 216.155 of the regulations to allow the Navy to discontinue monitoring of the potential effects of launches on elephant seals, publish a notice of the proposal in the *Federal Register* and provide an opportunity for public review and comment, require the U.S. Navy to implement the original monitoring plan for the remaining term of the current letter of authorization, consider alternative monitoring schemes only for subsequent letters of authorization and only after rulemaking or other public review procedures, and require the Navy to (1) obtain, analyze, and review the existing information regarding potential displacement of pinnipeds from those rookeries and haul-out sites affected by launch activities, and (2) if the information is insufficient for that purpose, design and implement the necessary monitoring strategy to determine if launch activities are displacing pinnipeds.
Agency Response: The Service issued a notice in the *Federal Register* on 24 September 2010 regarding the modifications to the marine mammal monitoring plan and addressed the Commission's recommendations in its revised letter of authorization issued on 24 November 2010.

2 August 2010

To: National Marine Fisheries Service
Issue: Application to amend a research permit from Daniel Costa, Ph.D., to attach a drag-inducing device on a portion of the tagged Weddell seals in the Antarctic
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided that the Service consult with the permit holder regarding the design of the drag device that will be used and if the drag device that is selected could hinder passage of Weddell seals through ice holes, require the permit holder to test the device on a small number of seals to ensure that passage is not hindered before being allowed to deploy the device on all eight seals. The Commission also recommended that the Service ensure that the proposed activities have been reviewed and approved by the permit holder's IACUC, require the permit holder to obtain all necessary permits under CITES before importing or exporting marine mammal parts, and require the conditions contained in the permit as currently amended remain in effect.
Agency Response: The Service issued the permit amendment on 7 September 2010, consistent with the Commission's recommendations.

2 August 2010

To: National Marine Fisheries Service
Issue: Application from the U.S. Geological Survey to take small numbers of marine mammals by harassment incidental to a seismic survey in the Beaufort Sea and Arctic Ocean
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, provided the Service (1) ascertain who will be responsible for operating the Canadian vessel and the airguns and other instruments deployed from the *St. Laurent* and issue an incidental harassment authorization for these activities only if a U.S. agency or U.S. citizen(s) will be conducting those operations; (2) work with the applicant to re-estimate exposures for ice-breaking activities based upon the total area that may be exposed to sound levels greater than or equal to 120 dB re 1 µPa; (3) advise the applicant to consult with the U.S. Fish and Wildlife Service

regarding the need for a separate incidental harassment authorization for walruses and polar bears; (4) provide additional justification for its preliminary determination that the planned monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified exclusion zones, including (a) identifying those species that it believes can be detected with a high degree of confidence using visual monitoring only, (b) describing detection probability as a function of distance from the vessel, (c) describing changes in detection probability under various sea state and weather conditions and at night, and (d) explaining how close to the vessel marine mammals must be for observers to achieve the anticipated high nighttime detection rate; (5) clarify the meaning of the qualifiers "when practical," "if practical," and "when feasible"; (6) propose to the U.S. Geological Survey that it revise its study design to collect meaningful baseline sighting data for marine mammals; (7) require the applicant to collect information to evaluate the assumption that 160 dB re 1 µPa is the appropriate threshold at which harassment occurs for all marine mammals in the survey area; and (8) require the applicant to make observations during all ramp-up procedures to gather the data needed to analyze and report on their effectiveness.

Agency Response: The Service issued the incidental harassment authorization on 22 September 2010, consistent with some of the Commission's recommendations. The Service verified that Canadians would be operating the *St. Laurent*; however, it appears that the Service still issued the incidental harassment authorization for the vessel's activities. The Service made it clear that erroneous information was included in the application and *Federal Register* notice regarding the zone of exposure for ice-breaking activities. As such, it is unclear if the zone of exposure and associated takes were estimated correctly. The U.S. Fish and Wildlife Service completed an informal consultation for walrus and polar bears and determined that an incidental harassment authorization was not needed. The Service only provided justification for why marine mammals would be seen at night but did not justify how visual monitoring is effective and how detection probabilities and various sea states affect visual monitoring. The Service stated that data would be collected regarding baseline abundance, behavioral observations at the 160 dB re 1 µPa, and during ramp-up. However, the conclusions may not be statistically robust and some of these recommendations are beyond the scope of the proposed action.

6 August 2010

To: National Marine Fisheries Service

Issue: Application from Excelerate Energy, L.P. and Tetra Tech EC, Inc., on behalf of Northeast Gateway Energy Bridge, LLC, and Algonquin Gas Transmission, LLC, to take small numbers of marine mammals by harassment incidental to operating and maintaining the Northeast Gateway liquid natural gas port facility and associated pipeline in Massachusetts Bay

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, provided that the service include in the authorization and in any proposed regulations issued by the Service during the subsequent five-year period all marine mammal mitigation, monitoring, and reporting measures identified in the Service's *Federal Register* notice and require the applicants to halt activities and consult with the Service regarding any seriously injured or dead marine mammal when the injury or death may have resulted from those activities and allow resumption of those activities only after steps to avoid additional serious injuries or deaths have been implemented or such takings have been authorized under section 101(2)(5)(A) of the Marine Mammal Protection Act.

Agency Response: The Service issued the permit on 27 August 2010, consistent with the Commission's recommendations.

6 August 2010	**To:** National Marine Fisheries Service **Issue:** Request from Bluewater Wind, LLC, to take small numbers of marine mammals by harassment incidental to pile driving during installation of meteorological data collection facilities off the coasts of Delaware and New Jersey **Recommendation:** The Commission recommended that, prior to issuing the incidental harassment authorization, the National Marine Fisheries Service require that observations be made during all soft-starts of pile-driving activities to gather the data needed to analyze and report on its effectiveness as a mitigation measure. **Agency Response:** The Service issued the incidental harassment authorization on 29 September 2010, consistent with the Commission's recommendation.
6 August 2010	**To:** National Marine Fisheries Service **Issue:** Application for permit from Sea World to import one male short-finned pilot whale from the Netherlands Antilles to Sea World California for public display **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the permit in accordance with section 104(c)(7) of the Marine Mammal Protection Act to authorize the retention of this pilot whale for public display, although no taking or importation is being authorized. **Agency Response:** The Service issued the permit on 11 July 2011 in accordance with section 104(c)(2) of the Act, not 104(c)(7).
12 August 2010	**To:** NOAA **Issue:** The Administration's Draft Next Generation Strategic Plan **Recommendation:** The Commission recommended that NOAA revise its Next Generation Strategic Plan by re-examining the concepts of adaptation and resilience, carefully evaluating human ability to manage or control them, and revising the plan to give a more realistic appraisal of their roles in the conservation and sustainability of marine ecosystems. The Commission also recommended that NOAA finalize the Plan and then immediately initiate a companion strategy for identifying and securing the necessary resources. **Agency Response:** The Administration considered the Commission's recommendation in the final revisions to the Next Generation Strategic Plan, which was posted in December 2010.
16 August 2010	**To:** National Marine Fisheries Service **Issue:** Application from the Exploratorium to take small numbers of marine mammals by harassment incidental to pile driving during its relocation project in San Francisco Bay **Recommendation:** The Commission recommended that, prior to issuing the incidental harassment authorization, the National Marine Fisheries Service require that observations be made during all soft-starts of pile-driving activities to gather the data needed to analyze and report on its effectiveness as a mitigation measure and require the Exploratorium to monitor the presence and behavior of marine mammals during all impact and vibratory pile-driving activities. **Agency Response:** The Service issued the incidental harassment authorization on 14 October 2010 and did not agree with the Commission's recommendations. The Service believes that monitoring 30 minutes before, during, and 30 minutes after all impact hammer activities (including soft-starts) and two days each week for vibratory hammer activities is sufficient to allow for adequate interpretation of marine mammal behavior in response to pile driving.
16 August	**To:** U.S. Navy

2010 **Issue:** The Navy's Integrated Comprehensive Monitoring Program
Recommendation: The Commission recommended that during its annual review of progress in implementing the program and as performance information becomes available, the Navy set standards for the various monitoring methods it uses, emphasize the use of monitoring information to reduce the adverse impact of its activities to the least practicable level, consider the application of a similar program aimed at better understanding of potential effects of low-frequency active sonar, and continue behavioral response studies.
Agency Response: The Navy, working with the National Marine Fisheries Service, revised its Integrated Comprehensive Monitoring Program to incorporate some of the Commission's recommendations, namely to expand the top-level goals and emphasize the use of monitoring information to reduce the adverse impact of its activities.

18 August 2010 **To:** U.S. Fish and Wildlife Service
Issue: Application from the NOAA Restoration Center, SW Region, to take small numbers of marine mammals by harassment incidental to construction activities as part of a tidal wetlands project at the Elkhorn Slough National Estuarine Research Reserve in Moss Landing, California
Recommendation: The Commission recommended that, prior to issuing the incidental harassment authorization, the U.S. Fish and Wildlife Service use behavioral observations documented during the proposed activity to begin building a database of information for determining more realistic thresholds for when taking by harassment may result from in-air sounds, advise the applicant to consult with the National Marine Fisheries Service regarding the need for a separate incidental harassment authorization for harbor seals and California sea lions, require the applicant to determine in-situ safety zones based on specific sound thresholds associated with Level A and Level B harassment and use those safety zones to supplement monitoring by observers and require that observations be made during all ramp-up procedures to gather the data needed to analyze and report on their effectiveness as mitigation measures.
Agency Response: The Service issued the incidental harassment authorization on 23 November 2010, consistent with the Commission's recommendations.

19 August 2010 **To:** U.S. Fish and Wildlife Service
Issue: Application for research permit from Seattle Aquarium to import from Canada tissue samples from northern sea otters for genetic analysis
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that the applicant obtains all necessary permits under CITES before importing or exporting marine mammal parts.
Agency Response: The Service issued the permit on 8 October 2010, consistent with the Commission's recommendation.

20 August 2010 **To:** U.S. Fish and Wildlife Service
Issue: Application for research permit from Vince Bacalan, American University, to obtain manatee skeletal material
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that the applicant maintain and include in his annual report to the Service detailed records indicating the number of samples collected and the names of the laboratories and institutions from which they were collected.
Agency Response: The Service issued the permit on 5 October 2010, consistent with the Commission's recommendation.

20 August **To:** U.S. Fish and Wildlife Service

2010

Issue: Application to amend a research permit from the North Slope Borough Dept. of Wildlife Management to collect and transport tissues of polar bears and walruses to augment the Alaska Marine Mammal Tissue Archival Project.
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit amendment, provided the conditions contained in the existing permit remain in effect.
Agency Response: The Service issued the permit amendment on 10 September 2010, consistent with the Commission's recommendation.

24 August 2010

To: National Marine Fisheries Service
Issue: Proposed rulemaking regarding the List of Fisheries for 2011
Recommendation: The Commission recommended that the National Marine Fisheries Service provide additional justification for splitting the Washington Dungeness crab pot/trap fishery into two fisheries, consult with the U.S. Fish and Wildlife Service, tribal authorities, and other relevant groups on the need for observer coverage of the Washington Dungeness crab pot/trap fisheries both along the outer coast and in Puget Sound to assess bycatch risks for Washington State sea otters, list the Hawaii kaka line and the Hawaii vertical longline fisheries as Category II fisheries, and work with the state of Hawaii to create an effective observer program for them. The Commission also concurred with the National Marine Fisheries Service's proposal to retain a Category II listing for the Hawaii shallow-set longline/set line fishery, to elevate the southeastern U.S. Atlantic, Gulf of Mexico shrimp trawl fishery from Category III to Category II, and to add the Atlantic spotted dolphin (northern Gulf of Mexico stock) to the list of species/stocks incidentally killed or injured in the southeastern U.S. Atlantic, Gulf of Mexico shrimp trawl fishery. The Commission also recommended that the National Marine Fisheries Service increase observer coverage in the southeastern U.S. Atlantic, Gulf of Mexico shrimp trawl fishery and conduct the stock assessments necessary to estimate reliable potential biological removal levels for the affected marine mammal stocks and set the boundary between the northeast and mid-Atlantic bottom trawl fisheries at the location that will result in the most reliable estimates of bycatch for the two fisheries. The Commission reiterated its prior recommendations that the National Marine Fisheries Service develop new methods that will produce accurate, reliable estimates of effort for the fisheries in question and describe in its List of Fisheries the basis for confirming that a fishery warrants a Category III listing.
Agency Response: The Service issued its final rule on 1 November 2010, consistent with some of the Commission's recommendations. The Service provided additional justification for splitting the Washington Dungeness crab pot/trap fishery into two fisheries; however, the justification is not totally convincing. The Service did consult with the U.S. Fish and Wildlife Service, but the consultations did not yield more observer coverage. The Hawaii kaka line and the Hawaii vertical longline fisheries were not listed as Category II fisheries because the Service does not consider these species similar to other Hawaii shortline and longline fisheries. The Service will increase observer coverage in the southeastern U.S. Atlantic, Gulf of Mexico shrimp trawl fishery when resources become available. The Service believed it set a boundary between the northeast and mid-Atlantic bottom trawl fisheries in the proposed rule and concluded this was not an issue. The Service argued that new methods for determining accurate, reliable estimates of fishing effort are not needed because this data will not be used in determining current or future management of fisheries or observer coverage designation. Finally, the Service stated it would consider how best to present information used to list a Category III fishery in the 2012 process, but it did not agree that listing observer effort for all fisheries would provide a clear representation regarding why fisheries are listed.

26 August 2010	**To:** U.S. Fish and Wildlife Service **Issue:** Application to amend a research permit from the U.S. Geological Survey, Alaska Science Center, to capture and study up to 250 polar bears annually during a five-year period **Recommendation:** The Commission recommended that the U.S. Fish and Wildlife Service issue the permit amendment, provided that the conditions currently contained in the permit remain in effect. **Agency Response:** The Service issued the permit on 10 September 2010, consistent with the Commission's recommendation.
30 August 2010	**To:** National Marine Fisheries Service **Issue:** Proposed rulemaking on fish and fish products using regulatory standards to evaluate the impact of foreign fisheries on marine mammals **Recommendation:** The Commission recommended that the National Marine Fisheries Service adopt performance-based standards for evaluating the impact of foreign fishing on marine mammal stocks, expand its programs to export or otherwise facilitate transfer to other nations those U.S. fishing practices, technologies, and programs for reducing marine mammal bycatch, and conduct feasibility analyses on the performance-based standards and select those that would be clear, consistent, uniformly applied, and easily verifiable. The Commission also recommended that the Service collaborate with relevant trade-related offices in the Departments of Treasury, State, and Homeland Security and the U.S. Trade Representative in carrying out the feasibility analyses and include in the feasibility analyses all of the standards applicable to U.S. fisheries regardless of whether those standards have yet to be met fully by U.S. fisheries. The Commission recommended that the Service develop its proposed rule with sufficient detail to allow for meaningful comment and create regulations to provide sufficient direction to other countries, agency reviewers, and the public as to what information they would be required to submit, specify in the proposed rule the requirement that fish-exporting nations provide "reasonable proof" of the impacts of their fishing operations on marine mammals, specify in the proposed rule where the burden of proof lies with respect to imports of fish and fish products under section 101(a)(2) of the Marine Mammal Protection Act, and establish regulatory procedures under which fish-exporting nations must submit promptly the required level of proof concerning the impacts of each applicable commercial fishery to marine mammal mortality and serious injury relative to U.S. standards. The Commission further recommended that the Service require that any findings of non-compliance or inadequate proof be forwarded immediately to the Secretary of the Treasury, stipulate that consultations with those nations whose fish products are banned from U.S. markets be undertaken rapidly to identify and rectify the causes of marine mammal bycatch in excess of U.S. standards, work closely with the Department of the Treasury to identify ways in which the envisioned regulations would address the procedures for assessing the impacts of foreign fisheries on marine mammals and procedures for imposing or lifting import bans based on those assessments, and require any nation seeking to export fish products to the United States to provide documentation or evidence regarding marine mammal bycatch in the harvest of those products relative to U.S. standards. **Agency Response:** The Service had not issued a proposed rule by the end of 2011.
1 September 2010	**To:** U.S. Fish and Wildlife Service **Issue:** Application to amend a research permit from EcoHealth Alliance, Inc., to conduct research on free-ranging and captive manatees in the southeastern United States and import/export samples from live West Indian manatees **Recommendation:** The Commission recommended that the U.S. Fish and Wildlife Service

	issue the permit amendment, provided that conditions contained in the current permit remain in effect, and that the permit holder clarify the number of animals from which tail notch samples would be collected annually, the permit holder be required to obtain all necessary permits under CITES before any importing or exporting marine mammal parts, and the permit amendment, if issued, be conditioned to require the permit holder, prior to importing any specific specimen, to submit documentation demonstrating that the specimen was taken in accordance with the laws of the country of origin and was not taken in violation of the Marine Mammal Protection Act or other applicable U.S. laws. **Agency Response:** The Service issued the permit on 19 November 2010, consistent with the Commission's recommendations.
1 September 2010	**To:** National Marine Fisheries Service **Issue:** Application to amend a research permit from Gregory Bossart, V.M.D., Georgia Aquarium to conduct research on up to 400 Atlantic bottlenose dolphins in Charleston, South Carolina **Recommendation:** The Commission recommended that the National Marine Fisheries Service defer issuance of the permit amendment until the permit holder provides documentation regarding the review and approval of the proposed research activities by an IACUC, ensures that activities to be conducted under this permit and those of other permit holders are coordinated and data are shared to avoid unnecessary duplication of research and disturbance of animals, ensures the conditions contained in the current permit remain in effect, and advises the applicant to contact the U.S. Fish and Wildlife Service regarding the possible need for an authorization to take Florida manatees incidental to conducting research on dolphins. **Agency Response:** The Service issued the permit amendment on 6 April 2011, consistent with most of the Commission's recommendations. The Service did indicate that the applicant verified that the protocols for the Charleston study area are the exact same protocols and sampling techniques as previously analyzed and approved by the IACUC for the original study area (Indian River Lagoon). However, it is unclear if the IACUC approved the Charleston project.
2 September 2010	**To:** National Marine Fisheries Service **Issue:** Application from the Washington State Department of Natural Resources to take small numbers of marine mammals by harassment incidental to removal of pilings and associated structures in Puget Sound, Washington **Recommendation:** The Commission recommended that, before issuing the harassment authorization, the National Marine Fisheries Service require the applicant to provide constant monitoring beginning 30 minutes before all daily activities are initiated and ending 30 minutes after all daily activities cease, require the applicant to measure sound pressure levels during vibratory extraction to verify that these levels do not have the potential to cause injury and, if the in-situ sound pressure levels may cause injury, require the applicant to determine a safety zone based on the in-situ levels and to shut down activities if a harbor seal enters the zone, condition the authorization to give the protected species observer the authority to shut down the proposed activities if he or she believes that a seal is at risk of direct strike, and continue to require ramp-up or soft-starts pending the outcome of a meeting between Service and Commission staff. **Agency Response:** The Service issued the incidental harassment authorization on 29 October 2010, consistent with the Commission's recommendation regarding soft-starts. The Service disagreed that continuous monitoring was necessary based on the low probability that the proposed activities would cause serious injury or mortality and based on the paucity of species present. The Service noted that there are no known acoustic data

available on source levels of vibratory extraction of timber piles, but it was confident that the extraction would not cause Level A harassment. As such, the Service did not require in-situ measurements or determination of safety zones. The Service inferred that "direct strike" was in reference to the vibratory hammer and not the actual direct strike from piles or structures being removed by heavy equipment. The Service stated that the observers could shut-down operations if seals were in danger of direct strike.

3 September 2010

To: National Marine Fisheries Service
Issue: Draft Biological Opinion for the Bering Sea and Aleutian Islands and Gulf of Alaska Groundfish Fisheries Section 7 Consultation, August 2010
Recommendation: The Commission recommended that the National Marine Fisheries Service revise the biological opinion to (1) describe the full extent of biomass reduction in each of the fisheries over time and as projected under the proposed management strategy for these fisheries; (2) provide a detailed explanation for how such reductions in biomass affect the foraging efficiency of western Steller sea lions; and (3) explain how such reductions still allow for the recovery of the western Steller sea lion population despite a requirement of no changes to the overall harvest strategy to mitigate either jeopardy to the western population's continued existence or adverse modifications to its critical habitat. The Commission also recommended that the Service include a description of the shift in the age/size distribution of the prey stocks and explain how this shift in distribution affects the foraging efficiency of western Steller sea lions, describe changes in the distribution of the fished stocks under unfished and fished conditions, and take advantage of the circumstances surrounding the Alaska groundfish fisheries by developing an adaptive, experimental approach to fisheries management. In addition, the Commission recommended that the Service (1) correct and clarify the use of the terms "recovery" and "carrying capacity" and ensure that references to recovery in the opinion are consistent with the recovery criteria set forth in the Service's revised Steller Sea Lion Recovery Plan and (2) analyze all of the reasonable and prudent measures and alternatives and explain how they facilitate Steller sea lion recovery rather than just maintaining the status quo.
Agency Response: The Service issued the biological opinion on 24 November 2010. In the Commission's view, the Service has not yet addressed the Commission's recommendations.

9 September 2010

To: U.S. Coast Guard
Issue: Comments for the Interagency Coordinating Committee on Oil Pollution Research regarding oil pollution research priorities
Recommendation: The Commission recommended that the Interagency Coordinating Committee on Oil Pollution (1) compile and analyze required background information; (2) describe in detail all aspects of the proposed activities and their potential sources of failure; (3) project the fate of spilled oil, dispersants, and dispersed oil from different operations and geographical locations; (4) evaluate options for response given current technology and capabilities and the environment in which operations will occur; and (5)identify the limits of response technologies' capabilities and understand the research that is needed to address those limits. The Commission also recommended that the Committee describe interactions with other human activities that may affect or be affected by oil and gas operations and accidents, conduct a risk analysis and develop a research plan and budget for filling data gaps for living marine resources and their habitats, identify existing education and outreach tools, and develop a research plan with a detailed budget and timeline to address knowledge and technology gaps related to oil-spill prevention and response in the Arctic.
Agency Response: The Coast Guard did not finalize its Oil Pollution Research and Technology Plan by the end of 2011 but plans to finalize it in 2013.

16 September 2010
To: U.S. Fish and Wildlife Service
Issue: Application for a research permit from Pennsylvania State University to import polar bear blood from Norway for population genetics analyses
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that the permit holder is required to obtain all necessary permits under CITES before importing the specimens.
Agency Response: The Service issued the permit on 18 October 2010, consistent with the Commission's recommendation.

17 September 2010
To: National Science Foundation
Issue: Application to modify an authorization from Daniel Costa, Ph.D., to administer isotopes and to attach small drag-inducing devices to Weddell seals in addition to ARGOS telemetry tags, time-depth recorders, and accelerometers
Recommendation: The Commission recommended that the National Science Foundation issue the authorization modification only after it has confirmed that the National Marine Fisheries Service has issued a permit amendment under the Marine Mammal Protection Act to authorize the proposed activities and advise the permit holder of the need to obtain all necessary permits under CITES before importing or exporting marine mammal parts.
Agency Response: The Foundation issued the authorization modification on 26 October 2010, consistent with the Commission's recommendations.

23 September 2010
To: U.S. Fish and Wildlife Service
Issue: Application for a research permit from Iskande Larkin, Ph.D., University of Florida, to take manatees during behavioral observations and health assessments to obtain information on the reproductive endocrine health of Florida manatees
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that conditions currently contained in the permit remain in effect and refrain from authorizing the proposed male reproductive studies until the IACUC has approved those studies.
Agency Response: The Service issued the permit on 25 February 2011, consistent with the Commission's recommendations.

27 September 2010
To: National Marine Fisheries Service
Issue: Application for a research permit from James Harvey, Ph.D., to conduct research on blue, fin, humpback, and gray whales off California, Oregon, and Washington during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided it restricts biopsy sampling and tagging neonates or females accompanied by a neonate. The Commission also recommended that the Service condition the permit to require that the applicant document observations regarding short- and long-term effects from biopsy sampling and tagging and report them to the Permit office and provide the Service with documentation that the applicant's IACUC has reviewed and approved the research protocol prior to initiating the activities.
Agency Response: The Service issued the permit on 29 March, 2011, consistent with most of the Commission's recommendations. The Service did indicate that it is the responsibility of the researcher to obtain IACUC approvals for their research.

28 September 2010
To: National Marine Fisheries Service
Issue: Application from Scripps Institution of Oceanography to take small numbers of marine mammals by harassment incidental to a marine geophysical survey in the eastern

tropical Pacific Ocean

Recommendation: The Commission recommended that the National Marine Fisheries Service, prior to issuing the incidental harassment authorization, require the applicant to use location-specific environmental parameters to re-estimate safety zones and then recalculate associated takes, require the applicant to use in-situ measurements to verify and, if need be, refine the safety zones prior to or at the beginning of the survey, and require the applicant to determine actual takes based on refined safety zones, sightability, and relevant detection functions. The Commission also recommended that the Service provide additional justification for its preliminary determination that the planned monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified safety zones, propose to Scripps Institution of Oceanography that it revise its study design to include collections of meaningful baseline data on the distribution and behavior of marine mammals, extend the monitoring period to at least one hour before initiation of airgun activities and at least one hour before the resumption of airgun activities after a power-down because of a marine mammal sighting within a safety zone, continue to require ramp-up and power-down procedures as a mitigation measure pending the outcome of a meeting to discuss these procedures, and not include detailed information and analyses for species that are not expected to be in the proposed survey area in future *Federal Register* notices.

Agency Response: The Service issued the incidental harassment authorization on 15 October 2010, consistent with some of the Commission's recommendations. The Service was confident in the calibration results from the Gulf of Mexico as the basis for the safety zones, and believed they were considered best available science. It also believed the safety zones were appropriate based on the low density of marine mammals in the area. The Service stated that the monitoring measures would detect marine mammals in the safety zones based on the small size of the safety zones and planned monitoring and mitigation measures. At night, night vision technology would be used to monitor for marine mammals and ramp-up would not commence unless the safety zone was visible for 30 minutes. The Service believed that redesigning the study was beyond the scope of the proposed action; however, sighting data would be obtained pre- and post-survey to provide baseline information. The Service did not agree with using a 1-hour clearance time because the majority of the species do not submerge longer than 30 minutes, observations are made for time periods greater than 30 minutes before airguns are active and during ramp-up procedures, and power-down would not occur based on the nature of the sound source. Finally, the Service believed the level of detail for pinnipeds was necessary to support their exclusion from the authorization.

6 October 2010

To: National Science Foundation

Issue: Application for authorization from Paul Ponganis to assess leopard seal hunting strategies and their impact on the emperor penguin colony at Cape Washington, Antarctica

Recommendation: The Commission recommended that the National Science Foundation issue the authorization as requested.

Agency Response: The Foundation issued the authorization on 12 October 2010, consistent with the Commission's recommendation.

6 October 2010

To: National Marine Fisheries Service

Issue: Application for a research permit from George Church, Harvard University, to acquire and maintain frozen whale lung and skin cells extracted from tissues previously collected from stranded bowhead whales

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit as requested.

Agency Response: The Service issued the permit on 24 January 2011, consistent with the Commission's recommendation.

7 October 2010

To: National Marine Fisheries Service
Issue: Request from the Knik Arm Bridge and Toll Authority in coordination with the Department of Transportation's Federal Highway Administration to take small numbers of beluga whales, harbor seals, and harbor porpoises by harassment incidental to bridge construction from 2013–2017
Recommendation: The Commission recommended that the National Marine Fisheries Service require the applicants to (1) clarify how source levels of the impact and vibratory hammers were determined; (2) fully describe the process and data used to estimate propagation loss, associated distances to Level A and B harassment thresholds, and the number of takes; (3) clarify how those takes reflect variations in the activities that would be conducted and the seasonal distribution of marine mammals near the project site; and (4) refrain from issuing a proposed rule for the proposed construction activities until the Service or the applicants have obtained and verified source level and propagation loss data for large-diameter, drilled-shaft construction methods using an oscillator and use that information to estimate the expected number of takes. The Commission also recommended that the Service verify the timing of the proposed in-water construction activities, require that the applicants provide marine mammal density estimates and estimated takes during those months currently not addressed in the application, and explain how the applicants would adjust their activities during the construction period to take into account the observed distribution, movements, and behavior of beluga whales. If the Service proposes regulations for the planned bridge construction activities without better data, the Commission recommends that it incorporate safety zones with added precautionary buffers for use with the impact and vibratory hammers until in-situ measurements have been made and estimated sound pressure levels have been verified and apply the same proposed safety zones associated with vibratory hammer use to the oscillator's use. Before publishing a proposed rule, the Commission recommended that the Service (1) resolve the uncertainty when using the qualifiers "when possible and practicable" and "when weather and daylight hours permit" and structure the proposed rule to prohibit in-water activities at times and under conditions when the specified mitigation and monitoring measures are not being implemented or are not expected to be effective; (2) require that observations be made before, during, and after all soft-starts of pile-driving and pile-removal activities to gather the data needed to analyze the effectiveness of this technique as a mitigation measure and require the applicants to analyze and report their findings as part of the monitoring and reporting requirements; and (3) condition the proposed rule and any letter of authorization issued thereunder to require suspension of the construction activities if a marine mammal is seriously injured or killed and the injury or death could be associated with those activities and, if supplementary measures are unlikely to reduce this risk to a negligible level, require the applicants to suspend their activities until an authorization for such taking has been obtained.
Agency Response: The Service had not issued the proposed rule by the end of 2011.

14 October 2010

To: U.S. Fish and Wildlife Service
Issue: Application for a photography permit from Thomas Postel to harass Florida manatees during filming activities at Blue Spring State Park, Florida
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit as requested.
Agency Response: The applicant amended the request and the Service published a *Federal Register* notice reopening the public comment period (see 19 January 2011, below).

15 October 2010

To: Office of Marine Sanctuaries

Issue: Management plan review for the Hawaiian Islands Humpback Whale National Marine Sanctuary

Recommendation: The Commission recommended that the Office of National Marine Sanctuaries develop a new management plan for the Hawaiian Islands Humpback Whale National Marine Sanctuary that expands its purpose and scope from the current conservation of a single species to one with an ecosystem perspective. Specifically, the Commission recommended that the new management plan include protecting, conserving, and restoring significant biological components and marine habitats occurring between the shoreline and a seaward boundary around all eight main Hawaiian Islands; adopt a new name for the sanctuary and new vision and mission statements that encompass an ecosystem-based management approach to protect, conserve, and restore marine life, marine habitat, and ecosystem health using management strategies that balance conflicting or competing uses while complementing existing management programs and measures; include a clear statement of intent to develop and implement all sanctuary management actions in close consultation with federal and state agencies and Native Hawaiian organizations that share responsibilities for conserving living marine resources in the sanctuary boundaries; and include provisions for establishing an interagency coordinating committee chaired by the Sanctuary's co-superintendents with representatives from the National Marine Fisheries Service, the Coast Guard, the Navy, the Western Pacific Regional Fishery Management Council, key offices of state government, and the Native Hawaiian community. The Commission also recommended that the Office of Sanctuaries direct particular attention to the need for protecting and promoting the reoccupation of the main Hawaiian Islands by Hawaiian monk seals, reducing risks to humpback whales from entanglement in fishing gear and collisions with vessels, minimizing harassment of spinner dolphins, monitoring and assisting with the recovery of the insular stock of false killer whales, and responding to stranded or distressed marine mammals. The Commission further recommended that the Office reserve authority to regulate future activities and development including vessel traffic, commercial and recreational fishing, sound sources, and construction activities.

Agency Response: The Sanctuary Advisory Council working groups developed management recommendations that were expected to be presented to the full council for their approval at a meeting in early 2012, prior to being forwarded to sanctuary management.

19 October 2010

To: National Marine Fisheries Service

Issue: Application from the U.S. Navy for revision of its letter of authorization for missile launch activities on San Nicolas Island, California, to discontinue targeted monitoring of northern elephant seals but continue targeted monitoring of California sea lions and harbor seals

Recommendation: The Commission recommended that the National Marine Fisheries Service (1) initiate a rulemaking or provide adequate justification to support a determination that rulemaking is not required to amend section 216.155 of the regulations to authorize the Navy to discontinue monitoring the potential effects of launches on elephant seals and (2) clarify the intent of section 216.158(a)(1) of its regulations and explain why it does not believe that the Navy should be held to the commitment that there would be no substantial modifications to the monitoring program to be carried out during the 12 months covered by the letter of authorization, particularly when it sought renewal of its letter of authorization just months before submitting the request to change the monitoring requirements. The Commission also recommended that the Service provide the

Commission and the public with the information necessary to evaluate the conclusion that there has been no displacement of pinnipeds from rookeries and haul-out sites in the areas potentially affected by launch activities, and develop and implement a monitoring strategy designed to determine whether there are gaps in the available information for assessing possible long-term impacts and, if so, to what extent the cumulative impacts of repeated launch activities might be displacing pinnipeds.

Agency Response: The Service issued a revised letter of authorization on 18 November 2010. It determined that rulemaking was not required to amend regulations because the Navy notified the Service of the changes and the requirements under 50 CFR 216.155 remain in effect. The Service also determined that the changes are not substantial; therefore, section 216.158(a)(1) is not relevant. Information regarding elephant seal displacement was provided, including an overall increase of numbers near launch sites from 2000–2005, but information regarding disturbance of other pinniped species was not provided. Lastly, the Service determined that the current monitoring strategy is sufficient to determine long-term impacts to pinnipeds from the launch activities.

22 October 2010

To: National Marine Fisheries Service

Issue: Application from the NOAA Restoration Center, Southwest Region, to take small numbers of harbor seals by harassment incidental to construction activities during a tidal wetlands project at the Elkhorn Slough National Estuarine Research Reserve in Moss Landing, California

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, provided that it require the applicant first use site-specific environmental parameters to re-estimate safety zones and then use in-situ measurements to verify and, if need be, refine the safety zones prior to or at the beginning of sill construction and require that observations be made during all soft-starts to gather the data needed to analyze and report on its effectiveness as a mitigation measure.

Agency Response: The Service issued the incidental harassment authorization on 23 November 2010, consistent with most of the Commission's recommendations. The Service required the applicant to conduct in-situ measurements for the impact hammer but not the vibratory hammer due to its lower source level.

22 October 2010

To: U.S. Fish and Wildlife Service

Issue: Application for a public display permit from the Indianapolis Zoological Society to continue to retain a juvenile male walrus maintained at the Indianapolis Zoo

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that the Service, in consultation with the Animal and Plant Health Inspection Service, is satisfied that the applicant's facilities for maintaining the animal are adequate to provide for its health and well-being and is satisfied that the applicant's education program is acceptable.

Agency Response: The Service did not issue the permit because the animal died.

22 October 2010

To: U.S. Fish and Wildlife Service

Issue: Application for a research permit from the U.S. Fish and Wildlife Service's Marine Mammals Management to take polar bears in Alaska and in waters around Alaska during a five-year period

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that the Service consults with the applicant to determine the number of serious injuries and deaths of animals that might occur during the proposed activities and provide authorization for a limited number of accidental deaths. The Commission also recommended that the Service require that activities be suspended if the

mortality level reaches the authorized number, consult with the applicant to determine whether the harassment of non-target marine mammal species is warranted and should be included in the permit request, ensure that activities to be conducted under this permit and those of other permit holders are coordinated to avoid duplicative research and unnecessary disturbance of animals, and is satisfied that the proposed activities have been reviewed and approved by the permit holder's IACUC.
Agency Response: The Service issued the permit on 11 March 2011, consistent with the Commission's recommendations.

29 October 2010
To: National Marine Fisheries Service
Issue: Application for a research permit from Randall Wells, Ph.D., to conduct research on bottlenose dolphins off the west coast of Florida during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that it conditions the permit to require the applicant to provide IACUC approval prior to initiating the research activities.
Agency Response: The Service issued the permit on 26 May 2011, consistent with the Commission's recommendation.

1 November 2010
To: U.S. Department of Energy
Issue: Review by the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling
Recommendation: The Commission recommended that the Oil Spill Commission identify the proximate causes of the Deepwater Horizon oil spill, take a critical look at the regulatory and social environment in which this event occurred, and develop measures to reduce the likelihood that faulty judgment and human error may contribute to similar events. The Commission also recommended that the Oil Spill Commission call for development of a national database for all oil and gas operations in U.S. waters and mandatory standardized testing of all major types of equipment and technology used in oil and gas operations to assess risks, make recommendations regarding how to improve government regulators to ensure adequate industry regulation, and review the environmental analyses prepared for the Deepwater Horizon drill site, including the BP oil spill response plan, to identify their shortcomings and make recommendations to address them. The Commission further recommended that the Oil Spill Commission (1) evaluate the role society played in creating the conditions and circumstances that led to the Deepwater Horizon oil spill and make recommendations that will lead to a comprehensive national energy policy that will reduce the risk of future spills; (2) pay close attention to the quantity and quality of baseline population and health information for wildlife in the Gulf of Mexico and, where it identifies shortcomings in that information, make recommendations for its improvement; (3) examine the balance between collection of essential information and multiple review processes and consider whether information standards ought to be imposed to ensure transparency; and (4) evaluate the nature, impacts, and efficacy of response methods and the apparent lack of preparation for addressing problems that could and should have been anticipated by the oil and gas industry and government regulators.
Agency Response: The Oil Spill Commission issued its report, "Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling," in January 2011, consistent with some of the Commission's recommendations. The Oil Spill Commission noted that while the oil spill itself was caused by a lack of well control, the ultimate cause of the disaster was a failure in the safety culture of the industry as a whole. The Oil Spill Commission determined that a fundamental reform of the regulatory oversight process was needed, as well as, self-policing by the industry. The Oil Spill Commission made numerous recommendations

designed to improve the safety of offshore operations, enhance environmental safeguards, strengthen oil spill response capabilities, and advance well-containment technologies. A complete discussion of the Commission's recommendations is provided in Chapter Three of this report.

2 November 2010

To: National Marine Fisheries Service
Issue: Review of the draft 2010 stock assessment reports
Recommendations: To improve stock assessment efforts generally, the Commission recommended that the National Marine Fisheries Service (1) review its observer programs nationwide, set standards for observer coverage, identify gaps in existing coverage, and determine the resources needed to (a) observe all fisheries that do or may directly interact with marine mammals, and (b) provide reasonably accurate and precise estimates of serious injury and mortality levels; (2) work with federal and state fishery management agencies and the industry to develop a funding strategy that will support adequate observer programs for collecting data on incidental serious injury and mortality of marine mammals and other protected species; (3) develop a strategy to collaborate with other nations to expand existing surveys and assessments for stocks that move into international or foreign waters and may be subject to fisheries or other human-related risk factors; and (4) develop and implement a systematic approach for integrating all human-related risk factors into stock assessment reports.

To improve stock assessment efforts in the Atlantic and Gulf of Mexico region, the Commission recommended that the National Marine Fisheries Service (1) conduct the necessary surveys of North Atlantic pinniped stocks and incorporate the results in its stock assessment reports; (2) improve stock assessments for bottlenose dolphins in both the Atlantic and the Gulf of Mexico by conducting the research needed to describe stock structure, provide more accurate and precise estimates of the abundance and trends of the various stocks, and provide more precise estimates of the level of dolphin serious injury and mortality from fisheries and other human activities in those regions; and (3) develop a stock assessment plan for the Gulf of Mexico that describes (a) a feasible strategy for assessing the Gulf's marine mammal stocks, (b) the infrastructure needed to support that plan, (c) the expertise required to carry out the plan, and (d) the funding needed to implement the plan.

To improve stock assessment efforts in the Alaska region, the Commission recommended that the National Marine Fisheries Service (1) proceed with formal recognition of 12 stocks of harbor seals in Alaska and then proceed with the necessary research and management of those stocks as required by the Marine Mammal Protection Act; (2) continue to seek the additional support needed to develop and implement an ice seal research and management strategy that is commensurate with the grave threats that those species face; (3) ensure that funding for research on the eastern stock of North Pacific right whales is incorporated into the Administration's fiscal year 2012 budget; and (4) provide in the 2011 stock assessment reports updated estimates of serious injury and mortality for the 11 stocks identified in the 2009 stock assessment reports but not addressed in the 2010 drafts, or at least explain why that information is not available.

To improve stock assessment efforts in the Pacific region, the Commission recommended that the National Marine Fisheries Service (1) investigate possible sources of fishery-related mortality of harbor porpoises from central California to the Washington coast and ensure adequate observer coverage on vessels in fisheries that may be taking harbor porpoises so that the total bycatch can be estimated more accurately; and (2) conduct the

necessary surveys to update stock assessment reports for harbor seals along the Oregon/Washington coast and in Washington inland waters.

Agency Response: The Service released its final 2010 stock assessment reports on 6 June 2011, highlighting ongoing efforts that will address many of the Commission's comments and recommendations. Specifically, the Service has begun to or will address the need for a review of observer programs, a strategy to incorporate funding from industry, and an international strategy for marine mammal conservation. Although the Service acknowledged that additional information would improve the stock assessment reports and better inform conservation decisions, it already has utilized available resources for surveys, observer programs, and estimating other types of mortality. Thus, the Service will not initiate any new large surveys or other programs until additional resources are available or ongoing monitoring or conservation efforts can be terminated and resources are redirected.

In response to recommendations regarding the Atlantic and Gulf of Mexico region, the Service detailed plans for a harbor seal abundance survey in May 2011, including determining a correction factor for seals not hauled out during the survey. The Service also will analyze archived digital images from 2005–2011 of seasonal seal surveys off the southeast Massachusetts coast to provide a minimum abundance estimate of non-pup gray seals in the Cape Cod/eastern Nantucket Sound region. In addition, the Service indicated that the critical elements for a strategic stock assessment plan for the Gulf of Mexico already exist in the protected species Stock Assessment Improvement Plan, and these elements are addressed in the 2008 Southeast Fisheries Science Center Marine Mammal Program Strategic Plan and a 2007 research plan for assessing bottlenose dolphin stocks in the north-central Gulf of Mexico. Because of limited staff resources, the Service will not develop a focused Southeast Fisheries Science Center document in the near future.

In response to recommendations regarding the Alaska region, the Service explained that the draft 2011 stock assessment reports will include separate evaluations of 12 harbor seal stocks for Alaska. Although the Service has completed status reviews of ringed, bearded, ribbon, and spotted seals, it is apparent that more information is needed to assess any potential threats or the impact to those species. The Service continues to request appropriations for ice seals to the extent consistent with other priorities of the Administration for the national budget. The Service also partners with other agencies to support research and monitoring of ice seals to the extent such activities are consistent with the priorities of those agencies. Lastly, the Service stated that it will continue to seek resources to study the critically endangered North Pacific right whale.

The Service did not provide any specific comments in response to the Commission's recommendations regarding the Pacific region.

4 November 2010

To: U.S. Fish and Wildlife Service

Issue: Application for a research permit from the Florida Fish and Wildlife Conservation Commission to conduct research on up to 90 West Indian manatees annually and to import/export salvaged specimens and biological samples from manatees and dugongs during a five-year period

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service defer issuing the permit until the applicant clarifies the additional number of manatees that could be taken by biopsy sampling; explained the reason for biopsy sampling an individual animal up to 10 times annually; explained why it is necessary to take incidentally a subset of manatees up to 30 times annually and either has provided a reasoned basis for assuming that the proposed number of takes will not have significant impact on the manatees and

	their habitat-use patterns or has described how the applicant will evaluate the potential impact of that many takes; and provided written documentation demonstrating that the procedures proposed in the permit request have been reviewed and approved by the applicant's IACUC. **Agency Response:** The Service issued the permit on 20 October 2011, consistent with the Commission's recommendations.
8 November 2010	**To:** Bureau of Ocean Energy Management, Regulation, and Enforcement **Issue:** Review of categorical exclusions for outer continental shelf decisions **Recommendations:** The Commission recommended that the Bureau of Ocean Energy Management, Regulation, and Enforcement discontinue the use of categorical exclusions for exploration, development, and production plans for proposed oil and gas activities on the outer continental shelf in the central or western Gulf of Mexico; review its requirements for safety and environmental management systems and its practices for inspecting those systems to ensure that they are functioning as designed and expected; and work with the Services to expedite implementation of the incidental take provisions of the Marine Mammal Protection Act in the Gulf of Mexico, including collection and analysis of the information needed to assess accurately the impact of oil and gas operations on marine mammals and other marine resources. **Agency Response:** The Bureau had taken no formal action by the end of 2011 but reported that the issue is still under review.
9 November 2010	**To:** National Marine Fisheries Service **Issue:** Application from the U.S. Air Force to take Atlantic bottlenose dolphins incidental to training operations off the coast of Santa Rosa Island at the Eglin Gulf Test and Training Range in the Gulf of Mexico from 2011–2015 **Recommendation:** The Commission recommended that the National Marine Fisheries Service require the Air Force to describe in detail the environmental parameters and methods used to determine the safety zones and subsequent takes and incorporate these in the final rule and, before issuing the final rule, require the Air Force to re-estimate the safety zones and associated takes based on the Level A harassment (injury) threshold of 13 psi-msec and the Level B harassment (non-TTS) threshold of 177 dB re 1 μPa^2-sec. The Commission also recommended that the Service, before issuing the final rule, provide additional justification for its preliminary determination that the mitigation and monitoring measures would be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified safety zones; condition the final rule and any letter of authorization issued under that rule to require suspension of the proposed activities if a marine mammal is seriously injured or killed and the injury or death could be associated with the proposed activities and, if supplementary measures are unlikely to reduce the risk of serious injury or death to a very low level, require the Air Force to suspend its activities until an authorization for such taking has been obtained; and ensure that numerous discrepancies in the application and proposed rule are corrected in the final rule. **Agency Response:** The Service had not issued a final rule by the end of 2011.
18 November 2010	**To:** National Marine Fisheries Service **Issue:** Application from the U.S. Navy to take marine mammals incidental to military training operations in the Temporary Maritime Activities Area in the Gulf of Alaska from 2011–2015 **Recommendation:** The Commission recommended that if the National Marine Fisheries Service proceeds with publication of a final rule to authorize the taking of small numbers

of marine mammals incidental to the proposed military training operations, the Service should (1) advise the Navy to consult with the U.S. Fish and Wildlife Service to determine if the Navy also needs authorization to take sea otters; (2) require the Navy to conduct an external peer review of its marine mammal density estimates for the Gulf of Alaska, the data upon which those estimates are based, and the manner in which those data are being used; (3) require the Navy to conduct seasonal, systematic vessel or aerial line-transect surveys supplemented with passive acoustic monitoring and satellite tracking to provide marine mammal density, distribution, and habitat use data during the seasons and in the regions when and where the Navy plans to conduct its exercises; (4) require the Navy to estimate marine mammal takes using season- and site-specific environmental parameters (including sound speed profiles and wind speed) and marine mammal densities before the Service issues the final rule; (6) if the Navy plans to conduct major training exercises in April or May but does not provide more realistic take estimates for those months, limit the final rule to major training exercises that occur during the period from June to October; (7) extend the required monitoring period to at least one hour before the resumption of training exercises when an animal has been sighted within a safety zone and after power-down and shutdown of active sonar sources; (8) condition the final rule to require that all members of the Navy's mitigation teams be required to complete the marine mammal training program (i.e., the Service-approved Marine Species Awareness Training) before they participate in any of the proposed activities; (9) require the Navy to use a sufficient level of monitoring during all training activities to ensure that marine mammals are not being taken in unanticipated ways or numbers; and (10) condition the final rule to require that the Navy suspend any of the training exercises or other activities covered by this authorization if it observes a marine mammal that is seriously injured or dead and the injury or death could have resulted from the Navy's activities. The Commission also recommended that, before issuing the final rule, the Service clarify the meaning of the qualifiers "when operationally feasible," "if operationally feasible," "when feasible," and "if feasible" to indicate how often, under what specific conditions, and for what timeframe the Navy expects to use visual and aural monitoring via aerial- and vessel-based observers and passive acoustic sensors; ensure that it can provide oversight of and response to uncommon stranding events within the Temporary Maritime Activities Area in the Gulf of Alaska sufficient to meet in full the monitoring and reporting requirements of the Marine Mammal Protection Act; and ensure that discrepancies within and between the application and *Federal Register* notice are corrected and addressed in the final rule.

Agency Response: The Service issued a final rule on 25 April 2011, consistent with a few of the Commission's recommendations. The Service indicated that the Navy consulted with the U.S. Fish and Wildlife Service regarding sea otters, which were considered extralimital in the range complex. The Service also stated that the Navy uses peer-reviewed science whenever it is available and applicable, and it has encouraged the Navy to have the models they use and data they gather peer-reviewed. The Service did agree that the Navy should focus its monitoring plan on passive acoustics; however, it did not address vessel or aerial surveys and all monitoring would occur after the final rule would be issued. Further, the Service indicated that the Navy used the greater densities for determining takes but did not address site-specific or season-specific modeling. The Service did not extend the monitoring period to one hour because it believes that animals that have the ability to dive for longer than 30 minutes may not dive for extended periods, that it is unlikely that vessels and animals would travel in the same direction at the same sustained speed to be exposed to sonar for extended periods of time, and animals avoid vessels and active sonar sources. The Service did not indicate if all members of the mitigation team (i.e., look-outs) would be required to complete the Service-approved Marine Species Awareness Training, as it is used to augment look-out training. Individuals are not expected to identify marine

mammals to species and they are not expected to provide in depth behavioral or status information on marine mammals. The Service believes that the monitoring stipulated in the monitoring plan and conducted by the look-outs is sufficient, as it did not require further monitoring requirements. Lastly, the Service did not specifically respond to the last four recommendations and the Commission is unsure if they were implemented.

18 November 2010

To: National Marine Fisheries Service

Issue: Application from the U.S. Navy to take gray whales, bottlenose dolphins, California sea lions, and harbor seals by harassment incidental to training operations at the Silver Strand Training Complex, California, for a one-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service require the Navy to revise the density estimates and subsequent number of takes to reflect accurately the densities presented in the references or provide a reasoned explanation for the densities that were used; require the Navy to conduct an external peer review of its marine mammal density estimates, the data upon which those estimates are based, and the manner in which those data are being used; issue the incidental harassment authorization contingent on the requirement that the Navy first use site-specific environmental parameters to re-estimate safety zones and then use in-situ measurements to verify and, if need be, refine the safety zones prior to or at the beginning of pile driving and removal, and before issuing the authorization, require the Navy to use consistent methods for rounding "fractional" animals to whole numbers to determine takes from underwater detonations and pile driving and removal and re-estimate marine mammal takes using the same methods for all proposed activities. The Commission also recommended that the Service require the Navy to monitor for at least 30 minutes before, during, and at least 30 minutes after all underwater detonation and pile-driving and pile-removal activities, to take steps to ensure that the safety zones for pile driving and removal are clear of marine mammals for at least 30 minutes before activities can be resumed after a shutdown, and to make observations during all soft-starts to gather the data needed to analyze and report on the effectiveness of soft-starts as a mitigation measure. The Commission further recommended that the Service condition the authorization to require suspension of exercises if a marine mammal is seriously injured or killed and the injury or death could be associated with those exercises, and if additional measures are unlikely to reduce the risk of additional serious injuries or deaths of marine mammals to a very low level, require the Navy to obtain the necessary authorization for such takings under section 101(a)(5)(A) of the Marine Mammal Protection Act before continuing the training exercises and ensure that the discrepancies within the application and the Service's *Federal Register* notice are corrected and addressed in the incidental harassment authorization.

Agency Response: The Service had not issued the incidental harassment authorization by the end of 2011.

18 November 2010

To: National Marine Fisheries Service

Issue: Application for a research permit from Oleg Lyamin, University of California at Los Angeles, to import whole brains and brain tissues from 10 sub-adult male fur seals to study sleep mechanisms

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the Service consult with the applicant and the previous permit holder to obtain clarification on whether importations of samples under Permit No. 1009-1640 exceeded the number authorized and require that the applicant obtain all necessary permits under CITES before importing or exporting marine mammal parts.

Agency Response: The Service issued the permit on 18 July 2011, consistent with the

	Commission's recommendations.
24 November 2010	**To:** National Marine Fisheries Service **Issue:** Proposal to authorize the taking of certain endangered and threatened marine mammal stocks incidental to conducting Alaska-based groundfish fisheries for three years **Recommendation:** The Commission recommended that the National Marine Fisheries Service (1) issue an authorization under section 101(a)(5)(E) to permit the incidental take of endangered and threatened stocks of humpback whales, fin whales, sperm whales, and Steller sea lions; (2) emphasize research and monitoring programs to address uncertainties related to reproduction and survival of the far-western sub-populations of the western U.S. stock of Steller sea lions and re-evaluate the negligible impact determination as new information becomes available; (3) work with state and tribal fisheries managers and participants in those fisheries to expand observer coverage in fisheries that may take marine mammals and, as observers provide better data, re-evaluate the negligible impact determination; and (4) identify the information gaps related to endangered and threatened species that may be affected by the issuance of the proposed permit and elevate the priority given to addressing those gaps. **Agency Response:** The Service issued the permit for several groundfish fisheries in the Bering Sea and the Gulf of Alaska on 21 December 2010, consistent with most of the Commission's recommendations. The Service did indicate that implementation of some of the recommendations were dependent on budgetary constraints.
24 November 2010	**To:** National Science Foundation **Issue:** Draft Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement (PEIS) for marine seismic research (i.e., geophysical surveys) funded by the National Science Foundation or conducted by the U.S. Geological Survey **Recommendation:** The Commission recommended that the National Science Foundation and the U.S. Geological Survey be prepared to conduct supplemental environmental analyses under the National Environmental Policy Act; redefine the alternatives considered in the programmatic analysis to encompass the broad technological, monitoring, and mitigation issues that pertain to all marine seismic research and provide a clear basis for choosing among options by decision-makers and the public; require for each proposed project specific mitigation and monitoring requirements tailored to the species present in the research area, pertinent oceanographic and bathymetric features, and the proposed operations; and develop guidelines for cruise research design and planning that would minimize the potential impacts of seismic research on marine mammals and other protected species. The Commission also recommended that the Foundation work with their observers, observer service providers, and the Services to establish and implement standards for protected species observers, establish requirements for analysis of data collected by the observers, provide additional justification for their preliminary determination that the mitigation and monitoring measures that depend on visual observations would be sufficient to detect, with a high level of confidence, all marine mammals within or entering identified mitigation zones. The Commission further recommended that the Foundation provide a comprehensive analysis of the cumulative impacts expected from proposed and future seismic surveys. **Agency Response:** The Foundation issued the final programmatic environmental impact statement in June 2011, consistent with some of the Commission's recommendations. The Foundation believed that that the technologies for potential future surveys and monitoring and mitigation are well defined in the PEIS, thus the alternatives presented in the PEIS are appropriate. The Foundation also stated that the monitoring reports currently, and will continue to, estimate potential effects on marine mammals and provide information

	regarding the effectiveness of monitoring and mitigation measures. Data collected by observers are viewed as public information and any further analysis of them is allowable, and encouraged, at user's expense. Because the National Marine Fisheries Service views the combination of visual and passive acoustic monitoring as the most effective mitigation techniques available for detecting marine mammals within or entering the exclusion zone, the Foundation believes they are effective. Lastly, the Foundation indicated that its cumulative impacts analysis in the draft PEIS examined potential impacts at a programmatic level, but it will include a cumulative impact analyses for future projects.
6 December 2010	**To:** Bureau of Ocean Energy Management, Regulation, and Enforcement **Issue:** Draft Supplemental Environmental Impact Statement for the Chukchi Sea Planning Area Oil and Gas Lease Sale 193 **Recommendation:** The Commission recommended that the Bureau of Ocean Energy Management, Regulation, and Enforcement (1) adopt a slow, phased approach to oil and gas development in the Chukchi Sea Planning Area by limiting initial operations to one or two active lease areas until the Bureau, industry, and all responsible parties have demonstrated their ability to conduct oil and gas operations safely in this region, have developed means for responding to oil spills in icy waters, and have collected needed baseline information on the marine wildlife and habitat at risk from such operations; (2) strengthen its supplemental environmental impact statement by providing a more complete description of the added risks associated with natural gas extraction, including a large-scale spill or loss of well control, prolonged use of platforms in the harsh Arctic environment, and construction and maintenance of the proposed gas pipeline; (3) work with other agencies with related responsibilities, the oil and gas industry, conservation organizations, and other stakeholders to develop standards and seek resources for baseline research and monitoring in areas under consideration for oil and gas development, including the Chukchi Sea Planning Area; such standards must take into account the rapidly changing conditions in the Arctic; and (4) work with the Department of Energy and related agencies to develop a national energy policy that will reduce the environmental risks being imposed by the nation's current dependence on oil and gas for energy. **Agency Response:** The Bureau issued its final supplemental environmental impact statement in October 2011. The Bureau did not address or provide responses to the Commission's recommendations in the final statement.
8 December 2010	**To:** National Marine Fisheries Service **Issue:** Petition from the California Gray Whale Coalition to designate the Eastern North Pacific population of gray whales as "depleted" under the Marine Mammal Protection Act **Recommendation:** The Commission recommended that the National Marine Fisheries Service defer any status change until the scientific evidence provides a stronger basis for concluding that the population may be below its maximum net productivity level, focus its research and management efforts related to the eastern North Pacific gray whale population on continued monitoring and expanded study of the whales' natural history and factors that may affect conservation of the population, and establish and fund a program to continue monitoring gray whale abundance and reproduction and to initiate efforts to understand how climate change in the Arctic affects gray whales. The Commission also recommended that the Service take advantage of opportunities to convene groups of gray whale researchers from Mexico, Canada, the Service, state research and management agencies, non-governmental organizations, academic institutions, and Native American groups to discuss ways of coordinating research aimed at the issues most relevant to conservation of the eastern North Pacific gray whale population. **Agency Response:** The Service found that the petition did not present substantial

information to indicate that a status review may be warranted and indicated that the Commission's comments were helpful in reaching its decision, as it agreed with the Commission's recommendations. However, the Service did state that compliance with some of the recommendations was based on budgetary constraints.

9 December 2010

To: National Marine Fisheries Service
Issue: Application to amend a research permit from the Northwest Fisheries Science Center to tag with suction-cup tags 20 southern resident killer whales per year and to tag with satellite dart tags six southern resident killer whales per year
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided that the conditions contained in the existing permit remain in effect and the Service ensure that the researchers coordinate and integrate all proposed tagging and biopsy activities with those of Canadian researchers studying the southern resident killer whale population.
Agency Response: The Service issued the permit amendment on 9 December 2011, consistent with the Commission's recommendations.

13 December 2010

To: Gray's Reef National Marine Sanctuary
Issue: Proposed rule from NOAA to create a research area within the Gray's Reef National Marine Sanctuary for conducting controlled scientific studies
Recommendation: The Commission recommended that NOAA adopt the proposed rule to establish a research area within the Sanctuary and prohibit fishing, diving, and stopping while transiting the area. The Commission also recommended that the Administration encourage research to assess the localized effects of removing fishing and other human activities on the size, distribution, abundance, and reproduction of economically important fish and shellfish within and outside the research area and encourage researchers working in the Sanctuary to record information on bottlenose dolphins, thereby providing a stronger basis for their management and conservation.
Agency Response: The Service issued a final rule on 4 December 2011 designating the southern third of NOAA's 22-square mile Gray's Reef National Marine Sanctuary as a research area.

20 December 2010

To: National Marine Fisheries Service
Issue: Application for a research permit from ABR, Inc. Environmental Research and Services to harass 11 species of marine mammals during aerial surveys in Alaska waters during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that it conditions the permit to require ABR, Inc., to collect, maintain, and annually report any disturbance caused by the planned surveys and require that ABR, Inc., consult with the Service if the surveys cause disturbance of Cook Inlet beluga whales to determine how to adjust survey methods to prevent such disturbance.
Agency Response: The Service issued the permit on 21 November 2011, consistent with one of the Commission's recommendations. The Service indicated that it is not reasonable to require the permit holder to modify its methods to avoid harassment of Cook Inlet beluga whales when the aerial surveys are targeting those whales.

21 December 2010

To: National Marine Fisheries Service
Issue: Application for a research permit from the Wildlife Resources Division of the Georgia Department of Natural Resources to conduct research on North Atlantic right whales off Florida, Georgia, and South Carolina during a five-year period

	Recommendation: The Commission recommended that the National Marine Fisheries Service refrain from issuing the permit until it either completes a programmatic environmental impact statement or explains why it no longer believes that an environmental impact statement is necessary to comply with the National Environmental Policy Act. If the Service decides to issue a permit without resolving this issue, the Commission recommended that the Service ensure that the proposed research has been approved by an IACUC and require the applicant to obtain all necessary permits under CITES before importing or exporting marine mammal parts. **Agency Response:** The Service issued the permit on 24 June 2011, consistent with none of the Commission's recommendations. The Service stated that it is not precluded from issuing permits while the environmental impact statement is being developed, per the National Environmental Policy Act and its implementing regulations at 40 CFR Section 1506.1. It is evaluating the applicant's request for right whale research to determine whether the action would result in significant impacts to the species or other portions of the environment. The Service also indicated that it is the responsibility of the researcher to obtain IACUC approvals for his or her research and CITES permits for import and export of marine mammal parts.
21 December 2010	**To:** National Marine Fisheries Service **Issue:** Application for a research permit from Scott Kraus, Ph.D., to conduct research on North Atlantic right whales along the U.S. East Coast from New York Harbor to the Maine-Canada border during a three-year period **Recommendation:** The Commission recommended that the National Marine Fisheries Service refrain from issuing a permit until it either completes a programmatic environmental impact statement or explains why it no longer believes that preparation of an environmental impact statement is necessary to comply with the National Environmental Policy Act. If the Service decides to issue the requested permit without resolving this issue, the Commission recommended that the Service ensure that the proposed research has been approved by an IACUC. **Agency Response:** The Service issued the permit on 21 April 2011, consistent with none of the Commission's recommendations. The Service stated that it is not precluded from issuing permits while the environmental impact statement is being developed, per the National Environmental Policy Act and its implementing regulations at 40 CFR Section 1506.1. It is evaluating the applicant's request for right whale research to determine whether the action would result in significant impacts to the species or other portions of the environment. The Service also indicated that the applicant's IACUC reviews his protocols annually and the Animal Plant and Health Inspection Service implements the Animal Welfare Act, not the National Marine Fisheries Service.
30 December 2010	**To:** National Marine Fisheries Service **Issue:** Application to amend a research permit from Terrie Williams, Long Marine Laboratory, to conduct physiological research on up to 18 captive Hawaiian monk seals in facilities in the United States and to hold up to three Hawaiian monk seals at Long Marine Laboratory at any given time **Recommendation:** The Commission recommended that the Service issue the permit amendment as requested. **Agency Response:** The Service issued the permit amendment on 3 February 2011, consistent with the Commission's recommendation.
30 December	**To:** National Marine Fisheries Service **Issue:** Application from the California Department of Transportation to take small

2010 numbers of marine mammals by harassment incidental to construction of a replacement bridge for part of the San Francisco-Oakland Bay Bridge

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization subject to a condition requiring the applicant to make observations before, during, and after all soft-starts of pile-driving activities to gather the data needed to analyze and report on its effectiveness as a mitigation measure.

Agency Response: The Service issued the incidental harassment authorization on 7 February 2011, consistent with the Commission's recommendation.

2011

3 January 2011

To: U.S. Fish and Wildlife Service
Issue: Possible listing of the Pacific walrus as threatened or endangered under the Endangered Species Act
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service propose to list the Pacific walrus as threatened under the Endangered Species Act because the population faces serious threats and its management warrants a precautionary approach.
Agency Response: The Service issued its 12-month finding on 10 February 2011 in which it determined that listing the walrus as a threatened or endangered species was warranted but precluded at this time due to higher priority listing actions. Thus, the walrus is considered a candidate species, which requires annual reviews and determining a schedule for rule making.

3 January 2011

To: Bureau of Ocean Energy Management, Regulation, and Enforcement
Issue: Notice of intent to prepare a supplemental environmental impact statement for the remaining Western and Central Planning Area lease sales in the 2007–2012 leasing program
Recommendation: The Commission recommended that the Bureau of Ocean Energy Management, Regulation, and Enforcement (1) consult with the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the Commission to develop a set of standards for baseline information needed to assess the impacts of oil and gas operations on marine mammals and their environments; (2) initiate research on these topics prior to the resumption of lease sales in the Gulf of Mexico; (3) consider ways to improve oil spill prevention and response capabilities by (a) requiring the industry to provide the resources for related research and technology development and (b) adding performance-based incentives for the industry; and (4) prepare for public review a detailed description of the lessons learned and adjustments made to improve management of offshore oil and gas operations based on experience from the BP oil spill.
Agency Response: The Bureau issued its final supplemental environmental impact statement for Lease Sale 218 (i.e., the remaining lease sale for the 2012-2017 leasing program in the Western Planning Area) in August 2011, consistent with one of the Commission's recommendations. The Bureau included a summary of its regulatory changes resulting from the Deepwater Horizon oil spill event to improve the safety of oil and gas development on the Outer Continental Shelf. The Bureau had not issued a final supplemental environmental impact statement for combined lease sales 216 and 222 (i.e., the remaining lease sales in the Central Planning Area) by the end of 2011, but it anticipated issuance in early 2012.

14 January 2011

To: National Marine Fisheries Service
Issue: Application from the St. George Reef Lighthouse Preservation Society to take small numbers of pinnipeds by harassment incidental to aircraft operations, restoration and maintenance work on the St. George Reef Light Station on Northwest Seal Rock off the coast of Crescent City, California
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, subject to inclusion of the proposed mitigation and monitoring measures.
Agency Response: The Service issued the incidental harassment authorization on 16 February 2011, consistent with the Commission's recommendation.

14 January 2011
To: National Marine Fisheries Service
Issue: Application from the U.S. Fish and Wildlife Service to take small numbers of pinnipeds by harassment incidental to aircraft operations during polar bear captures in the Chukchi Sea
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the incidental harassment authorization, subject to inclusion of the proposed mitigation and monitoring measures.
Agency Response: The Service issued the incidental harassment authorization on 4 March 2011, consistent with the Commission's recommendation.

19 January 2011
To: U.S. Fish and Wildlife Service
Issue: Application to amend a photography permit request from Thomas Postel to film manatees at various Florida locations year-round for one year (see 14 October 2010, above)
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that it specifies that, when required, additional authorization to enter the water to conduct filming activities be obtained from Florida state and/or federal refuge authorities and filming of a particular animal or animals cease if the animals appear to be unduly disturbed by the activity.
Agency Response: The Service issued the permit amendment on 6 May 2011, consistent with the Commission's recommendations.

24 January 2011
To: National Marine Fisheries Service
Issue: Application from the Alaska Aerospace Corporation to take small numbers of harbor seals and Steller sea lions by harassment incidental to missile launches at Kodiak Launch Complex, Alaska, for a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service (1) include in its final rule all of the applicant's proposed mitigation and monitoring measures, including those described in the preamble; (2) require the Corporation to use a remote video-camera system to monitor harbor seals on the eastern side of Ugak Island during at least five launches; if the cameras detect any disturbance then the Corporation and the Service should consult to determine what monitoring adjustments are needed and, if the authorized harbor seal takes are exceeded due to disturbance on the eastern side of the island, the Corporation should consult with the Service to determine if amendments to the regulations or letters of authorization are needed; (3) require appropriate monitoring of Steller sea lions before, during, and after launches to determine if the launches are disturbing the sea lions' use of Ugak Island and possibly discouraging more sea lions from hauling out there; and (4) advise the applicant of the need to consult with the U.S. Fish and Wildlife Service regarding the potential incidental take of sea otters.
Agency Response: The Service issued a final rule on 16 February 2011, consistent with some of the Commission's recommendations. However, the Service did not require monitoring of Steller sea lions, stating that monitoring could occur after the first five launches via the remote video-camera system and that the Corporation would attempt to capture sea lion behavioral responses. The Service further stated that the Corporation is aware of U.S. Fish and Wildlife's jurisdiction over incidental take of sea otters.

24 January 2011
To: Bureau of Ocean Energy Management
Issue: Notice of intent to prepare an environmental assessment for proposed seismic surveys by ION Geophysical Corporation in the Beaufort and Chukchi Seas in 2011
Recommendation: The Commission recommended that the Bureau of Ocean Energy Management expand its environmental analysis to include, at a minimum, an alternative

	that highlights other possible methods for gaining the required information and describes the levels of risk to marine mammals and other marine life associated with those methods, work with stakeholders to develop alternative survey strategies that avoid unnecessary redundancy in seismic studies in the Alaska Arctic and elsewhere, describe the limitations in existing baseline data for the September–December period, and ensure that the resulting uncertainty is acknowledged and accounted for in the analysis of impacts and the final decision-making process. The Commission also recommended that the Bureau analyze the benefits and costs of using visual observations and passive acoustics together to mitigate potential adverse impacts and produce a more reliable estimate of the number of marine mammal takes resulting from the proposed survey, require the use of expanded safety zones as a precautionary measure, and require ION Geophysical Corporation to (1) instruct its monitoring teams on the survey vessel to keep detailed records of each marine mammal sighting, the species involved, the location of the animal(s) relative to the vessels and array, and the reaction of the animal(s) to the vessels and array and (2) ensure analysis of that information to provide a more accurate assessment of the number of animals taken and the nature of their responses as a function of distance from the vessels and array and the level of exposure to airgun sounds. In addition, the Commission recommended that the Bureau use its 2011 environmental assessment to describe the potential cumulative impacts of the proposed activity and other human activities in the region, the information needed to assess those impacts, the information that is presently available for that purpose, and the resulting uncertainty regarding those impacts for all marine mammal species in the action area and reconsider whether an environmental impact statement would be more useful and appropriate in this case. **Agency Response:** The Bureau did not issue a draft environmental assessment by the end of 2011.
27 January 2011	**To:** U.S. Fish and Wildlife Service **Issue:** Application for a research permit from Texas A&M University, Randall Davis, Ph.D., to conduct research on sea otters in Prince William Sound, Alaska, during a five-year period **Recommendation:** The Commission recommended that the U.S. Fish and Wildlife Service issue the permit but condition it to (1) protect females with pups by prohibiting the positioning of a skiff above their dive sites; (2) limit the collection of dive depth and location data for other otters to periods after a foraging bout has been completed and animals have surfaced at least 50 m from the dive site and are no longer foraging; and (3) require monitoring and reporting of sea otter reactions to the presence of the boat. **Agency Response:** The Service issued the permit on 19 May 2011, consistent with the Commission's recommendations.
27 January 2011	**To:** National Marine Fisheries Service **Issue:** Application to amend a research permit from the National Marine Mammal Laboratory to conduct research on narwhals during a five-year period **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the permit as requested. **Agency Response:** The Service issued the permit on 25 April 2011, consistent with the Commission's recommendation.
31 January 2011	**To:** National Marine Fisheries Service **Issue:** Application for a research permit from Craig Matkin to conduct research on killer, gray, Baird's beaked, Cuvier's beaked, and Stejneger's beaked whales in Alaska during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit authorizing the applicant to biopsy and tag killer, gray, Baird's beaked, Cuvier's beaked, and Stejneger's beaked whales but condition the permit to exclude authorization to biopsy or tag calves less than six months of age or females accompanied by calves less than six months of age and include a permit condition requiring the applicant to document observations regarding possible short- and long-term effects from biopsy sampling and tagging and report them to the Permit Office. The Commission also recommended that the Service ensure that activities to be conducted under this permit and those of other permit holders who might be conducting research on the same species in the same areas are coordinated and, as possible, data and samples shared to avoid duplicative research and unnecessary disturbance of animals and include a permit condition specifically limiting the applicant from approaching a carcass if a marine mammal is within a specified distance (e.g., 100 yards) of the carcass. In addition, the Commission recommended that the Service require that a co-investigator's or collaborator's IACUC review and approve the research protocol, prior to issuing the permit.

Agency Response: The Service issued the permit on 23 February 2011, consistent with most of the Commission's recommendations. However, the Service stated that it cannot require permit holders to share samples or data under section 104 of the Marine Mammal Protection Act. In addition, compliance with the IACUC provisions of the Animal Welfare Act is not a criterion under section 104 of the Act and enforcement of compliance with those provisions is not under the purview of the Service.

3 February 2011

To: National Marine Fisheries Service

Issue: Application to amend a research permit from the Aleut Community of St. Paul Island to harass Steller sea lions and harbor seals during collection of scat samples used to characterize their diet

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment as requested.

Agency Response: The Service issued the permit amendment on 31 March 2011, consistent with the Commission's recommendation.

4 February 2011

To: National Marine Fisheries Service

Issue: Application from Neptune LNG LLC to take small numbers of pinnipeds and cetaceans by harassment incidental to work on its offshore liquefied natural gas facility, Neptune Deepwater Port, during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the final rule, provided that it (1) allows additional opportunity for public review and comment before publication of a final rule if the recalculated takes or zones in which takes might occur are significantly greater than those described in the proposed rule, or, if it determines that additional notice and opportunity to comment are not needed, it ensures the revised estimates of the zones of exposure and anticipated takes for each of the three proposed activities are provided in the final rule together with the rationale for not providing an additional opportunity for public review and comment; (2) adopts a consistent requirement that mitigation zones be clear of all species of marine mammals for 30 minutes before initiation or resumption of activities; (3) requires that visibility also be at least 1 km before maintenance and repair activities can proceed or provide a reasoned basis for allowing these activities under poorer visibility; (4) (a) requires that protected species observers monitor continuously for the presence of marine mammals when activities occur during daylight hours, and (b) either prohibits nighttime operations or adopts measures that it can demonstrate to be reliable for detecting all marine mammals within the specified

mitigation zones under nighttime conditions; and (5) includes in its final rule an analysis evaluating the impact of the proposed operations together with the cumulative impacts of all the other pertinent risk factors affecting right whales and other marine mammals that occur in the port area and explains why it believes that the combined impact would be negligible.

Agency Response: The Service issued a final rule on 11 July 2011, consistent with some of the Commission's recommendations. The Service did revise its exposure and take estimates (which decreased) and did provide rationale for those changes. As such, the Service did not believe an additional public comment period was warranted. The Service also indicated that a cumulative effects analysis was included in various NEPA documents related to Neptune's activities and that it considered those data and data within stock assessment reports and other scientific reports in its negligible impact conclusion.

To: National Marine Fisheries Service

4 February 2011

Issue: Proposed interim final rule pertaining to fisheries of the Exclusive Economic Zone off Alaska and Steller sea lion protection measures for the Bering Sea and Aleutian Islands groundfish fisheries off Alaska

Recommendation: The Commission recommended that the National Marine Fisheries Service implement its interim final rule and then begin the process of reexamining and modifying the specified protective measures with the goal of facilitating recovery rather than just preventing further decline and expand its section 7 consultations regarding the Alaska groundfish fisheries by analyzing the theory underlying its fishing strategy and its full ecological effects.

Agency Response: The Service implemented the interim final rule that was effective in January 2011. It is unclear if the Service began reexamining and modifying its protective measures to facilitate recovery.

8 February 2011

To: U.S. Fish and Wildlife Service

Issue: Draft recovery plan for the distinct population segment of northern sea otters in southwest Alaska

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service adopt the draft recovery plan for the southwest Alaska distinct population segment of northern sea otters subject to the following changes: (l) revise the draft plan by including estimates of the total time and cost required to recover the population to the point that it can be delisted; (2)(a) delete the statement concluding that the potential impact on sea otters from oil development in southern portions of the Bering Sea will be negligible and replace it with a statement that potential impacts on sea otters could range from negligible to high depending on the nature and extent of any spills that occur and (b) update the tables in the Threats Analysis section accordingly; (3) reconsider and revise its proposed approach for determining when the listing status of the southwest Alaska sea otter should be changed to endangered; (4) revise the plan to include the initial frequency for population monitoring surveys of each management unit; (5) expand the list of actions under Task 2.3 to include the development of an oil spill response plan that describes (a) priority areas requiring protection, (b) personnel and equipment needed to protect those areas from contact by oil and to respond to oiled otters, (c) logistical requirements for deploying those resources and response efforts, and (d) the costs of purchasing and establishing equipment caches to meet specific sea otter response needs; (6) restructure the planned actions to investigate the role and significance of disease on pages 8-6 and 8-7; and (7) work with the National Marine Fisheries Service to modify Task 5.1 on predation impacts by (a) dividing the task into two subtasks, one for studies focused on sea otters and the other for studies focused on killer whales and other predators, (b) expanding the discussion under each to

identify the studies that the Services believe to be of highest priority, and (c) providing cost estimates for those studies.
Agency Response: The Service had not issued its recovery plan by the end of 2011 but anticipates finalizing the plan in spring 2012.

11 February 2011
To: U.S. Fish and Wildlife Service
Issue: Application for research permit from Floragenex, Inc., to import tissue samples from up to 30 polar bears from Canada for population genetics analyses
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that Floragenex is required to obtain all necessary permits under CITES before importing the samples.
Agency Response: The Service issued the permit on 24 February 2011, consistent with the Commission's recommendation.

15 February 2011
To: National Marine Fisheries Service
Issue: Possible listing of the Hawaiian insular false killer whale as endangered
Recommendation: The Commission recommended that the National Marine Fisheries Service proceed with the proposed listing of the Hawaiian insular false killer whale as endangered under the Endangered Species Act and further investigate (1) fishery-related reductions of the target fish stocks and the manner in which those reductions are realized on a spatial basis and (2) how those reductions coincide with or may affect the foraging of Hawaiian insular false killer whales. The Commission also recommended that the Service expand the scope of the False Killer Whale Take Reduction Team to include Hawaiian inshore fisheries and recommend measures to identify and reduce their impact on Hawaiian insular false killer whales.
Agency Response: The Service had not issued the final rule by the end of 2011.

17 February 2011
To: National Marine Fisheries Service
Issue: Possible delisting of the eastern distinct population of Steller sea lions
Recommendation: The Commission recommended that the National Marine Fisheries Service proceed with delisting the eastern distinct population segment of Steller sea lions. The Commission further recommended that the Service (1) conduct a review of Steller sea lions in California waters to examine the existing genetic and other related information to determine if the southern portion of the eastern population is discrete and warrants management as a separate unit; (2) develop or design a strategy to track the status of the population in California waters; (3) identify possible causes of the southern range contraction and the evidence needed to prove or disprove each; (4) develop a research plan to investigate the gaps in information regarding the potential causes of the contraction; and (5) estimate the costs for carrying out such a plan.
Agency Response: The Service had not issued its 12-month finding by the end of 2011 but anticipated publishing it in spring 2012.

17 February 2011
To: National Marine Fisheries Service
Issue: Application to amend a research permit from the Alaska SeaLife Center to revise the terms and conditions governing handling of animals and monitoring following surgical and hot-branding procedures
Recommendation: The Commission recommended the National Marine Fisheries Service issue the amended permit, provided that the amendment (1) denies the Alaska SeaLife Center's request to change the allowable holding time of non-feeding juveniles from 10 days after capture to 10 days after arrival at the Center; (2) includes authorization to implant juveniles with life history tags before they have regained capture weight if they are

	otherwise above a minimum weight, are healthy, and are feeding sufficiently well to be gaining weight; and (3) includes authorization to release implanted juveniles 10 days after implantation provided that they meet all other criteria for release. The Commission also recommended that the Service renew its efforts to find ways to authorize the permanent retention of non-releasable animals as an alternative to euthanasia. **Agency Response:** The Service issued the permit amendment on 29 March 2011, consistent with the Commission's first recommendation. The Service denied the other requested changes to the permit conditions because the Center and Commission did not provide objective or measurable criteria that are clearly articulated for compliance and enforcement in a permit. As such, the Service conditioned the permit to require that animals that are not feeding sufficiently well to be gaining weight and/or are 5% or more below their capture mass would not be selected for life history tag implantation. The Service also did not believe that the issue is whether the "extra" four days of monitoring in captivity outweigh the "added risk" of exposure and habituation, but whether the condition is consistent with applicable permit issuance requirements under the Marine Mammal Protection Act. The condition is consistent and has not hindered the Center in conducting research in the past. Lastly, the Service declined to reconsider its position on euthanizing non-releasable animals.
22 February 2011	**To:** National Marine Fisheries Service **Issue:** Application for research permit from Dan Salden, Ph.D., to conduct research on humpback whales, Hawaiian insular false killer whales, and other cetaceans in Hawaii waters during a five-year period **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the permit but condition it to (1) ensure that the applicant takes steps to minimize disturbance of the subject animals by exercising caution when approaching animals, particularly female/calf pairs, and stopping an approach if there is evidence that the activity may be interfering with female/calf behavior, feeding, or other vital functions; (2) require monitoring, documentation, and reporting of any and all strong whale reactions to the approach and presence of research watercraft and researchers; and (3) ensure that activities to be conducted under this permit and those of other permit holders who might be carrying out research on the same species in the same areas are coordinated and, as possible, data and samples shared to avoid duplicative research and unnecessary disturbance of animals. **Agency Response:** The Service issued the permit on 18 November 2011, consistent with the Commission's recommendations.
22 February 2011	**To:** National Science Foundation **Issue:** Application for authorization from Natalie Goodall to salvage cetacean and pinniped skeletal remains from South Georgia, the south Shetlands, the Antarctic Peninsula, and adjacent islands during a five-year period **Recommendation:** The Commission recommended that the National Science Foundation issue the authorization, but condition it to apply only to naturalists who are not U.S. citizens until such time that any U.S. naturalist who might be involved in collecting and transporting marine mammal parts has obtained the necessary permit under the Marine Mammal Protection Act and advise Ms. Goodall of the need to obtain all necessary permits under CITES before exporting any marine mammal part. **Agency Response:** The Foundation had not issued the authorization by the end of 2011, because the applicant had not obtained the necessary permit under the Marine Mammal Protection Act.

23 February 2011j	**To:** National Marine Fisheries Service **Issue:** Application for a photography permit from Wild Horizons, Ltd., to harass bottlenose dolphins during filming activities at Bull Creek and Hilton Head, South Carolina **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the permit, provided that it requires the applicant to monitor and report all cases where filming leads to sufficient disturbance that the dolphins alter their behavior or otherwise exhibit strong response to filming activities, the boat, or the helicopter. **Agency Response:** The Service issued the permit on 10 June 2011, consistent with the Commission's recommendation.
23 February 2011	**To:** National Marine Fisheries Service **Issue:** Application from the Burke Museum of Natural History and Culture to import, export, analyze, and archive specimens of all marine mammal species for the purposes of archiving, scientific exchange, and scientific research for a five-year period **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the applicant obtains all necessary permits under CITES before importing or exporting any marine mammal part, maintains detailed records indicating the source of each specimen and the circumstances under which it was collected, and periodically provides reports to the Service sufficient to demonstrate that each specimen was taken in accordance with the laws of the country of origin, was not taken in violation of the Marine Mammal Protection Act or other applicable U.S. laws, and is being used only for bona fide scientific purposes and incidental educational and public display purposes. **Agency Response:** The Service issued the permit on 25 April 2011, consistent with the Commission's recommendations.
23 February 2011	**To:** National Marine Fisheries Service **Issue:** Application for a research permit from Waikiki Aquarium to conduct research on captive Hawaiian monk seals and to continue and expand its related enhancement efforts during a five-year period **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the permit, but condition it to require that only one seal be vaccinated at first and the second be vaccinated only after sufficient time has passed to rule out an adverse response and to require that the applicant consult with the Service and Commission if the first seal vaccinated dies. **Agency Response:** Waikiki Aquarium amended and resubmitted its application in May 2011; however, the Service had not issued the permit by the end of 2011.
28 February 2011	**To:** National Marine Fisheries Service **Issue:** Application from the Navy to take marine mammals by harassment incidental to a test pile program at Naval Base Kitsap in Bangor, Washington **Recommendation:** The Commission recommended that the National Marine Fisheries Service require the Navy to (1) make careful observations in conjunction with in-air propagation information in order to add to the miniscule dataset so that in the future thresholds can be set based on a more robust dataset; (2) provide a full description of the survey methods used, including how the Navy searched for animals, if and how it corrected its estimate for sighting probability, and if and how it corrected its estimate for decreasing sighting probability with distance from the observer; (3)(a) explain why it used the anticipated area of ensonification rather than surveyed area to estimate sea lion density and (b) correct the density estimates unless the Navy has a reasoned basis for not making such corrections; and (4) re-estimate the expected number of in-water and in-air takes using the

overall density of harbor seals in Hood Canal (i.e., 3.74 animals/km^2). In addition, the Commission recommended that if the Navy does not request authorization for in-air takes of harbor seals, the Service should require the Navy to shut down activities whenever a harbor seal is within the in-air Level B harassment zone (i.e., within a radius of 501 m). The Commission also recommends that the Service encourage the Navy to consult with experts at the National Marine Mammal Laboratory to review and revise the Navy's survey methods as needed to make them scientifically sound, require the Navy to record distances to and behavioral observations of animals sighted within the entirety of the in-water Level B harassment zone that would be established for vibratory pile driving and removal activities, and complete an analysis of the impact of the proposed activities together with the cumulative impacts of all the other pertinent risk factors (including the Navy's concurrent wharf repair project) affecting marine mammals in the Hood Canal area before issuing the authorization.

Agency Response: The Service issued the incidental harassment authorization on 16 July 2011, consistent with some of the Commission's recommendations. However, the Service did not correct the Navy's sea lion or harbor seal densities because it believes it used the best data available, albeit not ideal. Thus, takes were not re-estimated. In addition, the Service did not require the applicant to monitor the entirety of the Level B harassment zones based on financial constraints and consistency with other incidental harassment authorizations (i.e., seismic and geophysical surveys and sonar activities).

2 March 2011

To: National Marine Fisheries Service

Issue: Application to amend a research permit from the Alaska SeaLife Center to unintentionally kill up to five captive adult Steller sea lions during tagging and other scientific research activities

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment.

Agency Response: The Service issued the permit amendment on 21 March 2011, consistent with the Commission's recommendation.

4 March 2011

To: National Marine Fisheries Service

Issue: Application for a research permit from Jennifer Burns, Ph.D., to import and export samples from seals and sea lions to and from various countries

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that it require the applicant to obtain all necessary permits under CITES; maintain detailed records indicating the source of each specimen and the circumstances under which it was collected; specify the approximate numbers and types of samples that would be collected and imported from live pinnipeds in Canada and Norway and clarify whether these specimens would be collected specifically for purposes of the proposed research or would be collected for other purposes; and provide periodic reports to the Service summarizing by country and species the number of animals from which such samples were taken and providing sufficient information to demonstrate that each specimen was taken in accordance with the laws of the country of origin, was not taken in violation of the Marine Mammal Protection Act or other applicable U.S. laws, and is being used for bona fide scientific purposes only.

Agency Response: The Service issued the permit on 25 April 2011, consistent with the Commission's recommendations.

4 March 2011

To: U.S. Navy

Issue: Revised Integrated Comprehensive Monitoring Program

Recommendation: The Commission recommended that, as performance information

becomes available, the Navy identify standards that should be applied across multiple range complexes and integrate those standards into the respective range-specific monitoring programs and continue to support studies to better understand the impacts of sonar on marine mammals, including sonar-related changes in behavior and pathological changes that may occur as a result of exposure to sonar.
Agency Response: The Navy updated the Integrated Comprehensive Monitoring Program, consistent with the Commission's recommendations.

7 March 2011

To: National Marine Fisheries Service
Issue: Application from the U.S. Navy to take marine mammals by harassment incidental to pile driving at Naval Base Kitsap in Bangor, Washington
Recommendation: The Commission recommended that the National Marine Fisheries Service require the Navy to (1) make careful observations in conjunction with in-air propagation information in order to add to the miniscule dataset so that in the future thresholds can be set based on a more robust dataset; (2) provide a full description of the survey methods used, including how the Navy searched for animals, if and how it corrected its estimate for sighting probability, and if and how it corrected its estimate for decreasing sighting probability with distance from the observer; (3)(a) explain why it used the anticipated area of ensonification rather than surveyed area to estimate sea lion density and (b) correct the density estimates unless the Navy has a reasoned basis for not making such corrections; and (4) re-estimate the expected number of in-water and in-air takes using the overall density of harbor seals in Hood Canal (i.e., 3.74 animals/km^2). In addition, the Commission recommended that if the Navy does not request authorization for in-air takes of harbor seals, the Service should require the Navy to shut down activities whenever a harbor seal is within the in-air Level B harassment zone (i.e., within a radius of 501 m). The Commission also recommended that the Service encourage the Navy to consult with experts at the National Marine Mammal Laboratory to review and revise the Navy's survey methods as needed to make them scientifically sound, require the Navy to record distances to and behavioral observations of animals sighted within the entirety of the in-water Level B harassment zone that would be established for vibratory pile driving and removal activities and complete an analysis of the impact of the proposed activities together with the cumulative impacts of all the other pertinent risk factors (including the Navy's concurrent test pile program) on marine mammals in the Hood Canal area before issuing the authorization.
Agency Response: The Service issued the incidental harassment authorization on 16 July 2011, consistent with some of the Commission's recommendations. However, the Service did not correct the Navy's sea lion or harbor seal densities because it believes it used the best data available, albeit not ideal. Thus, takes were not re-estimated. In addition, the Service did not require the applicant to monitor the entirety of the Level B harassment zones based on financial constraints and consistency with other incidental harassment authorizations (i.e., seismic and geophysical surveys and sonar activities).

7 March 2011

To: National Marine Fisheries Service
Issue: Application from the Lamont-Doherty Earth Observatory to take marine mammals by harassment incidental to a marine geophysical survey in the eastern tropical Pacific Ocean
Recommendation: The Commission recommended that the National Marine Fisheries Service require the Observatory to (1) provide a full description of the Observatory's model as it is used to estimate safety and buffer zones and (2) rerun the model using site-specific information to determine safety and buffer zones and associated takes. The Commission also recommended that, prior to issuing the incidental harassment

	authorization, the Service provide additional justification for its preliminary determination that the planned monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified safety zones; propose to the Observatory that it revise its survey design to add pre- and post-seismic survey assessments as a way of obtaining a more realistic baseline abundance estimate of marine mammals; require the applicant (1) to report on the number of marine mammals acoustically detected for which a power-down or shutdown of the airguns was initiated, (2) specify if the animals also were visually detected, and (3) compare the results from the two methods to help identify their respective weaknesses; and condition the authorization to prohibit an eight-minute pause before ramping up after either a power-down or shutdown of the airguns, based on the presence of a marine mammal in the safety zone and the *Langseth's* movement (speed and direction). In addition, the Commission recommended that the Service extend the monitoring period to at least 1 hour before initiation of seismic activities and at least 1 hour before the resumption of airgun activities after a power-down or shutdown and before ramp-up because of a marine mammal sighting within a safety zone, and condition the authorization to require the Observatory to monitor, document, and report observations during all ramp-up procedures. **Agency Response:** The Service issued the incidental harassment authorization on 7 April 2011, consistent with some of the Commission's recommendations. However, the Service did not require modeling of site-specific information because of its analysis of the likely effects of the activity on the marine mammals and their habitat, the implementation of the mitigation and monitoring measures, and the appropriateness and sufficiency of the exclusion zones. The Service also indicated that the monitoring program would be sufficient to detect marine mammals because the mitigation and monitoring measures are the most effective, feasible measures available. In addition, the Service did not extend the monitoring period to 1 hour because observations are made longer than 30 minutes during ramp-up procedures, observers are monitoring in many cases when the airguns are not firing, the majority of the species do not remain underwater for more than 30 minutes, and there is a one in three chance that an animal would surface before the 30-minute period and then not again during the 30-minute period.
21 March 2011	**To:** U.S. Fish and Wildlife Service **Issue:** Application to amend a research permit from the U.S. Geological Survey, Alaska Science Center, to increase the number of polar bears that can be biopsy darted annually and to paint mark each bear that is biopsy darted **Recommendation:** The Commission recommended that the U.S. Fish and Wildlife Service issue the amendment request provided that the proposed research has been reviewed and approved by the permit holder's IACUC and the conditions currently contained in the permit remain in effect. **Agency Response:** The Service issued the permit amendment on 20 April 2011, consistent with the Commission's recommendation.
23 March 2011	**To:** National Marine Fisheries Service **Issue:** Proposed rule and finding regarding a petition from the Center for Biological Diversity to list the Arctic, Okhotsk, Baltic, and Ladoga subspecies of ringed seal under the Endangered Species Act **Recommendation:** The Commission recommended that the National Marine Fisheries Service list the Arctic ringed seal subspecies as threatened under the Endangered Species Act, but first determine if ringed seals in the Canadian Archipelago might be recognized as discrete and excluded from that listing based on projections of limited change in physical and ecological conditions in the Archipelago; list the Okhotsk ringed seal subspecies as threatened under the Endangered Species Act; and re-evaluate the status and threats to the

Baltic and Ladoga ringed seal subspecies and consider listing them as endangered. The Commission also recommended that the Service devise and implement a research plan to address the major uncertainties and programmatic shortcomings revealed in the status review; strengthen collaborative efforts among range states to (1) assess the status and trend of ringed seal populations throughout the species' range and (2) identify the need for protective measures where necessary; collaborate with the Alaska Native community to monitor abundance and distribution of ringed seals and use seals taken in the subsistence harvest to obtain relevant data; and continue investigating ringed seal population structure, especially that of the arctic subspecies.
Agency Response: The Service had not issued the final rule by the end of 2011, because the deadline for issuance was extended until June 2012.

23 March 2011
To: National Marine Fisheries Service
Issue: Proposed rule and finding regarding a petition from the Center for Biological Diversity to list the bearded seal under the Endangered Species Act
Recommendation: The Commission recommended that the National Marine Fisheries Service proceed with listing the Sea of Okhotsk and Beringia distinct population segments of the bearded seal as threatened under the Endangered Species Act and devise and implement a research plan to address the major uncertainties and information gaps revealed in the status review, including a research budget that is sufficient to address the priority needs. The Commission also recommended that the Service seek ways to facilitate cooperation in bearded seal research and management among the five nations with jurisdiction over parts of the species' range, collaborate with the Alaska Native community to monitor abundance and distribution of bearded seals, use seals taken in the subsistence harvest to collect relevant data, and periodically re-evaluate the species as more information becomes available regarding the subspecies' population status and trends and/or risk factors that may threaten its existence.
Agency Response: The Service had not issued the final rule by the end of 2011, because the deadline for issuance was extended until June 2012.

28 March 2011
To: National Marine Fisheries Service
Issue: Application for a research permit from Robin Baird, Ph.D., to conduct research on cetaceans in the Pacific Ocean during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the Service includes a permit condition requiring the applicant to make observations sufficient to detect possible short- and long-term effects of biopsy sampling and tagging and report the effort made and the information collected to the Permit Office; ensures that activities to be conducted under this permit and those of other permit holders who might be conducting research on the same species in the same areas are coordinated and, as possible, data and samples shared to avoid duplicative research and unnecessary disturbance of animals; and advises the applicant of the need to obtain permits under CITES before importing or exporting any cetacean part.
Agency Response: The Service issued the permit on 1 August 2011, consistent with most of the Commission's recommendations. It did clarify that the permit will not cover biopsy sampling, even though biopsy sampling was mentioned in the application and take tables.

28 March 2011
To: U.S. Fish and Wildlife Service
Issue: Application for a photography permit from Wild Horizons, Ltd., to harass Alaskan sea otters during filming activities in Glacier Bay and Prince William Sound, Alaska
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that it conditions the permit to specify the number of sea otters

that may be harassed in Glacier Bay and Prince William Sound as a result of the filming activities, and require the applicant to monitor and report all cases where the filming activities lead to sufficient disturbance that the otters alter their behavior or otherwise exhibit strong response to filming activities, the boat, or the helicopter.
Agency Response: The Service issued the permit on 5 October 2011, consistent with the Commission recommendation.

28 March 2011

To: Bureau of Ocean Energy Management, Regulation, and Enforcement
Issue: Notice of intent to prepare an environmental impact statement for its 2012–2017 leasing program in the Gulf of Mexico's Western and Central Planning Areas
Recommendation: The Commission recommended that the Bureau of Ocean Energy Management, Regulation, and Enforcement (1) work with the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the Marine Mammal Commission to develop comprehensive standards for baseline environmental information needed to evaluate the impacts of offshore oil and gas operations on marine mammals and their environment; (2) conduct an immediate, systematic, and rigorous expert review of the state of environmental knowledge in the Gulf to provide the basis for its proposed multi-sale environmental impact statement; (3) use recommendations from that review to revise and expand its Environmental Studies Program for the Gulf to address priority research needs and data gaps prior to further lease sales; (4) work with the oil and gas industry to fully fund and implement a revised and expanded Environmental Studies Program for the Gulf; and (5) provide a comprehensive analysis of the cumulative impacts expected from oil and gas operations, in the context of all other human uses of the offshore environment.
Agency Response: The Bureau issued a draft environmental impact statement in December 2011, consistent with none of the Commission's recommendations. The document did not address specifically any of the Commission's recommendations.

11 April 2011

To: U.S. Fish and Wildlife Service
Issue: Application from the Alaska Oil and Gas Association to take polar bears and Pacific walruses by harassment incidental to year-round oil and gas operations in the Beaufort Sea and the adjacent northern coast of Alaska
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the final rule, provided that it advises the applicant of the desirability of initiating a conference for the walrus to help fulfill the applicant's obligations under the Endangered Species Act for the five-year period of the final rule; describes all updated information for the four sites in question and reassess the risk of oil spills to polar bears for the Northstar and Liberty sites prior to issuing the final rule; assesses the risk of an oil spill to polar bears at Oooguruk and Nikaitchuq sites prior to issuing the final rule; and requires applicants for letters of authorization under the final rule to incorporate those updated oil spill projections in their applications, when available.
Agency Response: The Service issued the final rule on 3 August 2011, consistent with some of the Commission's recommendations. However, the Service believed it used the best available information regarding oil spills and encapsulated all of the known Industry activities that will occur in the geographic region during the five-year regulation period, as such oil spill risk at those four sites either were not assessed for the first time or reassessed based on new information.

13 April 2011

To: National Marine Fisheries Service
Issue: Application for a research permit from the National Marine Mammal Laboratory to conduct research on pinnipeds on the west coast of the United States during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, contingent on conditioning the permit to require suspension of research activities and review by the Service if 6 or more sea lions are unintentionally killed in one year and consult with the Commission if 10 sea lions are unintentionally killed in one year.
Agency Response: The Service issued the permit on 18 May 2011, without implementing any of the Commission's recommendations. The Service stated that the researchers may not know when 6 (or 10) animals have died as a result of their research; thus, the conditions proposed by the Commission are impractical. In addition, the Service noted that the Commission did not provide a rationale for suspending research if 6 (or 10) animals die, or suggest what the consultation between the Service and the permit holder, or the Service and the Commission, should achieve.

13 April 2011 **To:** National Marine Fisheries Service
Issue: Application from the Alaska SeaLife Center to conduct research on Weddell seals to quantify thermoregulatory costs to seals in Antarctica during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, contingent on the applicant providing the Service documentation demonstrating that the proposed research has been reviewed and approved by the IACUC identified in the application.
Agency Response: The Service issued the permit on 25 May 2011, without implementing the Commission's recommendation. The Service noted that review and approval by an IACUC is not a condition of permit issuance under the Marine Mammal Protection Act, but is a requirement under the Animal Welfare Act. The U.S. Department of Agriculture enforces compliance with that provision, not the Service.

18 April 2011 **To:** Bureau of Ocean Energy Management, Regulation, and Enforcement
Issue: Notice soliciting comments and information pertinent to wind energy production in marine areas off Massachusetts
Recommendation: The Commission recommended that the Bureau of Ocean Energy Management, Regulation, and Enforcement (1) prepare an environmental impact statement, rather than an environmental assessment, to evaluate the potential impacts of issuing renewable energy leases; (2) consult with the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the Army Corps of Engineers, and the Marine Mammal Commission to develop a set of standards for the collection of baseline information on marine mammals and their environment; and (3) identify and address any significant data gaps before initiating the leasing process for renewable energy operations.
Agency Response: The Bureau posted the comments it received on regulations.gov website. It expects to publish a request for information in early 2012.

18 April 2011 **To:** National Marine Fisheries Service
Issue: Application from the Sonoma County Water Agency to take small numbers of marine mammals by harassment incidental to construction and maintenance activities in association with estuary management at the Russian River near Jenner, California
Recommendation: The Commission recommended that the Service issue the incidental harassment authorization, subject to inclusion of the proposed mitigation and monitoring measures.
Agency Response: The Service issued the incidental harassment authorization on 21 April 2011, consistent with the Commission's recommendation.

2 May **To:** U.S. Fish and Wildlife Service

2011

Issue: Application from the Alaska Department of Transportation and Public Facilities and the Aleutians East Borough to take small numbers of northern sea otters by harassment incidental to construction of a new airport, access road, and hovercraft landing area on Akun Island; a hovercraft landing and storage area on Akutan Island; and testing of a hovercraft between Akun and Akutan Islands, Alaska

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the incidental harassment authorizations, provided that it requires the applicants to conduct monitoring for 30 minutes before, during, and 30 minutes after hovercraft testing and conditions the authorizations to require suspension of hovercraft testing if a sea otter is seriously injured or killed and the injury or death could be associated with those activities.

Agency Response: The Service issued the incidental harassment authorizations on 23 May 2011, consistent with the Commission's recommendation.

2 May 2011

To: National Marine Fisheries Service

Issue: Application from the U.S. Geological Survey to take small numbers of marine mammals by harassment incidental to a marine geophysical survey in the central Gulf of Alaska

Recommendation: The Commission recommended that the National Marine Fisheries Service require the U.S. Geological Survey to re-estimate the proposed exclusion and buffer zones and associated takes of marine mammals using site-specific information and, if site-specific information is not used, then provide a detailed justification for basing the exclusion and buffer zones for the proposed survey in the Gulf of Alaska on empirical data collected in the Gulf of Mexico or on modeling that uses measurements from the Gulf of Mexico and that explains the significance of any deviations in survey method, such as the proposed change in tow depth. The Commission also recommended that the Service specify in the authorization all conditions under which an 8-minute period could be followed by a resumption of the airguns at full power, extend the 30-minute period following a marine mammal sighting in the exclusion zone to cover the full dive times of all species likely to be encountered, and provide additional justification for its preliminary determination that the proposed monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified exclusion and buffer zones. In addition, the Commission recommended that the Service consult with the funding agency and individual applicants to develop; validate, and implement a monitoring program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal taking and the number of marine mammals taken; and require the applicant (1) to report on the number of marine mammals that were detected acoustically and for which a power-down or shutdown of the airguns was initiated, (2) specify if such animals also were detected visually, and (3) compare the results from the two monitoring methods to help identify their respective strengths and weaknesses. Lastly, the Commission recommended that the Service condition the authorization to require the U.S. Geological Survey to monitor, document, and report observations during all ramp-up procedures and analyze those data, in collaboration with the National Science Foundation, to determine the effectiveness of ramp-up procedures as a mitigation measure for geophysical surveys.

Agency Response: The Service issued the incidental take authorization on 5 June 2011, consistent with some of the Commission's recommendations. However, the Service did not require modeling of site-specific information because sound source verification studies are impractical logistically and financially, even though the Commission recommended site-specific modeling. In addition, the Service did not require remodeling because of its analysis of the likely effects of the activity on the marine mammals and their habitat, the implementation of the mitigation and monitoring measures, and the appropriateness and

sufficiency of the exclusion zones. The Service also indicated that the monitoring program would be sufficient to detect marine mammals because the mitigation and monitoring measures are the most effective feasible measures available. The Service did not extend the monitoring period to 1 hour because observations are made longer than 30 minutes during ramp-up procedures, observers are monitoring in many cases when the airguns are not firing, the majority of the species do not remain underwater for more than 30 minutes, and there is a one in three chance that an animal would surface before the 30-minute period and then not again during the 30-minute period. Lastly, data from geophysical surveys are being compiled but are scant and will not be analyzed for some time.

3 May 2011

To: U.S. Fish and Wildlife Service

Issue: Application for a research permit from Mote Marine Laboratory to conduct research on manatees during a five-year period

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that the proposed studies have been reviewed and approved by the applicant's IACUC; the Service ensures that the activities to be conducted under this permit and those of other permit holders who might be carrying out research on the same species in the same areas are coordinated and data shared to avoid duplicative research and unnecessary disturbance; the applicant maintains detailed records indicating the source of each specimen and the circumstances under which it was collected; and the applicant periodically provides reports to the Service sufficient to demonstrate that each specimen was taken in accordance with the laws of the country of origin, was not taken in violation of the Marine Mammal Protection Act or other applicable U.S. laws, and is being used only for bona fide scientific purposes or incidental educational and public display purposes. In addition, the Commission recommended that the Service require the applicant to provide a report of activities conducted annually and ensure that the applicant has obtained the necessary permits under CITES before importing or exporting any manatee part.

Agency Response: The Service issued the permit on 9 November 2011, consistent with the Commission's recommendations.

4 May 2011

To: National Marine Fisheries Service

Issue: Application from Mithriel MacKay to conduct research on humpback whales in Puerto Rico waters during a five-year period

Recommendation: The Commission recommended that the National Marine Fisheries Service defer action on this application and advise the applicant to gain experience with seasoned marine mammal biologists, who regularly approach humpback whales at a close distance and dive underwater with females and their calves, for at least one field season before seeking further action on this application. If the National Marine Fisheries Service decides to issue the permit notwithstanding the Commission's recommendation that action be deferred, the Commission recommended that the Service condition the permit to ensure that the applicant takes all necessary steps to minimize disturbance of the subject animals by exercising caution when approaching animals, particularly female-calf pairs, and stopping an approach if there is any evidence that the activity may be interfering with female-calf interactions such as nursing or other vital functions and condition the permit to require that the applicant remain at least 100 m from any female-calf pair when recording vocalizations

Agency Response: The Service issued the permit on 29 December 2011, consistent with some of the Commission's recommendations. The Service deferred action while Ms. MacKay worked with Dr. Jon Stern to gain experience approaching whales. Dr. Stern provided a letter of support regarding her boat-based work with him around whales in

Washington and his
assessment of her skills for the proposed research in Puerto Rico. Ms. MacKay withdrew her request to dive with the whales. The Service also conditioned the permit to require that Ms. MacKay remain at least 50 m from female-calf pairs when recording vocalizations.

4 May 2011

To: National Marine Fisheries Service
Issue: Application for a research permit from the Alaska Department of Fish and Game to conduct research on pinnipeds in Alaska during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit but condition it to (1) require that the applicant provide its updated IACUC approval to the Service once it has been issued and before the Department initiates research under the new permit; (2) require that the applicant suspend research activities and consult with the Service if, in any given year, its research leads to the death of four or more seals from any single species covered by the permit and consult with the Service and Commission regarding possible changes to the research protocols if more than eight seals (all species combined) are unintentionally killed during research in a given year; and (3) prohibit the Alaska Department of Fish and Game from leaving capture nets unattended in the water at any time, day or night.
Agency Response: The Service issued the permit on 18 May 2011, without implementing any of the Commission's recommendations. The Service stated that compliance with the IACUC provisions of the Animal Welfare Act is not a criterion of the Marine Mammal Protection Act and enforcement of compliance with those provisions is not under the purview of the Service. However, the Service believes that the applicant has provided information in its application sufficient for it to determine whether the methods are consistent with the Act's definition of humane. The Service also stated that the researchers may not know when four (or eight) animals have died as a result of their research; thus, the conditions proposed by the Commission are impractical. In addition, the Service noted that the Commission did not provide a rationale for suspending research if four (or eight) animals die, or suggest what the consultation between the Service and the permit holder, or the Service and the Commission, should achieve. Lastly, the Service did not prohibit the nets being unattended at night, because (1) it would interfere with their ability to achieve their research objectives by making it impossible to catch enough seals for tagging; (2) tending the nets causes disturbance that keeps seals away; and (3) the net is designed to allow captured seals to come to the surface to breath and that they have had no capture mortalities during capture of 167 seals in the last five years.

5 May 2011

To: National Marine Fisheries Service
Issue: Application to amend a research permit from North Pacific Universities Marine Mammal Research Consortium, University of British Columbia, to perform various procedures on 35 lactating female seals and sea lions
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided that the permit holder be required to provide documentation regarding the review and approval of the research activities by the University of British Columbia's Animal Care Committee sufficient to demonstrate compliance with the Animal Welfare Act and the conditions contained in the current permit remain in effect, including having an experienced marine mammal veterinarian present to ensure proper dosages and protocols for use of sedatives and anesthesia and for emergency response.
Agency Response: The Service issued the permit amendment on 25 May 2011, consistent with the Commission's recommendation that the conditions in the original permit remain in effect. However, the Service noted that compliance with the Animal Welfare Act is not

an issuance criterion under section 104 of the Marine Mammal Protection Act or its implementing regulations for permits. As such, IACUC documentation was not required.

6 May 2011

To: National Marine Fisheries service
Issue: Application to amend a research permit from the National Marine Mammal Laboratory to authorize additional research involving the western distinct population segment of Steller sea lions in Alaska
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided that the conditions contained in the current permit remain in effect, including having an experienced marine mammal veterinarian present to ensure proper dosages and protocols for use of sedatives and anesthesia and for emergency response. In addition, the Commission recommended that the Service condition the permit to include requirements to monitor darted animals and report (1) their behavioral response and any activities that place them at heightened risk of injury of death; (2) whether they entered the water and their fate could not be determined; and (3) the number of dependent pups of those darted animals and their behavior. The Commission also recommended that the Service require the permit holder to halt the use of this darting technique and to consult with the Service and the Commission if three or more animals are darted and suffer unanticipated adverse effects, including entering the water and either drowning or disappearing so that their fate cannot be determined.
Agency Response: The Service issued the permit amendment on 8 June 2011, consistent with the Commission's recommendations.

6 May 2011

To: National Marine Fisheries Service
Issue: Application from the United Launch Alliance to take small numbers of marine mammals by harassment incidental to *Delta Mariner* operations, cargo unloading activities, and harbor maintenance activities at Vandenberg Air Force Base, California
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, subject to inclusion of the proposed mitigation and monitoring measures, including a condition that requires suspension of the proposed activities if the Service determines that an injury or death of a marine mammal may have resulted from those activities and that modifications to the proposed activities or mitigation measures would be warranted.
Agency Response: The Service issued the incidental harassment authorization on 7 June 2011, consistent with the Commission recommendation.

6 May 2011

To: U.S. Coast Guard
Issue: Request for comments regarding the development of a port access route study for U.S. waters in the Bering Strait
Recommendation: The Commission recommended that, as part of its planned port access route study for the Bering Strait, the U.S. Coast Guard (1) conduct a spatial and temporal analysis of factors affecting the distribution and potential co-occurrence of both marine mammals and ship traffic through the Bering Strait to identify options for vessel traffic routes that would minimize overlap between marine mammals and ships while also meeting requirements for vessel safety and other environmental, cultural, and subsistence protection needs. The Commission also recommended that the Coast Guard consult with (1) the National Marine Fisheries Service and the U.S. Fish and Wildlife Service pursuant to section 7 of the Endangered Species Act to determine the vessel management actions and accident response capabilities needed to protect marine mammals listed or under consideration for listing under that Act from possible impacts associated with vessel traffic and alternative vessel traffic management options; (2) the National Marine Fisheries

Service's National Marine Mammal Laboratory to characterize the occurrence, movements, and seasonality of non-endangered and non-threatened seals and cetaceans in the Bering Strait and their potential vulnerability to impacts associated with vessel traffic; (3) Alaska Native communities bordering the Bering Strait, Alaska Native Organizations (e.g. the Alaska Eskimo Whaling Commission and Eskimo Walrus Commission) and the Alaska Department of Fish and Game to identify and characterize the species, seasons, and areas in which traditional marine mammal subsistence hunting occurs; and (4) its Russian counterpart to advise it of steps being taken in the United States to plan for increased shipping though the Bering Strait, to share data on vessel traffic and the possible impact of shipping on the environment, and to consider establishment of cooperative, complementary vessel management actions on both U.S. and Russian sides of the area. In addition, the Commission recommended that the Coast Guard analyze potentially hazardous cargo that might be transported through the Bering Strait and identify equipment and logistical requirements necessary to free vessels that run aground and clean up any hazardous materials that might be spilled in all possible seasons, weather, and ice conditions, assess the value of (1) establishing a mandatory vessel traffic separation scheme and (2) designating areas outside the vessel traffic lanes as "areas to be avoided" as defined by the International Maritime Organization, while taking account of environmental, cultural and subsistence protection needs, and consider the need for establishing vessel speed restrictions of 10 knots if vessel traffic and bowhead whales are likely to overlap during the species' peak migratory periods through the Bering Strait.

Agency Response: The Coast Guard had not issued its plans for the port access route study by the end of 2011 but anticipates issuance by the end of 2012.

11 May 2011

To: National Marine Fisheries Service

Issue: Draft environmental assessment regarding issuance of a public display permit for placing releasable, rehabilitated California sea lions at the Institute for Marine Mammal Studies in Gulfport, Mississippi

Recommendation: The Commission recommended that the National Marine Fisheries Service consider whether the precedent-setting nature of this and similar permit applications warrants the preparation of an environmental impact statement and, at a minimum, that the Service expand the discussion in the environmental assessment to explain why it believes that adoption of such a policy is not considered significant. The Commission further recommended that the National Marine Fisheries Service, in consultation with the Commission and other interested parties, conduct a review of issues related to the roles, rights, and responsibilities of the Permit Office, rehabilitation facilities, and public display facilities in determining whether, when, and where to place releasable, rehabilitated marine mammals and adopt policies to resolve those issues.

Agency Response: The Service issued an environmental assessment and a finding of no significant impact in September 2011. However, it does not appear that the Service considered or addressed any of the Commission's recommendations.

3 June 2011

To: National Marine Fisheries Service

Issue: Application for a research permit from Rebecca Dickhut, Ph.D., to import from Sweden samples from four phocid species and one cetacean species originally collected in Antarctica

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the applicant submits documentation that each sample was taken legally under Swedish law and obtains all necessary permits under CITES before importing any phocid samples.

Agency Response: The Service had not issued the permit by the end of 2011.

June 3 2011
To: National Marine Fisheries Service
Issue: Application for a research permit from Paul Nachtigall, Ph.D., to conduct auditory measurements and recordings on cetaceans that have stranded or are undergoing rehabilitation
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit as requested.
Agency Response: The Service had not issued the permit by the end of 2011.

6 June 2011
To: National Marine Fisheries Service
Issue: Application for a photography permit from Oceanic Nature Film Productions to take various species of whales by close approach during filming activities in waters off Kona, Hawaii
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that the applicant agrees to monitor and report all cases where filming leads to sufficient disturbance that a whale alters its behavior or otherwise exhibits strong response to filming activities, the boats, or the divers; stop filming a particular whale or whales if they appear to be unduly disturbed by the activity; and obtain the appropriate authorization to conduct filming from the state of Hawaii, if needed.
Agency Response: The Service issued the permit on 29 June 2011, consistent with the Commission's recommendation.

6 June 2011
To: National Marine Fisheries Service
Issue: Application from Lamont-Doherty Earth Observatory to take small numbers of marine mammals by harassment incidental to a marine geophysical survey in the western Gulf of Alaska
Recommendation: The Commission recommended that the National Marine Fisheries Service require the Lamont-Doherty Earth Observatory to re-estimate the proposed exclusion and buffer zones and associated takes of marine mammals using site-specific information; if the exclusion and buffer zones and takes are not re-estimated, require the Lamont-Doherty Earth Observatory to provide a detailed justification (1) for basing the exclusion and buffer zones for the proposed survey in the Gulf of Alaska on empirical data collected in the Gulf of Mexico or on modeling that relies on measurements from the Gulf of Mexico and (2) that explains why simple ratios were used to adjust for tow depth and median values were applied to intermediate water depths rather than using empirical measurements; and use species-specific maximum densities rather than best densities to re-estimate the anticipated number of takes. The Commission also recommended that if the Service is planning to allow the applicant to resume full power after nine minutes under certain circumstances, it should specify in the authorization all conditions under which a 9-minute period could be followed by a full-power resumption of the airguns. In addition, the Commission recommended that the Service extend the 30-minute period following a marine mammal sighting in the exclusion zone to cover the full dive times of all species likely to be encountered, provide additional justification for its preliminary determination that the proposed monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified exclusion and buffer zones prior to issuing the incidental harassment authorization, consult with the funding agency (i.e., the National Science Foundation) and individual applicants (e.g., the Lamont-Doherty Earth Observatory and U.S. Geological Survey) to develop, validate, and implement a monitoring program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal taking and the number of marine mammals

taken, and require the applicant to (1) report on the number of marine mammals that were detected acoustically and for which a power-down or shut-down of the airguns was initiated; (2) specify if such animals also were detected visually; and (3) compare the results from the two monitoring methods (visual versus acoustic) to help identify their respective strengths and weaknesses. Lastly, the Commission recommended that the Service condition the authorization to require the Lamont-Doherty Earth Observatory to monitor, document, and report observations during all ramp-up procedures, work with the National Science Foundation to analyze these monitoring data to help determine the effectiveness of ramp-up procedures as a mitigation measure for geophysical surveys after the data are compiled and quality control measures have been completed, and condition the incidental harassment authorization to require the Observatory to (1) report immediately all injured or dead marine mammals to the Service and (2) suspend the geophysical survey if a marine mammal is seriously injured or killed and the injury or death could have been caused by the survey (e.g., a fresh dead carcass).

Agency Response: The Service issued the incidental harassment authorization on 28 June 2011, consistent with some of the Commission's recommendations. However, the Service did not require modeling of site-specific information because it believes that the exclusion zone and density data are sufficient for the Service to conduct its analysis and make determinations and that the numbers of takes were estimated based on best available scientific information and estimation methodology. In addition, the Service did not require remodeling because of its analysis of the likely effects of the activity on the marine mammals and their habitat, the implementation of the mitigation and monitoring measures, and the appropriateness and sufficiency of the exclusion zones. The Service also indicated that the monitoring program would be sufficient to detect marine mammals and account for the number of takes because the mitigation and monitoring measures are the most effective feasible measures available. The Service did not extend the monitoring period to 1 hour because observations are made longer than 30 minutes during ramp-up procedures, observers are monitoring in many cases when the airguns are not firing, the majority of the species do not remain underwater for more than 30 minutes, and there is a one in three chance that an animal would surface before the 30-minute period and then not again during the 30-minute period. Lastly, data from geophysical surveys are being compiled but are scant and will not be analyzed for some time.

6 June 2011

To: National Marine Fisheries Service

Issue: Request to amend a research permit application from Waikiki Aquarium to conduct research on captive Hawaiian monk seals and to take by unintentional mortality up to three monk seals during the five-year permit

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit provided that it require only one seal be tested with the vaccines at first and research involving the other seals be allowed only if no adverse responses from that vaccine are detected and the applicant halt research activities and consult with the Service and the Commission should any of the seals die during the research.

Agency Response: The Service had not issued the permit by the end of 2011.

10 June 2011

To: National Science Foundation

Issue: Application for authorization from the Alaska SeaLife Center to conduct research on Weddell seals in McMurdo Sound and along the shore of Ross Island, Antarctica, during a five-year period

Recommendation: The Commission recommended that the National Science Foundation issue the authorization under the Antarctic Conservation Act, provided that it condition the permit to require the Center to wait to see if a seal that hauls out at Cape Royds will leave

that area on its own and only usher it out of or recapture it in that area if the researchers have no other time or option.
Agency Response: The Foundation issued the authorization on 6 July 2011, consistent with the Commission's recommendation.

10 June 2011
To: U.S. Fish and Wildlife Service
Issue: Application for a research permit from the U.S. Geological Survey to conduct research on West Indian manatees in the southern United States and Puerto Rico during a five-year period
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that the Service conditions the permit to allow two unintentional serious injuries or deaths during the five-year period but require suspension of research activities, pending review by the Service, if any death or serious injury occurs and takes steps to ensure that activities to be conducted under this permit and those of other permit holders who might be conducting manatee research in the same areas are coordinated and, as possible, data and samples are shared to avoid duplicative research and unnecessary disturbance of the animal. In addition, the Commission recommended that the Service advise the applicant of the need to obtain state permits and require the applicant to obtain all necessary permits under CITES before importing or exporting any manatee part and to provide periodic reports to the Service sufficient to demonstrate that each specimen was taken in accordance with the laws of the country of origin and was not taken in violation of the Marine Mammal Protection Act or other applicable U.S. laws.
Agency Response: The Service had not issued the permit by the end of 2011.

20 June 2011
To: National Marine Fisheries Service
Issue: Application for a research permit from Glacier Bay National Park and Reserve to conduct research on humpback, killer, and minke whales in southeastern Alaska during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided it requires the applicant to provide documentation that an IACUC has reviewed and approved the research activities before initiation of those activities; includes a permit condition requiring the applicant to make observations sufficient to detect possible short- and long-term effects of biopsy sampling and report the effort made and the information collected to the Permit Office; and ensures that activities to be conducted under this permit and those of other permit holders who might be conducting research on the same species in the same areas are coordinated and, as possible, data and samples shared to avoid duplicative research and unnecessary disturbance of animals.
Agency Response: The Service had not issued the permit by the end of 2011.

20 June 2011
To: National Marine Fisheries Service
Issue: Application from the Monterey Bay National Marine Sanctuary to take small numbers of marine mammals by harassment incidental to permitting commercial fireworks displays within the Sanctuary waters of California
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, subject to inclusion of the proposed mitigation and monitoring measures.
Agency Response: The Service issued the incidental harassment authorization on 4 July 2011, consistent with the Commission's recommendation.

23 June
To: National Marine Fisheries Service

2011 **Issue:** Application from Statoil USA E&P to take marine mammals by harassment incidental to open-water shallow hazards survey in the Chukchi Sea, Alaska, from July through November 2011

Recommendation: The Commission recommended that the National Marine Fisheries Service provide additional justification for its preliminary determination that the proposed monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified Level B harassment zones prior to issuing the incidental harassment authorization; require Statoil to (1) determine detection probabilities as a function of distance from the vessel and (2) describe changes in detection probabilities under the various sea state and weather conditions and light levels likely to be encountered at the times when activities would be conducted; and require Statoil to report and analyze both visual and acoustic data on the occurrence, abundance, distribution, and movement of marine mammals for periods before, during, and after all of the proposed activities. In addition, the Commission recommended that the Service work with Statoil and other industry operators to (1) evaluate the potential for using new technology for mitigation and monitoring purposes and (2), when and as appropriate, consult with the Federal Aviation Administration and other responsible agencies to clarify existing constraints on the use of such technology and devise methods to implement the new technology while staying within the constraints set by the responsible agencies. Lastly, the Commission recommended that the Service condition the incidental harassment authorization to require Statoil to suspend its activities if a marine mammal is seriously injured or killed and the injury or death could have been caused by those activities (e.g., a fresh dead carcass is found).

Agency Response: The Service issued the incidental harassment authorization on 1 August 2011, consistent with some of the Commission's recommendations. The Service believed that the proposed monitoring program would be sufficient to detect, with a high level of confidence, nearly all the marine mammals within or entering the exclusion zones based on the proposed measures, prior years' marine mammal visual monitoring measures as reported in the 90-day reports and comprehensive reports for seismic surveys in the Arctic, and the small exclusion zones anticipated during the proposed Statoil shallow hazards surveys. The Service did note that it investigated new technologies; however, those technologies are still in the developmental phase and could not be implemented presently. The Service did not address the Commission's recommendations regarding detection probabilities and conditions that affect those probabilities.

23 June 2011 **To:** National Marine Fisheries Service

Issue: Application from the Cher-Ae Heights Indian Community of the Trinidad Rancheria to take small numbers of marine mammals by harassment incidental to pile driving and pile removal during reconstruction of the Trinidad Pier in California

Recommendation: The Commission recommended that the Service defer issue of the incidental harassment authorization until it has (1) required the applicant to develop a more realistic estimate of the number of harbor seal takes that (a) accounts for all harbor seal haul-out sites in the area, (b) corrects seal abundance estimates to account for seals in the water during the counts, (c) incorporates a more realistic assessment of the portion of seals that will enter the water in the Level B harassment zone during the proposed construction operations, (d) includes a reasoned basis for estimating takes that occur from in-air construction sound, and (e) is based on a realistic estimate of the time required to remove 205 wood piles; (2) reviewed estimates of numbers of takes for California sea lions and gray whales during the proposed activities; and (3) re-estimated the distances to various in-water and in-air Level A and B harassment thresholds for all three types of proposed

sound-producing activities and then re-evaluated the proposed mitigation and monitoring measures to ensure that the appropriate areas are adequately monitored. In addition, the Commission recommended that the Service require the applicant to verify the associated Level A and B harassment zones through calibrated in-situ sound measurements and to adjust those zones as appropriate; require that shut-down procedures be established for both species of pinnipeds, provide further analysis and justification regarding the efficacy of visual monitoring for the proposed activities and the manner in which the number of takes can be determined accurately; require the applicant to use 30 minutes as the appropriate clearance time for gray whales before ramp-up activities may commence and to use hydrophones for acoustic detection of gray whales; and address the deficiencies identified by the Commission and publish a new proposed incidental harassment authorization in the *Federal Register* with the corrected information and provide for an additional 30-day comment period.

Agency Response: The Service issued the incidental harassment authorization on 1 August 2011, consistent with a few of the Commission's recommendations. The Service believed that the action described accounts for all of the harbor seal haul-out sites in the action area and that harbor seals may haul out elsewhere but enter the Bay to forage has not been corroborated by data. Movement data was not discussed in the Goley pers. comm. reference (i.e., a phone call), as that data supposedly does not exist. The Service used the 1.54 correction factor but then reduced the in-water harbor seal takes by 65% using the ratio of the average number of hauled out seals and the correction factor, even though those numbers are associated with any given timeframe, not the extended timeframe the activities would occur during one day. The Service, again, based the vast majority of its marine mammal occurrence, abundance, and density data on Goley et al. 2007 and Goley pers. comm. The Service did not extend the harassment zones beyond Trinidad Bay, as it cites that sound levels would slightly exceed ambient and harbor seals habituate to those types of sounds. The Service also believed that the take estimates for California sea lions and gray whales as presented in the *Federal Register* notice and application are accurate and likely overestimate the potential for takes, rendering further review unnecessary. In addition, the Service did not revise the distances to various in-water and in-air Level A and B harassment thresholds for the three types of proposed sound-producing activities or re-evaluate the proposed mitigation and monitoring measures, as it did not find evidence that significant changes were necessary. The Service stated that the applicant's visual monitoring program would be sufficient to detect, with reasonable certainty, the majority of marine mammals within or entering the exclusion zone; therefore, the monitoring program has been deemed sufficient. The Service did not require passive monitoring for gray whales, because the technology is largely experimental and cost prohibitive for the applicant; it did, however, require 30 minute clearance time for gray whales. Lastly, the Service believed that it and the applicant addressed all of the Commission's issues and recommendations, and that publishing a revised notice and allowing for an additional 30-day comment period was unnecessary.

24 June 2011

To: National Marine Fisheries Service

Issue: Application from PRBO Conservation Science to take small numbers of marine mammals by harassment incidental to conducting seabird and pinniped research on Southeast Farallon Island, Año Nuevo Island, and Point Reyes National Seashore in California

Recommendation: The Commission recommended that the Service issue the incidental harassment authorization, subject to inclusion of the proposed mitigation and monitoring measures.

Agency Response: The Service issued the incidental harassment authorization on 29 July

2011, consistent with the Commission's recommendation.

24 June 2011
To: National Science Foundation
Issue: Application to modify an authorization from Robert Pitman to conduct additional research on cetaceans near the Antarctic Peninsula and within McMurdo Sound and the Ross Sea
Recommendation: The Commission recommended that the National Science Foundation issue the authorization modification, provided that it contacts the permit holder to confirm whether he intends to approach fin whales to take photos as part of the proposed research and, if that is the intention, explains why an authorization is not needed for photo-identification activities involving fin whales. The Commission also recommended that the Foundation specify not only the species and total numbers of each species authorized to be taken, but also provide a breakdown of the authorized types of takes and advise the permit holder of the need to obtain all necessary permits under CITES before importing or exporting any marine mammal part.
Agency Response: The Foundation issued the authorization modification on 1 August 2011, consistent with one of the Commission's recommendations. However, it is unclear if the Foundation confirmed whether the permit holder intends to approach fin whales for photography purposes or advised the permit holder of the need to obtain relevant permits.

27 June 2011
To: National Marine Fisheries Service
Issue: Interim final rule from the Navy to amend regulations that govern the taking of marine mammals incidental to military training operations conducted in the Virginia Capes and Jacksonville Range Complexes between June 2009 and June 2014
Recommendation: The Commission recommended that the National Marine Fisheries Service take all steps possible to avoid invoking the good cause exception for future rulemakings under similar circumstances.
Agency Response: The Service issued the final rules in early June 2011 but did not address the Commission's recommendation.

8 July 2011
To: National Marine Fisheries Service
Issue: Application for a research permit from Jennifer Lewis, Ph.D., to conduct research on bottlenose dolphins in the Everglades National Park, Florida, during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that it requires Dr. Lewis to justify biopsy sampling, or attempting to biopsy sample up to 114 individuals from a single strategic stock with an unknown abundance estimate, rather than biopsy sampling 38 individuals from that stock and requires that Dr. Lewis not initiate her research until she has provided documentation that her IACUC has reviewed and approved the research. The Commission also recommended that the Service advise Dr. Lewis of the potential need to obtain additional permits from the National Park Service to conduct research activities in the park.

Agency Response: The Service issued the permit on 18 November 2011, consistent with some of the Commission's recommendations. The Service did not justify the biopsy sample size issue and indicated that IACUC approvals are not required under the Marine Mammal Protection Act; thus, it is not under its jurisdiction. However, Dr. Lewis did provide her IACUC approval by the time the permit was issued.

8 July 2011
To: National Marine Fisheries Service
Issue: Application from the U.S. Geological Survey to take small numbers of marine mammals by harassment incidental to a marine geophysical survey in the central-western

Bering Sea

Recommendation: The Commission recommended that the National Marine Fisheries Service require the U.S. Geological Survey to re-estimate the proposed exclusion and buffer zones and associated takes of marine mammals using site-specific information and species-specific maximum densities rather than best densities and, if the exclusion and buffer zones and numbers of takes are not re-estimated, require the U.S. Geological Survey to provide a detailed justification (1) for basing the exclusion and buffer zones for the proposed survey in the Bering Sea on empirical data collected in the Gulf of Mexico or on modeling that relies on measurements from the Gulf of Mexico and (2) that explains why simple ratios were used to adjust for tow depth. The Commission also recommended that if the Service is planning to allow the applicant to resume full power after 8 minutes under certain circumstances, it should specify in the authorization all conditions under which an 8-minute period could be followed by a full-power resumption of the airguns. In addition, the Commission recommended that the Service extend the 30-minute period following a marine mammal sighting in the exclusion zone to cover the full dive times of all species likely to be encountered; provide additional justification for its preliminary determination that the proposed monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified exclusion and buffer zones prior to issuing the incidental harassment authorization; consult with the funding agency (i.e., the National Science Foundation) and individual applicants (e.g., the U.S. Geological Survey and Lamont-Doherty Earth Observatory) to develop, validate, and implement a monitoring program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal taking and the number of marine mammals taken; and require the applicant to (1) report the number of marine mammals that were detected acoustically and for which a power-down or shut-down of the airguns was initiated, (2) specify if such animals also were detected visually, (3) compare the results from the two monitoring methods to help identify their respective strengths and weaknesses, and (4) use that information to improve mitigation and monitoring methods. Lastly, the Commission recommended that the Service condition the authorization to require the U.S. Geological Survey to monitor, document, and report observations during all ramp-up procedures; work with the National Science Foundation to analyze monitoring data to help determine the effectiveness of ramp-up procedures as a mitigation measure for geophysical surveys after the data are compiled and quality control measures have been completed; and condition the incidental harassment authorization to require the Survey to (1) report immediately all injured or dead marine mammals to the Service and (2) suspend the geophysical survey if a marine mammal is seriously injured or killed and the injury or death could have been caused by the survey (e.g., a fresh dead carcass).

Agency Response: The Service issued the incidental harassment authorization on 7 August 2011, consistent with some of the Commission's recommendations. However, the Service did not require modeling of site-specific information because it believes that a sound source verification study is not warranted, although the Commission did not request for a verification study to estimate the relevant zones. The Service believed that the exclusion and buffer zones and density data are sufficient for the Service to conduct its analysis and make any determinations and that the numbers of takes were estimated based on best available scientific information and estimation methodology. In addition, the Service did not require remodeling because of its analysis of the likely effects of the activity on the marine mammals and their habitat, the implementation of the mitigation and monitoring measures, and the appropriateness and sufficiency of the exclusion zones. The Service also indicated that the monitoring program would be sufficient to detect marine mammals and account for the number of takes because the mitigation and monitoring measures are the most effective feasible measures available. The Service did not extend the monitoring

period to 1 hour because observations are made longer than 30 minutes during ramp-up procedures, observers are monitoring in many cases when the airguns are not firing, the majority of the species do not remain underwater for more than 30 minutes, and there is a one in three chance that an animal would surface before the 30-minute period and then not again during the 30-minute period. Lastly, data from geophysical surveys are being compiled but are scant and will not be analyzed for some time.

12 July 2011 **To:** U.S. Fish and Wildlife Service
Issue: Application to amend a research permit from Matson's Laboratory, LLC, to import more than 500 polar bear teeth per year, the limit imposed by its five-year permit
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit and maintain the requirement that the applicant obtain all necessary permits under CITES before importing any polar bear teeth.
Agency Response: The Service issued the permit on 5 October 2011, consistent with the Commission's recommendation.

12 July 2011 **To:** National Marine Fisheries Service
Issue: Application for a public display permit from Blank Park Zoo to import up to five non-releasable harbor seals or California sea lions during a five-year period
Recommendation: The Commission recommended that the Service issue the permit, provided that it is satisfied, along with the Animal and Plant Health Inspection Service, that the applicant's plans and facilities for transporting and maintaining the animals meet the requirements established under the Animal Welfare Act and are adequate to provide for the animals' health and well-being and is satisfied that the applicant's education program is acceptable.
Agency Response: The Service issued the permit on 8 September 2011, consistent with the Commission's recommendation.

12 July 2011 **To:** U.S. Fish and Wildlife Service
Issue: Application to amend a research permit from Tom Smith, Ph.D., to harass 18 polar bears per year while conducting den monitoring via videotaping in Alaska and to install devices that would allow real-time monitoring of polar bear den activity and remote data downloading
Recommendation: The Commission recommended that the Service issue the permit amendment as requested.
Agency Response: The Service had not issued the permit by the end of 2011.

14 July 2011 **To:** National Marine Fisheries Service
Issue: Request for comments regarding an application from the Bureau of Ocean Energy Management, Regulation, and Enforcement to take cetaceans incidental to oil and gas industry-sponsored seismic surveys for geological and geophysical exploration on the Outer Continental Shelf in the Gulf of Mexico during a five-year period
Recommendation: The Commission recommended that, in the proposed rule, the Service provide sufficient justification for its selection of the appropriate threshold for Level A harassment, regardless of which threshold is adopted; verify whether the Bureau is in fact requesting authority to take cetaceans by Level A harassment; and verify whether geotechnical soil surveys are part of the proposed action and, if so, include an estimate of the number and types of takes associated with the dynamic positioning system of the survey vessel, and, if the sound sources are considered continuous sources, use the threshold of 120 rather than 160 dB re 1 µPa for estimating Level B harassment takes. The Commission also recommended that the Service identify activity-specific Level A and B

harassment zones in the proposed rule. Those zones should be based on acoustic modeling and/or empirical data and, if based on modeling, should be updated after in-situ measurements have been made and estimated sound pressure levels have been verified. In-situ measurements should be made for all airgun configurations, the sub-bottom profiler, and geotechnical soil surveys at the onset of each activity and adjustments regarding the harassment zones should be made accordingly. In addition, the Commission recommended that the Service include a requirement that the Bureau use the same Level A harassment zone to initiate the shut-down of activities regardless of what species of marine mammal is detected within that zone; include power-down requirements and supplement the mitigation measures proposed by the Bureau to include speed reduction and course alteration requirements and restrictions on the timing or location of activities to avoid disturbing marine mammals during breeding or calving seasons; and include a requirement that passive acoustic monitoring be used to collect data on the occurrence, abundance, distribution, and movement of marine mammals during periods before, during, and after all of the proposed activities. Lastly, the Commission recommended that the Service advise the Bureau of the need to work jointly with industry operators to consider, and potentially fund, the testing of new technologies (i.e., unmanned aerial or underwater vehicles) for use in far-field monitoring and require the Bureau to report immediately all injured and dead marine mammals in the vicinity of the proposed surveys to the Service and to suspend those activities if a marine mammal is seriously injured or killed and the injury or death could have been caused by those activities (e.g., a fresh dead carcass is found).
Agency Response: The Service had not issued the proposed rule by the end of 2011.

15 July 2011

To: National Marine Fisheries Service
Issue: Application for an exempted fishing permit from the Gulf and South Atlantic Fisheries Foundation to collect and retain, under certain restrictions, limited numbers of fish and crustacean specimens taken as bycatch in the shrimp fisheries of the Gulf of Mexico and South Atlantic
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the exempted fishing permit, provided it is conditioned to require the applicant to record and report data about any incidental mortality or injury of a marine mammal during the course of this study and ensure the proper handling and safe release of those species.
Agency Response: The Service issued the exempted fishing permit on 18 July 2011. It is unclear if the Service implemented the Commission's recommendation.

18 July 2011

To: U.S. Fish and Wildlife Service
Issue: Application for a research permit from the U.S. Fish and Wildlife Service's Marine Mammals Management Office to conduct research on walruses in the Bering and Chukchi Seas during a five-year period
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit after the 30-day comment public comment period provided that it conditions the permit to require the Management Office to sponsor a review of its mark-recapture assessment approach before initiating field work; conditions it to allow for a maximum number of disturbances from aerial surveys and require monitoring and reporting of all disturbance events observed during those surveys; and requires the Management Office to estimate and then document and report the number of walruses harassed incidental to conducting the biopsy sampling and tagging activities proposed in this application. The Commission also recommended that the Service consult with the Management Office and reconsider whether it should include authorization for some level of unintended mortality in its research permit; condition the permit to require the

Management Office to provide documentation that any individual authorized to collect biopsy samples or tag walruses remotely has received sufficient training and has sufficient experience to conduct those activities before he or she is allowed to do so unsupervised; take steps to ensure that activities to be conducted under this permit and those of other permit holders who might be conducting research on walruses in the same areas are coordinated and, as possible, data and samples are shared to avoid duplicative research and unnecessary disturbance of animals; and condition the permit to require the applicant to obtain all necessary permits under CITES before importing any walrus part.
Agency Response: The Service issued the permit on 15 July 2011, prior to the end of the comment period based on the possibility of the Management Office losing a unique research opportunity (i.e., expiration of funding and opportunity to collect samples with the U.S. Geological Survey on this year's cruise). The Service indicated that the permit is valid for one year only, at which time it will review and address the Commission's recommendations before issuing the permit for the remaining four years.

28 July 2011

To: National Marine Fisheries Service
Issue: Proposed rulemaking regarding the List of Fisheries for 2012
Recommendation: Based on its review of the draft List of Fisheries for 2012, the Marine Mammal Commission concurred with the National Marine Fisheries Service's proposal to elevate (1) the California/Oregon thresher shark/swordfish drift gillnet fishery to Category II and its proposal to designate the California/Oregon/Washington stock of humpback whales as the basis for that categorization; (2) the Hawaii charter vessel and Hawaii trolling, rod and reel fisheries from Category III to Category II and its proposal to designate the Hawaii stock of pantropical spotted dolphins as the basis for those categorizations; and (3) the Southeastern Atlantic, Gulf of Mexico stone crab trap/pot fishery from Category III to Category II, based on analogy to the blue crab trap/pot fishery and on the likelihood of occasional interactions with bottlenose dolphins. The Commission also concurred with the Service's proposal to (1) list bottlenose dolphins (Northern North Carolina estuarine system stock) as a stock subject to incidental killing or serious injury in the Virginia pound net fishery and recommended that the Service work with the state of Virginia to develop a formal, scientifically sound system for observing or otherwise monitoring marine mammal interactions in this fishery; (2) add Gulf of Mexico bay, sound, and estuarine stocks of bottlenose dolphins to the list of marine mammals killed or injured in the Atlantic Ocean, Gulf of Mexico, Caribbean commercial passenger fishing vessel fishery and recommended that the Service elevate the Atlantic Ocean, Gulf of Mexico, Caribbean commercial passenger fishing vessel fishery to Category II; (3) add the Western North Atlantic stock of Risso's dolphins to the list of stocks incidentally killed or seriously injured in the Mid-Atlantic bottom trawl fishery and recommended that the Service further investigate any factors that may account for the notable recent increase in takes of Risso's dolphins in this fishery; and (4) add several marine mammal stocks, absent information on stock identity and fisheries interactions, to the list of those subject to incidental killing or serious injury in the Category I Western Pacific pelagic fishery, Hawaii deep-set component and the Category II Western Pacific pelagic fishery, Hawaii shallow-set component and recommended that the Service work with its international and industry partners to compile and analyze information about marine mammals on the high seas and their interactions with fisheries, so that the list of species incidentally killed or seriously injured in high seas fisheries can be refined in the near future. The Commission also reviewed its recommendations from previous years for the proposed List of Fisheries for 2012 and recommended that the Service work with the Commission to develop an effective long-term strategy for determining marine mammal stock structure and abundance, potential biological removal levels, and fisheries mortality and serious injury rates in the

Gulf of Mexico and work on its own and in collaboration with states to develop new, consistent methods for estimating fishing effort. Lastly, the Commission commended the Service for its efforts to centralize information used to classify Category III fisheries, including observer coverage and other fishery characteristics, and looks forward to seeing this effort come to fruition.
Agency Response: The Service had not issued the final rule by the end of 2011 but anticipated issuance in early 2012.

5 August 2011
To: National Marine Fisheries Service
Issue: Proposed rule to expand critical habitat boundaries for the endangered Hawaiian monk seal
Recommendation: The Commission recommended that the National Marine Fisheries Service adopt a final rule to expand the existing critical habitat boundaries for endangered Hawaiian monk seals as proposed.
Agency Response: The Service had not issued a final rule by the end of 2011.

5 August 2011
To: National Marine Fisheries Service
Issue: Application from BP Exploration (Alaska) to take marine mammals by harassment incidental to the operation of the Northstar facility for a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the final rule, provided that it require BP to provide a reasoned justification for the requested number of takes of beluga whales during the open-water season and ensure that the resulting take estimate is reflected accurately in section 217.142 of the regulations and (1) require BP to identify all untested or novel impulsive and continuous sound sources, (2) work with BP to determine activity- and site-specific in-air and in-water Level A and B harassment zones for all those sources (including using the 120-dB re 1 µPa threshold for continuous sources), and (3) require BP to monitor those zones during all operations of the various sound sources and report its findings. The Commission also recommended that the Service require BP to use ramp-up, shut-down, and power-down procedures with all activities that require establishment of harassment zones based on either impulsive or continuous noise, whether in air or in the water; require BP to conduct monitoring for 30 minutes before, during, and for 30 minutes after all in-water activities that use impulsive or continuous sources; and work with BP to continue its monitoring, analysis, and reporting of the acoustic data it collects on the occurrence, abundance, distribution, and movement of bowhead whales for periods before, during, and after all of the proposed activities. In addition, the Commission recommended that the Service work with BP and other industry operators to (1) evaluate the potential for using new technologies for mitigation and monitoring purposes and (2) when and as appropriate, consult with the Federal Aviation Administration and other responsible agencies to (a) clarify existing constraints on the use of such technology and (b) devise methods to implement the new technologies within those constraints. Lastly, the Commission recommended that the Service review BP's revised Oil Discharge Prevention and Contingency Plan to determine whether the plan is adequate for preventing and responding to a major oil spill; convey the findings of this determination to the Bureau of Ocean Energy Management, Regulation, and Enforcement; include a full description of response capabilities in the final rule and incorporate sufficient mitigation measures into that rule to address response capabilities; and condition the final rule to require BP to suspend its activities if more than five ringed seals are killed in any year, or any other marine mammal is seriously injured or killed and the injury or death could have been caused by those activities (e.g., a fresh carcass is found).
Agency Response: The Service had not issued a final rule by the end of 2011.

10 August 2011

To: U.S. Fish and Wildlife Service
Issue: Draft evaluation of the Southern sea otter translocation program
Recommendation: The Commission recommended that, as part of a proposed rulemaking to terminate the sea otter translocation, the U.S. Fish and Wildlife Service include proposed amendments to section 17.84(d)(8)(vi) to eliminate the requirement that sea otters at San Nicolas Island be returned to the parent population and complete that part of the rulemaking prior to making a final failure determination.
Agency Response: The Service issued a proposed rule on 26 August 2011 but did not include the Commission's recommendation. It assumed that by terminating the sea otter translocation program the requirement to return the sea otters at San Nicolas Island to their parent population also would be terminated.

10 August 2011

To: National Marine Fisheries Service
Issue: Application from the University of Alaska Geophysics Institute to take small numbers of marine mammals by harassment incidental to a marine geophysical survey in the Chukchi Sea and Arctic Ocean
Recommendation: The Commission recommended that the National Marine Fisheries Service require the Institute to re-estimate the proposed exclusion and buffer zones for the mitigation airgun using operational and site-specific environmental parameters and the model developed by Marine Acoustics, Inc.—if the Service does not follow this recommendation, then require the Institute to provide a detailed justification for basing the exclusion and buffer zones for the proposed survey in the Chukchi Sea and Arctic Ocean on modeling that relies on measurements from the Gulf of Mexico and that is inconsistent with the modeling approach used for the 10-airgun array. The Commission also recommended that the Service (1) specify in the authorization all conditions under which an 8-minute period could be followed by a full-power resumption of the airguns if the Service planned to allow the Institute to resume full power after 8 minutes under certain circumstances; (2) provide additional justification for its preliminary determination that the proposed monitoring program will be sufficient to detect all marine mammals within or entering the identified exclusion and buffer zones prior to issuing the incidental harassment authorization; (3) condition the authorization to require the Institute to monitor, document, and report observations during all ramp-up procedures; and (4) consult with the funding agency (i.e., the National Science Foundation) and individual applicants (i.e., the University of Alaska Geophysics Institute, the U.S. Geological Survey, and Lamont-Doherty Earth Observatory) to develop, validate, and implement a monitoring program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal taking and the number of marine mammals taken. In addition the Commission recommended that the Service require the applicant to (1) report the number of marine mammals that were detected acoustically and for which a power-down or shut-down of the airguns was initiated; (2) specify if such animals also were detected visually; (3) compare the results from the two monitoring methods to help identify their respective strengths and weaknesses; and (4) use that information to improve mitigation and monitoring methods. Lastly, the Commission recommended that the Service work with the National Science Foundation to analyze those data to help determine the effectiveness of ramp-up procedures as a mitigation measure for geophysical surveys after the data are compiled and quality control measures have been completed.
Agency Response: The Service issued the incidental harassment authorization on 5 September 2011, consistent with some of the Commission's recommendations. However, the Service was satisfied that the exclusion and buffer zone data were sufficient for it to conduct its analysis and make any determinations, and therefore no further effort is needed

by the applicant. Given that the mitigation airgun is a small source, the Service thought it was unnecessary to run an additional model incorporating environmental parameters for this survey. The Service also believes that the final monitoring and mitigation measures are the most effective feasible measures, and NMFS is not aware of any additional measures that could meaningfully increase the likelihood of detecting marine mammals in and around the exclusion zone. Lastly, the Service indicated that the Foundation is compiling all data associated with ramp-up, to be analyzed at a later date.

11 August 2011

To: Bureau of Ocean Energy Management, Regulation, and Enforcement
Issue: Draft environmental assessment for commercial wind lease issuance and site characterization activities on the Atlantic Outer Continental Shelf offshore of New Jersey, Delaware, Maryland, and Virginia
Recommendation: The Commission recommended that the Bureau of Ocean Energy Management, Regulation, and Enforcement continue its proactive and collaborative approach for identifying specific leasing areas for wind energy development; select Alternative D as the preferred alternative for leasing of wind energy areas in the mid-Atlantic to minimize the likelihood of noise-related injuries and vessel strikes to marine mammals from activities associated with site characterization and assessment; and work with lessees to ensure the availability of adequate baseline information before moving forward with wind energy site characterization and assessment projects. The Commission also recommended that the Bureau (1) require lessees to apply mitigation measures to reduce the impacts of vessel activities on marine mammal species, including those that are and are not listed under the Endangered Species Act; (2) require the use of passive acoustic monitoring to increase protection of marine mammals during geophysical surveys; (3) require lessees to estimate the proposed exclusion and buffer zones for all sound sources using operational- and site-specific information and the relevant thresholds established by the National Marine Fisheries Service and modify those zones as necessary using in-situ sound measurements; (4) use exclusion zones to protect both listed and non-listed marine mammals; (5) require lessees to report immediately all injuries or mortalities of both listed and non-listed marine mammals and suspend their activities if a marine mammal is seriously injured or killed and the injury or death could have been caused by their activities; and (6) consult with the National Marine Fisheries Service and the Marine Mammal Commission to determine the cause of the injury or death and devise means for avoiding such impacts before operations resume. In addition, the Commission recommended that the Service (1) allow lessees to resume to full power for geophysical surveys only when the shutdown has been eight minutes or less in duration and when no marine mammals have been observed within the exclusion zone before or during the shutdown or when a marine mammal is seen within the exclusion zone but also is observed leaving the zone; (2) require lessees to cease pile driving if a marine mammal has entered the exclusion zone around a pile driving operation until the marine mammal is observed to have left the exclusion zone or has not been seen or otherwise detected within the exclusion zone for 15 minutes in the case of small odontocetes and 30 minutes in the case of mysticetes and large odontocetes; and (3) require that any alternative monitoring methods used during pile driving or other activities be clearly specified so that a determination can be made as to the effectiveness and adequacy of that alternative method. Lastly, the Commission recommended that the Service encourage lessees to use acoustical monitoring to characterize ambient sound levels before, during, and after proposed activities and to monitor for the presence and movements of cetaceans in the vicinity of specific proposed wind energy areas and provide a comprehensive analysis of the cumulative impacts of wind energy development and other human activities that affect the development area.

Agency Response: The Bureau had not issued a final environmental assessment by the end of 2011 but anticipated its issuance in early 2012.

15 August 2011

To: National Marine Fisheries Service
Issue: Application for a research permit from the Southwest Fisheries Science Center to conduct research on four pinniped species in Antarctica during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that it requires the Center to (1) have an experienced marine mammal veterinarian present to ensure proper dosages and protocols for use of sedatives and anesthesia and to direct emergency responses or (2) if—despite all reasonable efforts—a marine mammal veterinarian or another experienced veterinarian is not available, ensure that the researchers have been instructed in procedures for sedating pinnipeds by an experienced marine mammal veterinarian and their protocols and equipment for animal handling, sedation, and emergency response have been reviewed by that veterinarian prior to conducting the proposed activities. The Commission also recommended that the Service advise the Center of the need to obtain approval from its IACUC prior to conducting the proposed activities and all necessary permits under CITES before importing any marine mammal part.
Agency Response: The Service issued the permit on 22 September 2011, consistent with some of the Commission's recommendations. It did not require the presence of a veterinarian but did require proper training by a veterinarian. The Service indicated that compliance with IACUC review and approval requirements is not a criterion under the Marine Mammal Protection Act and is not under its jurisdiction. However, the Center did provide the Service with its IACUC approval letter.

18 August 2011

To: National Marine Fisheries Service
Issue: Application from the U.S. Air Force to take marine mammals by harassment incidental to air-to-surface gunnery missions within the Eglin Air Force Base's Gulf of Mexico Test and Training Range
Recommendation: The Commission recommended that the National Marine Fisheries Service withhold issuing the incidental harassment authorization until the Air Force has provided a clear, step-by-step description of how it estimated the zones of exposure and associated number of takes for the sound exposure level thresholds; require the Air Force to evaluate its mitigation and monitoring measures to assess their effectiveness in detecting marine mammals and minimizing takes; and work with the Air Force to design and conduct the necessary performance verification testing for electronic detection devices under relevant sea state conditions.
Agency Response: The Service issued the incidental harassment authorization on 26 September 2011, consistent with none of the Commission's recommendations. The Service did not agree with the Commission that the incidental harassment authorization should not be issued until additional information regarding the zones of exposure and number of takes can be provided, as it believes the method and analytical approach was explained fully. Because the Commission did not make any specific recommendations regarding the performance testing of mitigation measures to assess their actual effectiveness at detecting marine mammals, the Service was uncertain as to what exactly it is the Commission was recommending be done in this instance. Lastly, Air Force subject matter experts have determined based on in-the-field experience, the airborne systems adequately function in a sea state of 4. Therefore, performance verification testing per se was not needed.

18 August 2011

To: National Science Foundation
Issue: Application for authorization from the Southwest Fisheries Science Center to

conduct research on pinnipeds on the South Shetland Islands and Antarctic Peninsula
Recommendation: The Commission recommended that the National Science Foundation issue the authorization, provided that it contacts the Center to confirm whether it expects to harass Antarctic fur seals, leopard seals, southern elephant seals, and Weddell seals incidental to census or survey activities, includes those takes in the permit, and advises the Center of the need to obtain all necessary permits under CITES before importing or exporting any marine mammal part.
Agency Response: The Foundation issued the authorization on 1 October 2011. It is unclear if the Foundation followed any of the Commission's recommendations.

19 August 2011

To: National Marine Fisheries Service
Issue: Policy for distinguishing serious from non-serious injuries of marine mammals
Recommendation: The Commission recommended that the National Marine Fisheries Service adopt the draft policy and procedure directives for determining when injuries to marine mammals should be considered serious, after making changes that require the Service to (1) count entangled large whales that are considered seriously injured for the purposes of triggering and guiding take reduction efforts, even if they are successfully disentangled; (2) review its available data on entanglements to (a) determine if females or dependent calves have become entangled and the entanglements were judged to be non-serious injuries, (b) characterize the outcome of any such cases in terms of risk to the associated calves, and (c) revise this criterion accordingly if the evidence suggests serious risk to the calves; (3) review its available data to determine how often injuries initially judged to be non-serious have evolved to a state that was considered serious and adjust its proposed new guidelines to account for the probability of escalating risks; (4) count entangled small cetaceans and pinnipeds that would be judged as seriously injured when categorizing each fishery and determining if additional take reduction efforts are needed, even when the affected individuals have been disentangled; and (5) expand its policy directives by including a list of research needed to improve injury prevention, response, and assessment efforts in the future.
Agency Response: The Service had not issued the final policy by the end of 2011.

19 August 2011

To: NOAA's Scientific Integrity Team
Issue: Its Scientific Integrity Policy
Recommendation: The Commission recommended that NOAA adopt and implement its Scientific Integrity Policy and Handbook, after making changes to (1) define, interpret, and discuss the terms "transparency" and "traceability" in its Policy; (2) fully describe the policies, procedures, guidelines, and mandates related to the development and dissemination of scientific and technical products; (3) identify the 'timely dissemination' of science as one of the principles of scientific integrity and include explicit guidelines for the timely dissemination of data, analyses, and scientific findings; (4) revise section 4.03 of the Policy to characterize its scientists' viewpoints on matters consistent with their expertise as "expert opinion" rather than "personal opinion"; and (5) specify in the Policy those special circumstances wherein NOAA anticipates the data and models underlying regulatory proposals or policy decisions might not be made available. The Commission also recommended that the Service expand its Policy to identify and address those external factors that might damage its scientific integrity, delineate the policies and procedures that will be necessary to mitigate those influences, and expand its Handbook to include descriptions of the structural changes that will be made, procedures that will be put in place, resources that will be allocated, and performance-assessment processes that will be used to ensure that its scientific integrity policies become integral to its culture and operations. In addition, the Commission recommended that the Service revise the Policy to

(1) require the use or development of streamlined, rapid, or otherwise customized, peer-review processes for situations in which the standard peer-review procedures would not be effective or timely and specify within the Policy the criteria to be used to delineate those situations in which modified peer review is to be used; (2) stipulate explicitly and in detail what whistleblower protections are or will be put in place and revise the Handbook to describe the procedures to be followed to ensure that whistleblowers are protected and treated justly and fairly; (3) require communication of information on scientific uncertainty, projections and/or expected best-/worse-case scenarios, and standard operating procedures and describe clearly the circumstances when this practice would not be necessary and/or appropriate; and (4) require communication of scientific integrity policies to employees, contractors, and grantees who assist with developing and applying the results of scientific activities and specify those circumstances in which it would not be appropriate to communicate that information.

Agency Response: NOAA issued the policy as an Administrative Order on 7 December 2012, consistent with a few of the Commission's recommendations. Although NOAA defined the terms "transparency" and "traceability", it did not interpret or discuss the significance of those terms. NOAA did add references to policies, procedures, and guidelines related to the development and dissemination of scientific and technical products but did not fully describe or address the situations in which prohibitions against such action would occur. In addition, NOAA did not expand upon the meaning of "timely" and apparently declined to make the "timely dissemination of science" one of their principles of scientific integrity. NOAA did not expand the handbook, nor did it specify the circumstances under which data and models would be available to the public. Lastly, NOAA declined to provide details regarding whistleblower protections.

22 August 2011

To: National Marine Fisheries Service

Issue: Application from Northeast Gateway Energy Bridge to take small numbers of marine mammals by harassment incidental to operation of a liquefied natural gas port facility in Massachusetts Bay

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, subject to inclusion of the proposed mitigation and monitoring measures, including a condition that requires suspension of the proposed activities if an injury or death of a marine mammal occurs that may have resulted from those activities, pending authorization from the Service to proceed.

Agency Response: The Service issued the incidental harassment authorization on 6 October 2011, consistent with the Commission's recommendation.

22 August 2011

To: U.S. Fish and Wildlife Service

Issue: Draft environmental assessment for issuing a proposed rule that establishes a manatee refuge in Kings Bay, Florida

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service adopt the proposed rule that would establish year-round slow-speed requirements in all areas of the refuge not otherwise designated as either idle speed zones or no-entry manatee sanctuaries; (1) adopt Alternative D in its draft environmental assessment, which would establish the proposed Kings Bay manatee refuge and (2) expand its list of prohibited activities to include petting, touching, rubbing, or attempting to pet, touch, or rub, any manatees and approaching them closer than 10 feet; and modify its draft environmental assessment by providing a more complete analysis of the no-touching and stand-off distance requirements.

Agency Response: The Service had not issued the final environmental assessment or final

rule by the end of 2011.

24 August 2011 **To:** U.S. Fish and Wildlife Service
Issue: Application for research permit from University of Florida, Iskande Larkin, Ph.D., to import samples from the West Indian manatee to determine baseline health parameters during a five-year period
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit but condition it to require that Dr. Larkin obtain authorization for reissuance of her permit under CITES before importing any manatee part in subsequent years.
Agency Response: The Service had not issued the permit by the end of 2011.

26 August 2011 **To:** National Marine Fisheries Service
Issue: Application for a research permit from David Honig to import bones from two sperm whales and one minke whale to study the ecological importance of whales to invertebrate communities during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, provided that it advises Mr. Honig to obtain all necessary permits under CITES and the Antarctic Conservation Act before collecting, exporting, and/or importing the bones.
Agency Response: The Service issued the permit on 5 October 2011, consistent with the Commission's recommendation.

29 August 2011 **To:** National Marine Fisheries Service
Issue: Application for a research permit from the Alaska Department of Fish and Game to conduct research on harbor seals in Alaska during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service condition the permit to require the Department to consult with the Service and the Commission regarding possible changes to the harbor seal capture protocols if two or more harbor porpoises are killed in one year or five harbor porpoises are killed incidental to those activities during the five-year period and advise the applicant of the need to obtain approval from its IACUC before initiating the proposed activities.
Agency Response: The Service issued the permit on 20 September 2011, consistent with one of the Commission's recommendations. The Service believed the level of harbor porpoise mortality is reasonable and noted that the Commission did not indicate that it believes the mortality was unreasonable. Thus, the Department does not have to consult with the Service unless it kills five harbor porpoises during the five-year period. At that time, the Service would consult with the Commission to assess whether harbor seal capture methods should be revised. The Service also noted that IACUC requirements are not a criterion for permit issuance under the Act; however, the information provided by the Department was sufficient for the Service to determine that the methods were considered humane under the Act.

29 August 2011 **To:** National Marine Fisheries Service
Issue: Application from the Scripps Institution of Oceanography to take small numbers of marine mammals by harassment incidental to a marine geophysical survey in the western tropical Pacific Ocean
Recommendation: The Commission recommended that the National Marine Fisheries Service require Scripps to re-estimate the proposed exclusion and buffer zones for the two-airgun array and associated numbers of marine mammal takes using operational and site-specific environmental parameters, and if the exclusion and buffer zones are not re-

estimated for the two-airgun array, require Scripps to provide a detailed justification for basing the exclusion and buffer zones for the proposed survey in the western tropical Pacific Ocean on modeling that relies on measurements from the Gulf of Mexico. The Commission also recommended that the Service require Scripps to use operational and site-specific environmental parameters to estimate the exclusion zone, buffer zone, and number of marine mammal takes associated with use of the sub-bottom profiler and to incorporate those exclusion and buffer zones into the same type of mitigation and monitoring measures for the sub-bottom profiler as are proposed for the two-airgun array. In addition, the Commission recommended that the Service condition the authorization to prohibit a 15-minute pause and require a longer pause before ramping up after a power-down or shut-down of the airguns, based on the presence of a mysticete or large odontocete in the exclusion zone and the *Thompson's* movement; extend the 30-minute period following a marine mammal sighting in the exclusion zone to cover the full dive times of all species likely to be encountered; condition the authorization to require Scripps to monitor, document, and report observations during all ramp-up procedures; and work with the National Science Foundation to analyze those data to help determine the effectiveness of ramp-up procedures as a mitigation measure for geophysical surveys after the data are compiled and quality control measures have been completed.

Agency Response: The Service issued the incidental harassment authorization on 5 November 2011, consistent with some of the Commission's recommendations. However, the Service was satisfied that the exclusion and buffer zone data were sufficient for it to conduct its analysis and make any determinations and therefore no further effort is needed by the applicant. The Service believed that it is unlikely that marine mammals would be affected by sub-bottom profiler signals whether operating alone or in conjunction with other acoustic devices, since the animals would need to swim adjacent to the vessel or directly under the vessel. Therefore, operation of the sub-bottom profiler did not warrant take requests, or consultation, under the Act. The Service did not prohibit a 15-minute pause, but rather explained that if ramp-up would occur, it would take longer than 15 minutes for the observers to be able to monitor for marine mammals. In addition, the Service did not extend the monitoring period to 1 hour because observations are made longer than 30 minutes during ramp-up procedures, observers are monitoring in many cases when the airguns are not firing, the majority of the species do not remain underwater for more than 30 minutes, and there is a one in three chance that an animal would surface before the 30-minute period and then not again during the 30-minute period. Lastly, the Service indicated that the Foundation is compiling all data associated with ramp-up, to be analyzed at a later date

30 August 2011

To: National Marine Fisheries Service

Issue: Application to amend a research permit from Daniel Costa, Ph.D., for a one-year extension that authorizes tagging studies and research on leopard, southern elephant, crabeater, Weddell, and Ross seals and California sea lions

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided that it require Dr. Costa to obtain all necessary permits under CITES before importing or exporting any marine mammal part and the conditions contained in the permit as currently amended remain in effect.

Agency Response: The Service issued the permit amendment on 4 November 2011, consistent with the Commission's recommendations.

31 August 2011

To: U.S. Fish and Wildlife Service

Issue: Application for a research permit from Sea to Shore Alliance to conduct research on West Indian and West African manatees during a five-year period

Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that the Service conditions the permit to require the Alliance to submit documentation demonstrating that all samples to be imported were taken in accordance with the laws of the country of origin and were not taken in violation of the Marine Mammal Protection Act or other applicable U.S. laws; requires the Alliance to obtain all necessary permits under CITES before exporting or importing any manatee part; and takes steps to ensure that activities to be conducted under this permit and those of other permit holders who might be conducting manatee research in the same areas are coordinated and data and samples shared to avoid duplicative research and unnecessary harassment of animals. The Commission also recommended that the Service condition the permit to (1) allow two unintentional serious injuries or deaths during the five-year period, but (2) require suspension of research activities, pending review by the Service, if any death or serious injury occurs and advise the applicant of the need to have the proposed activities reviewed and approved by IACUC before initiating the proposed activities.
Agency Response: The Service issued the permit on 22 December 2011, consistent with most of the Commission's recommendations. However, the Service did not authorize any unintentional injuries or deaths.

2 September 2011
To: U.S. Fish and Wildlife Service
Issue: Application for a photography permit from Red Rock Films to harass polar bears during filming activities in the North Slope region and Arctic National Wildlife Refuge, Alaska
Recommendation: The Commission recommended that the U.S. Fish and Wildlife Service issue the permit, provided that the applicant monitors all activities associated with filming and report all cases in which the activities lead to sufficient disturbance that a bear alters its behavior or otherwise exhibits a strong response to filming activities, the boats, or the camera crew; stops filming any bears that appear to be unduly disturbed by the activity; and obtains any necessary authorization to conduct filming activities from the Arctic National Wildlife Refuge and the U.S. Air Force.
Agency Response: The Service issued the permit on 14 September 2011, consistent with the Commission's recommendation.

6 September 2011
To: National Marine Fisheries Service
Issue: Application to amend a research permit from Michael Adkesson, D.V.M., to import an increased number of biological samples from live and dead South American fur seals in Punta San Juan de Marcona, Peru
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit amendment and advise the applicant of the need to obtain all necessary permits under CITES before importing any South American fur seal part.
Agency Response: The Service issued the permit amendment on 26 September 2011, consistent with the Commission's recommendation.

12 September 2011
To: National Marine Fisheries Service
Issue: Notice of intent to prepare an environmental impact statement for the Atlantic Large Whale Take Reduction Plan to help reduce entanglement of large whales in vertical lines associated with fishing along the Atlantic coast
Recommendation: The Commission recommended that the National Marine Fisheries Service consult with whale biologists on the Atlantic Large Whale Take Reduction Team to estimate occurrence rates greater than zero for right, humpback, and fin whales within 20 miles of the Maine coast, use those rates in the co-occurrence model to estimate the extent to which vertical lines in those waters contribute to overall entanglement risks for

	each species, and prioritize the protection of right whales rather than humpback whales when developing proposed mitigation measures. The Commission also recommended that the Service analyze in the draft environmental impact statement alternatives for establishing large management areas off the New England coast including (1) the majority of the southern Gulf of Maine from January through July; (2) the majority of the offshore central Gulf of Maine from October through February; and (3) the small area off northeastern Maine near the edge of U.S. jurisdiction and the Bay of Fundy right whale feeding area from August through September. In addition, the Commission recommended that the Service analyze restrictions that could be imposed in seasonal management areas; amendments to the Plan that would allow for the immediate implementation of additional take reduction measures if documented serious injury and mortality levels for right whales or humpback whales exceed their potential biological removal levels for two consecutive years; and requirements that (1) all trap and gillnet fishermen in state and federal waters record and report in a consistent manner data on the location and number of endlines deployed and the number of traps or nets fished per set and per month and (2) those data are compiled and analyzed in timely fashion. Lastly, the Commission recommended that the Service include options for new gear marking requirements to better identify the fisheries, fishing areas, and gear components involved in large whale entanglements. **Agency Response:** The Service had not published a draft environmental impact statement by the end of 2011 but anticipated its issuance in 2012.
12 September 2011	**To:** National Marine Fisheries Service **Issue:** Application for a research permit from Brent Stewart, Ph.D. to conduct research on harbor seals, northern elephant seals, and California sea lions throughout southern California during a five-year period **Recommendations:** The Commission recommended that the National Marine Fisheries Service issue the permit but condition it to ensure that activities to be conducted under the permit and those of other permit holders who might be conducting research on the same species in the same areas are coordinated and, as possible, data and samples shared to avoid duplicative research and unnecessary disturbance of animals. **Agency Response:** The Service issued the permit on 24 October 2011, consistent with the Commission's recommendation.
12 September 2011	**To:** National Marine Fisheries Service **Issue:** Application for a research permit from Geo-Marine, Inc., to conduct systematic, vessel-based line transect surveys for marine mammals in coast waters from North Carolina to New Jersey during a five-year period **Recommendations:** The Commission recommended that the National Marine Fisheries Service issue the permit, but condition it to require the applicant to minimize disturbance of the subject animals by exercising caution when approaching animals, particularly female/calf pairs, and stopping an approach if there is evidence that the activity may be interfering with female/calf behavior, feeding, or other vital functions. **Agency Response:** The Service had not issued the permit by the end of 2011.
12 September 2011	**To:** National Marine Fisheries Service **Issue:** Application for a research permit from Robert DiGiovanni to conduct aerial, vessel-based, and land-based surveys for marine mammals in coastal and offshore waters from Virginia to Rhode Island during a five-year period **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the permit but condition it to require the applicant to minimize disturbance of the subject animals by exercising caution when approaching animals, particularly

	female/calf pairs, and stopping an approach if there is evidence that the activity may be interfering with female/calf behavior, feeding, or other vital functions. **Agency Response:** The Service had not issued the permit by the end of 2011.
19 September 2011	**To:** National Marine Fisheries Service **Issue:** Application from the Port of Vancouver to take small numbers of marine mammals by harassment incidental to pile driving and removal during construction of a bulk potash handling facility on the Columbia River in Vancouver, Washington **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, provided it requires the Port to measure in-situ sound propagation for driving and removing the various sizes and types of piles using the vibratory hammer, impact hammer, and both hammers concurrently at the beginning of the project and uses that information to establish appropriate exclusion and buffer zones. The Commission also recommended that the Service require the presence of Service-approved observers before, during, and after all soft-starts of pile-driving activities, including when the vibratory hammer is used, to gather the data needed to determine the effectiveness of this technique as a mitigation measure and require the Port to monitor the presence and behavior of marine mammals during all impact pile-driving and vibratory pile-driving and pile-removal activities. In addition, the Commission recommended that the Service condition the incidental harassment authorization to require the Port to (1) immediately report all injured or dead marine mammals to the Service and local stranding network and (2) suspend the construction activities if a marine mammal is seriously injured or killed and the injury or death could have been caused by those activities (e.g., a fresh carcass). **Agency Response:** The Service had not issued the incidental harassment authorization by the end of 2011.
30 September 2011	**To:** National Marine Fisheries Service **Issue:** Application from the Navy to take marine mammals incidental to training, testing, and routine military operations using the Navy's Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) sonar source during a five-year period **Recommendation:** The Commission agreed that the National Marine Fisheries Service should propose regulations to govern the taking of marine mammals incidental to operation of SURTASS LFA sonar for another five-year period and recommended that the Service take appropriate steps to compel the Navy to amend its application and related DSEIS/SOEIS to (1) request authority to take marine mammals by Level A harassment and (2) specify the numbers of marine mammals that could be taken by Level A and B harassment incidental to operating SURTASS LFA sonar, rather than providing only the probabilities of such takes. **Agency Response:** The Service had not issued the proposed rule by the end of 2011.
3 October 2011	**To:** Bureau of Ocean Energy Management **Issue:** Notice of intent to prepare an environmental assessment for commercial wind lease issuance and site characterization for activities in the waters off Rhode Island and Massachusetts **Recommendation:** The Commission recommended that the Bureau of Ocean Energy Management prepare an environmental impact statement, rather than an environmental assessment, to evaluate the potential biological and socioeconomic effects of issuing renewable energy leases in this area and include an alternative that would prohibit surveys, construction, and decommissioning of meteorological towers and buoys in the leasing area during migration of North Atlantic right whales (November through April) to minimize the

likelihood of noise-related injuries and vessel collisions with right whales and other marine mammals. The Commission also recommended that the Bureau consult with the National Marine Fisheries Service, the Fish and Wildlife Service, the Marine Mammal Commission, and other federal and state agencies to develop a set of standards for the collection of baseline information on marine mammals and their habitats; use this consultation to identify and address any significant data gaps before initiating the leasing process for offshore renewable energy operations; and provide a comprehensive analysis of the cumulative impacts of wind energy development and other human activities that impact the development area.

Agency Response: The Bureau posted comments received on regulations.gov website. It anticipated initiating a process for identifying potential lease sites in advance of a lease sale notice in 2012.

11 October 2011

To: National Marine Fisheries Service

Issue: Application from the Washington State Department of Natural Resources to take small numbers of harbor seals by harassment incidental to a habitat restoration project in the Woodard Bay Natural Resource Conservation Area in Puget Sound

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, provided that it requires the Department to monitor the presence and behavior of marine mammals during all proposed activities (i.e., during vibratory pile-removal activities and during vessel and barge use) and requires the presence of Service-approved observers before, during, and after all soft-starts of pile-removal activities to gather the data needed to determine the effectiveness of this technique as a mitigation measure. The Commission further recommended that the Service condition the incidental harassment authorization to require the Department to (1) immediately report all injured or dead marine mammals to the Service and local stranding network and (2) suspend the construction activities if a marine mammal is seriously injured or killed and the injury or death could have been caused by those activities (e.g., a fresh carcass).

Agency Response: The Service issued the incidental harassment authorization on 1 November 2011, consistent with one of the Commission's recommendations. However, the Service agrees that marine mammal responses to stimuli are not predictable but believes that monitoring 15 of the 40 days would not be haphazard but based on days when heightened activities would occur with the remaining 25 days being representative of typical levels of activity. Therefore, the Service believes monitoring during all activities is not warranted. Further, while dedicated observers would not be present during the non-monitored days, construction personnel and Department staff are on-site and did not observe significantly deviant behavior on non-monitored days during the previous year's authorization. The Service considers soft-starts to be a mitigation measure but did not attempt to quantify the level of mitigation that the technique may provide nor did it rely on any assumption of efficacy in reaching its negligible impact determination. It is unclear how expanded monitoring, in the absence of specific experimental design for which the Commission did not provide, would verify empirically the efficacy of this technique.

17 October 2011

To: U.S. Navy

Issue: DEIS regarding proposed training, testing, and routine military operations using the Navy's Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) sonar source during a five-year period

Recommendation: The Commission recommended that the Navy amend its DEIS and related application for letters of authorization to (1) request authority to take marine mammals by Level A harassment and (2) specify the numbers of marine mammals that

could be taken by Level A and B harassment incidental to operating SURTASS LFA sonar, rather than providing only the probabilities of such takes. The Commission also recommended that the Navy work with the National Marine Fisheries Service to (1) describe fully the process used to select offshore biologically important areas (OBIAs) and provide an explanation for all deviations from it; (2) ensure that the outside expert group used to identify possible OBIAs is consulted on all the areas proposed for designation; (3) evaluate the potential for geographic bias in the OBIA selection process and develop a plan for addressing the sources of that bias; (4) provide a well-reasoned explanation for any area rejected for designation as an OBIA; and (5) provide support for the Service's claim that marine mammals other than mysticetes are not sensitive to LFA sonar and, therefore, need not be protected within OBIAs. In addition, the Commission recommended that the Navy work with the National Marine Fisheries Service to devise a plan for gathering the information needed to conduct a reliable review of candidate OBIAs rejected because of insufficient information; review the strengths and weaknesses of the current geographic mitigation measures involving the stand-off range and OBIAs; and develop a plan for collecting the information needed to refine or revise these mitigation measures to ensure that they are providing the necessary level of protection for marine mammals. Lastly, the Commission recommended that the Navy use a 60-minute clearance time before resuming SURTASS LFA sonar transmissions after a delay or suspension related to the sighting of a marine mammal in the mitigation zone.

Agency Response: The Navy had not issued the final supplemental environmental impact statement/supplemental overseas impact statement by the end of 2011.

17 October 2011

To: National Marine Fisheries Service

Issue: Proposed rule to implement the False Killer Whale Take Reduction Plan

Recommendation: The Commission recommended that the National Marine Fisheries Service adopt the proposed rule to implement the False Killer Whale Take Reduction Plan, provided it (1) considers defining weak hooks based not only on the diameter of the wire used to make them, but also on the force required to straighten them (e.g., an average 205 pounds); (2) adopt the proposed formula based on the potential biological removal level (PBR) for defining the trigger to close the southern exclusion zone and include in the regulations a corresponding PBR-based formula to determine when the zone should be reopened; (3) either (a) include all take reduction measures under authority of the Marine Mammal Protection Act in 50 C.F.R. part 229 or (b) require in the final rule that any changes to take reduction measures under 50 C.F.R. part 665 follow the same follow the same procedures as those required to change take reduction measures in 50 C.F.R. part 229, including advance review and consultation with the False Killer Whale Take Reduction Team; (4) (a) arrange for marine mammal observer coverage of the shortline fishery and (b) expand the Team to include a representative of that fishery; and (5) adopt and implement all of the proposed non-regulatory measures referenced in the preamble to the proposed rule.

Agency Response: The Service had not issued the final rule by the end of 2011 but anticipated issuance in 2012.

17 October 2011

To: National Marine Fisheries Service

Issue: Application by Cape Wind Associates to take small numbers of marine mammals by harassment incidental to geophysical and geotechnical surveys in Nantucket Sound off Massachusetts

Recommendation: The Commission recommended that the National Marine Fisheries Service require Cape Wind Associates to provide further justification for the use of 17 log R to calculate harassment zones for both shallow- and medium-penetration sub-bottom

profilers; recalculate the buffer zone for the shallow-penetration sub-bottom profiler based on the 120-dB re 1 µPa threshold and, if two or more survey vessels are used simultaneously, account for overlap of the ensonified areas in the calculation of the revised buffer zones; and specify the zone of exposure used to estimate the number of takes for each species and ensure that the zone is used consistently for all species. The Commission also recommended that the Service require Cape Wind Associates to re-estimate the number of the takes for each species using the revised harassment zone for the shallow-penetration sub-bottom profiler, accounting for the possibility that buffer zones from two or more vessels would overlap, and re-calculating density estimates based on haul-out counts. In addition, the Commission recommended that the Service require Cape Wind Associates to re-estimate the number of takes for each species from medium penetration sub-bottom profilers accounting for the sound that would be generated from multiple survey vessels and re-calculating density estimates based on haul-out counts. The Commission recommended that the Service require (1) Cape Wind Associates to monitor the presence and behavior of marine mammals during all proposed geophysical and geotechnical survey activities (i.e., operation of sub-bottom profilers, drilling, and vibracore sampling); (2) observers to gather the data needed to assess the effectiveness of soft-starts as a mitigation measure; and (3) Cape Wind Associates to cease all operations when the exclusion zone is obscured by fog or poor lighting conditions. Lastly, the Commission recommended that the Service provide additional justification for its preliminary determination that the proposed monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified exclusion and buffer zones and condition the incidental harassment authorization to require Cape Wind Associates to (1) report immediately all injured or dead marine mammals to the Service and local stranding network and (2) suspend the construction activities if a marine mammal is seriously injured or killed and the injury or death could have been caused by those activities (e.g., a fresh carcass).

Agency Response: The Service had not issued an incidental harassment authorization by the end of 2011 but anticipated issuance in early 2012.

19 October 2011

To: National Marine Fisheries Service

Issue: Application from the Lamont-Doherty Earth Observatory to take small numbers of marine mammals by harassment incidental to a marine geophysical survey in the central Pacific Ocean

Recommendation: The Commission recommended that the National Marine Fisheries Service require the Observatory to re-estimate the proposed exclusion and buffer zones and associated takes of marine mammals using site-specific information—if the exclusion and buffer zones and numbers of takes are not re-estimated, require the Observatory to provide a detailed justification (1) for basing the exclusion and buffer zones for the proposed survey in the central Pacific Ocean on empirical data collected in the Gulf of Mexico or on modeling that relies on measurements from the Gulf of Mexico and (2) that explains why simple ratios were used to adjust for tow depth. The Commission also recommended that the Service use species-specific maximum densities rather than the effort-weighted mean densities and re-estimate the anticipated number of takes. In addition, the Commission recommended that the Service condition the authorization to prohibit an 8-minute pause and require a longer pause before ramping up after a power-down or shut-down of the airguns, based on the presence of a marine mammal in the exclusion zone and the R/V *Langseth's* movement (speed and direction); extend the 30-minute period following a marine mammal sighting in the exclusion zone to cover the full dive times of all species likely to be encountered; and prior to issuing the incidental harassment authorization, provide additional justification for its preliminary determination that the proposed

monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified exclusion and buffer zones, including (1) identifying those species that it believes can be detected with a high degree of confidence using visual monitoring only, (2) describing detection probability as a function of distance from the vessel, (3) describing changes in detection probability under various sea state and weather conditions and light levels, and (4) explaining how close to the vessel marine mammals must be for observers to achieve high nighttime detection rates. The Commission recommended that the Service consult with the funding agency and individual applicants to develop, validate, and implement a monitoring program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal taking and the number of marine mammals taken; require the applicant to (1) report the number of marine mammals that were detected acoustically and for which a power-down or shut-down of the airguns was initiated, (2) specify if such animals also were detected visually, (3) compare the results from the two monitoring methods to help identify their respective strengths and weaknesses, and (4) use that information to improve mitigation and monitoring methods; condition the authorization to require the Observatory to monitor, document, and report observations during all ramp-up procedures; and work with the National Science Foundation to analyze those data to help determine the effectiveness of ramp-up procedures as a mitigation measure for geophysical surveys after the data are compiled and quality control measures have been completed.

Agency Response: The Service issued an incidental harassment authorization on 28 November 2011, consistent with some of the Commission's recommendations. However, the Service did not require modeling of site-specific information because it believes that the exclusion zone and density data are sufficient for the Service to conduct its analysis and make determinations and that the numbers of takes were estimated based on best available scientific information and estimation methodology. In addition, the Service did not require remodeling because of its analysis of the likely effects of the activity on the marine mammals and their habitat, the implementation of the mitigation and monitoring measures, and the appropriateness and sufficiency of the exclusion zones. The Service used effort-weighted mean densities because it is confident in the assumptions and calculations used to estimate densities for this survey area, even though it indicated in the proposed authorization that there was some uncertainty in those estimates. The Service also indicated that the monitoring program would be sufficient to detect marine mammals and account for the number of takes because the mitigation and monitoring measures are the most effective feasible measures available. The Service did not extend the monitoring period to 1 hour because observations are made longer than 30 minutes during ramp-up procedures, observers are monitoring in many cases when the airguns are not firing, the majority of the species do not remain underwater for more than 30 minutes, and there is a one in three chance that an animal would surface before the 30-minute period and then not again during the 30-minute period. Lastly, data from geophysical surveys are being compiled but are scant and will not be analyzed for some time.

21 October 2011

To: National Marine Fisheries Service

Issue: Application from Apache Alaska Corporation to take marine mammals by harassment incidental to a 3D seismic survey in Cook Inlet, Alaska

Recommendation: The Commission recommended that the National Marine Fisheries Service defer issuance of the proposed incidental harassment authorization until such time as the Service can support a conclusion that the proposed activities would have no more than a negligible impact on the Cook Inlet beluga whale population. However, if the Service decides to issue the incidental harassment authorization, the Commission further recommended that the Service require Apache Alaska Corporation to re-estimate the

ensonified areas for each sound threshold (i.e., 190, 180, and 160 dB re 1 µPa) and the expected number of marine mammal takes, accounting for the simultaneous, alternating use of two sound sources and the overlap of their acoustic footprints; describe and provide the rationale for the method used to determine the non-river density estimate for beluga whales and recalculate the density estimates accordingly; and recalculate the estimated number of takes for all species based on the modeled areas of ensonification for each sound threshold (i.e., 190, 180, and 160 dB re 1 µPa), using the full number of survey days rather than half that number. The Commission also recommended that the Service require that Apache Alaska Corporation either amend its application to seek authorization to take the full number of marine mammals that may be taken or provide sufficient justification for requesting lesser numbers of takes, particularly for beluga whales and harbor seals and ensure that the monitoring measures included in the authorization are sufficient to account for all takes of marine mammals and require Apache Alaska Corporation to provide timely reports of the number of marine mammals taken so that surveys can be stopped before the authorized takes are exceeded.

Agency Response: The Service had not issued an incidental harassment authorization by the end of 2011.

24 October 2011

To: National Marine Fisheries Service

Issue: Draft programmatic environmental impact statement on Hawaiian monk seal recovery actions

Recommendation: The Commission recommended that the Service adopt Alternative 4 of the programmatic environmental impact statement and move forward with its planned translocation program as quickly as possible. The Commission also recommended that the Service consult regularly with outside experts regarding the development and progress of the program; consider including in the final programmatic environmental impact statement a discussion of the issues surrounding ecosystem-based management measures to improve conditions for juvenile seals and enhance their survival; and (1) give high priority to further testing of a morbillivirus vaccine on captive monk seals to identify possible effects of the vaccine and (2) modify the first criterion for triggering morbillivirus vaccination efforts on wild seals to include the detection of canine distemper in any species outside of quarantine in the Main Hawaiian Islands.

Agency Response: The Service had not issued a final programmatic environmental impact statement by the end of 2011 but did anticipate issuance by the end of 2012.

31 October 2011

To: National Marine Fisheries Service

Issue: Application for a research permit from Thomas Jefferson, Ph.D., to conduct research on nine cetacean species in waters off California during a five-year period.

Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit but advise Dr. Jefferson to have the proposed activities reviewed and approved by a IACUC prior to initiating those activities and obtain additional permits from the relevant National Marine Sanctuary or the National Park Service prior to conducting the proposed activities in a sanctuary or park.

Agency Response: The Service issued the permit on 22 December 2011, consistent with none of the Commission's recommendations. It did state that IACUC approval, marine sanctuary, and national park authorizations and/or permits are not criteria for issuance of a scientific research permit under the Marine Mammal Protection Act. However, Dr. Jefferson is aware of the need to obtain permits form the National Marine Sanctuary.

21

To: National Marine Fisheries Service

Issue: Application from the U.S. Army Corps of Engineers, on behalf of the Port of San

November 2011	Francisco, to take small numbers of marine mammals by harassment incidental to construction of the city's Brannan Street Wharf at Pier 36 **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, provided that it requires the Port to monitor the presence and behavior of marine mammals during all vibratory and impact pile-driving activities; monitor before, during, and after all soft-starts of vibratory and impact pile-driving activities to gather the data needed to determine the effectiveness of this technique as a mitigation measure; and implement soft-start procedures after 15 minutes for pinnipeds and 30 minutes for cetaceans, if pile driving was delayed or shut down due to the presence of a marine mammal within or approaching the Level A harassment zone. **Agency Response:** The Service had not issued an incidental harassment authorization by the end of 2011.
21 November 2011	**To:** National Marine Fisheries Service **Issue:** Application for a research permit from John Wise, Ph.D., to receive, import, and export samples from cetaceans and pinnipeds during a five-year period **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the permit, provided that it requires Dr. Wise to maintain detailed records indicating the source of each specimen, the circumstances under which it was collected, and the researchers and associated institutions that received cell lines. It also advised Dr. Wise of the need to obtain all necessary permits under CITES before importing or exporting any marine mammal part. **Agency Response:** The Service had not issued a permit by the end of 2011.
21 November 2011	**To:** National Marine Fisheries Service **Issue:** Application to amend a research permit from Paul Ponganis, Ph.D., to conduct research on California sea lions on San Nicolas Island, California **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided that the conditions contained in the original permit remain in effect and it advises Dr. Ponganis of the need to have his IACUC review and approve the research activities before initiation of those activities. **Agency Response:** The Service had not issued the permit by the end of 2011.
21 November 2011	**To:** National Marine Fisheries Service **Issue:** Application for a research permit from The Whale Museum to monitor vessel activities around marine mammals, primarily southern resident killers, in Washington, during a five-year period **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the permit, provided that it conditions the permit to require The Whale Museum to minimize disturbance of the subject animals by exercising caution when approaching animals, particularly female/calf pairs, and stopping an approach if there is evidence that the activity may be interfering with female/calf behavior, feeding, or other vital functions and advises The Whale Museum of the need to obtain additional permits from the U.S. Fish and Wildlife Service prior to conducting the proposed activities in a wildlife refuge. **Agency Response:** The Service had not issued the permit by the end of 2011.
22 November 2011	**To:** National Marine Fisheries Service **Issue:** Review of the draft 2011 stock assessment reports for marine mammals occurring in U.S. waters

Recommendation: To improve stock assessment efforts generally, the Commission recommended that the National Marine Fisheries Service (1)
develop a nation-wide, five-year schedule for carrying out stock assessments that reflects projections and priorities for available ship and aircraft time and identifies the funding necessary to complete marine mammal population surveys; (2) review its observer programs nationwide, set standards for observer coverage, identify gaps in existing coverage, and determine the resources needed to (a) observe all fisheries that do or may directly interact with marine mammals and (b) provide reasonably accurate and precise estimates of serious injury and mortality levels; (3) partner with state fishery management agencies, the fishing industry, and other stakeholders to develop a funding strategy in 2012 that will improve substantially the extent and level of observer coverage and data collection concerning incidental serious injury and mortality of marine mammals within five years; (4) develop alternative strategies for collecting information on mortality and serious injury levels in fisheries for which entanglements are difficult to detect or quantify using traditional observer programs; (5) collaborate with other nations and international fishery management organizations to develop and implement cooperative or complementary strategies for assessing the status of transboundary marine mammal stocks, and the rate of serious injury and mortality of such stocks in fisheries; and (6) consider the various approaches that are available for integrating all human-related risk factors into stock assessments and adopt an integration method that will produce, at a minimum, reasonable estimates of the lower and upper bounds of serious injury and mortality rates for every stock.

To improve stock assessment efforts in the Atlantic and Gulf of Mexico, the Commission recommended that the National Marine Fisheries Service (1) conduct the required surveys of North Atlantic pinniped stocks, incorporate the results into stock assessment reports, and use that information to manage those stocks and the risk factors affecting them; (2) improve stock assessments for bottlenose dolphins in both the Atlantic and Gulf of Mexico by conducting the research needed to resolve questions concerning stock structure, provide more accurate and precise estimates of the abundance and trends of the various stocks, and provide more accurate and precise estimates of the level of serious injury and mortality in fisheries and from other human activities; and (3) develop a stock assessment plan for the Gulf of Mexico that describes (a) a feasible strategy for assessing the Gulf's marine mammal stocks and (a) the infrastructure, expertise, and funding needed to implement it.

To improve stock assessment efforts in the Alaska region, the Commission recommended that the National Marine Fisheries Service (1) consider the impending changes in the Arctic and develop a long-term assessment strategy that will provide a reliable basis for characterizing population abundance, stock status, and trends and for implementing protective measures that will minimize the effects of Arctic climate disruption on the viability of marine mammal stocks; (2) substantially increase its efforts to (a) collaborate with the Alaska Native community to monitor the abundance and distribution of ice seals and (b) use seals taken in the subsistence harvest to obtain data on demography, ecology, life history, behavior, health status, and other pertinent topics; (3) do everything it can to ensure that all vessels operating in the area are aware of the need to protect the North Pacific right whale, and that every practicable step be taken to minimize the probability of entanglements and ship strikes; and (4) continue its efforts to better describe the distribution and movement patterns of North Pacific right whales, especially with respect to their distribution during those periods when they are outside designated critical habitat.

To improve stock assessment efforts in the Pacific, the Marine Mammal Commission recommended that the National Marine Fisheries Service (1) conduct the necessary surveys to update stock assessment reports for harbor seals along the Oregon and Washington coasts and in Washington inland waters and (2) maintain and enhance existing collaborations to obtain the data necessary to generate stock assessments for all Pacific Island cetaceans within U.S. jurisdiction, and to seek new opportunities, such as collaborating with the Navy, to leverage resources for accomplishing this challenging task.
Agency Response: The Service had not issued the final stock assessment reports by the end of 2011.

7 December 2011

To: National Science Foundation
Issue: Application for authorization from Daniel Costa, Ph.D., to collect samples from dead pinnipeds at Cape Evans, Backdoor Bay, and Hut Point, Antarctica
Recommendation: The Commission recommended that the National Science Foundation issue the authorization as requested.
Agency Response: The Foundation had not issued the authorization by the end of 2011.

7 December 2011

To: National Marine Fisheries Service
Issue: Applications for modifications to letters of authorization issued to the Navy to govern the taking of marine mammals incidental to military training operations at Virginia Capes, Cherry Point, and Jacksonville Range Complexes
Recommendation: The Commission recommended that the National Marine Fisheries Service and the Navy (1) investigate the underlying cause of the high rate of non-compliance with the respective letters of authorization and determine why it was not detected earlier and (2) jointly review the full scope of the applicable regulations and letters of authorization to ensure that the responsible Navy officials are aware of, understand, and are in compliance with all mitigation, monitoring, and reporting requirements. The Commission further recommended that the Service require the Navy to conduct empirical sound propagation measurements to verify the adequacy of the sizes of the exclusion zones for 5-, 10-, and 20-lb charges and to expand those zones and the buffer zones derived from those zones as necessary; require the Navy to re-estimate the sizes of the buffer zones using the mean average swim speeds plus at least one standard deviation for marine mammals that inhabit the shallow-water areas where time-delay firing devices would be used, prior to amending the letters of authorization; and consider whether modifications to the letters of authorization alone are sufficient to satisfy the requirements of the Marine Mammal Protection Act and provide a thorough explanation of its rationale in the *Federal Register* notice taking final action on the proposed modifications, if it believes that regulatory modifications are not needed.
Agency Response: The Service had not issued the letters of authorization by the end of 2011.

9 December 2011

To: National Marine Fisheries Service
Issue: Application from Shell Offshore, Inc., to take small numbers of marine mammals by harassment incidental to offshore exploratory drilling in Camden Bay, Beaufort Sea, Alaska, during the 2012 Arctic open-water season
Recommendations: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, contingent upon the successful negotiation of a conflict avoidance agreement between Shell and the Alaska Eskimo Whaling Commission and the bowhead whale hunters it represents and facilitate development of more comprehensive conflict avoidance agreements that involve other

	species and potentially affected communities and co-management organizations and take into account all potential adverse effects on all marine mammal species taken for subsistence purposes. The Commission also recommended that the Service require Shell to (1) evaluate the source levels of the available drilling rigs at the proposed drilling locations, (2) recalculate the 120-dB re 1µPa harassment zones and estimated takes as appropriate, and (3) use the rig best suited for the proposed drilling locations based, in part, on consideration of the size of the harassment zones and the requirements of the Marine Mammal Protection Act to reduce impacts of the proposed activity to the least practicable level. In addition, the Commission recommended that the Service require Shell to develop and employ a more effective means to monitor the entire corrected 120-dB re 1µPa harassment zone associated with the drilling rig and support vessels for the presence and movements of bowhead whales and other marine mammals and for estimating the actual number of takes that occur; to track and enforce Shell's implementation of mitigation and monitoring measures to ensure that they are executed as expected; to cease drilling operations in mid- to late-September to reduce the possibility of having to respond to a large oil spill in ice conditions; and to develop and implement a detailed, comprehensive and coordinated Wildlife Protection Plan that includes strategies and sufficient resources for minimizing contamination of sensitive marine mammal habitats and that provides a realistic description of the actions that Shell can take, if any, to respond to oiled or otherwise affected marine mammals. **Agency Response:** The Service had not issued the incidental harassment authorization by the end of 2011.
9 December 2011	**To:** National Marine Fisheries Service **Issue:** Application from Shell Offshore, Inc., to take small numbers of marine mammals by harassment incidental to offshore exploratory drilling in the Chukchi Sea, Alaska, during the 2012 Arctic open-water season **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization but also facilitate development of conflict avoidance agreements that involve all potentially affected communities and co-management organizations and take into account potential adverse impacts on all marine mammal species taken for subsistence purposes including, but not limited to, bowhead whales. The Commission also recommended that the Service require Shell to collect all new and used drilling muds and cuttings and either reinject them or transport them to an Environmental Protection Agency licensed treatment/disposal site outside the Arctic. In addition, the Commission recommended that the Service require Shell to evaluate the source levels of the *Discoverer* at the proposed drilling location and recalculate the 120-dB re 1µPa harassment zone and estimated takes as appropriate; to develop and employ a more effective means for monitoring the entire corrected 120-dB re 1µPa harassment zone for the presence and movements of all marine mammals and for estimating the actual number of takes; to track and enforce Shell's implementation of mitigation and monitoring measures to ensure that they are executed as expected; to cease drilling operations in mid- to late-September to reduce the possibility of having to respond to a large oil spill in ice conditions; and to develop and implement a detailed, comprehensive, and coordinated Wildlife Protection Plan that includes strategies and sufficient resources for minimizing contamination of sensitive marine mammal habitats and that provides a realistic description of the actions that Shell can take, if any, to respond to oiled or otherwise affected marine mammals. **Agency Response:** The Service had not issued the incidental harassment authorization by the end of 2011.

12 December 2011	**To:** National Marine Fisheries Service **Issue:** Application for a research permit from Daniela Maldini, Ph.D., to study humpback whales in Hawaii during a five-year period **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the permit, provided that it require Dr. Maldini to minimize disturbance to the animals by exercising caution when approaching them, especially female/calf pairs, and stopping an approach if there is evidence that the activity may be interfering with female/calf behavior, feeding, or other vital functions. **Agency Response:** The Service had not issue the permit by the end of 2011.
12 December 2011	**To:** National Marine Fisheries Service **Issue:** Applications to amend the final rules governing the taking of marine mammals incidental to training and testing conducted in 12 Navy range complexes and at one Air Force Base **Recommendation:** The Commission recommended that the National Marine Fisheries Service amend the final rules as requested. **Agency Response:** The Service had not amended the final rules by the end of 2011.
13 December 2011	**To:** National Marine Fisheries Service **Issue:** Application from the U.S. Navy to take small numbers of marine mammals by harassment incidental to a seismic oceanographic survey in the southwestern Indian Ocean **Recommendation:** The Commission recommended that the National Marine Fisheries Service (1) require the Navy to re-estimate the proposed exclusion and buffer zones for the two-airgun array and associated number of marine mammal takes using operational and site-specific environmental parameters---if the exclusion and buffer zones are not re-estimated for the two-airgun array, require the Navy to provide a detailed justification for basing the exclusion and buffer zones for the proposed survey in the southwestern Indian Ocean on modeling that relies on measurements from the Gulf of Mexico; (2) require the Navy to use species-specific mean maximum densities rather than the mean average densities and then re-estimate the anticipated number of takes; and (3) extend the pause in airgun activity following a marine mammal sighting in the exclusion zone to cover the full dive times of all species likely to be encountered. **Agency Response:** The Service had not issued the incidental harassment authorization by the end of 2011.
13 December 2011	**To:** National Marine Fisheries Service **Issue:** Application from the U.S. Marine Corps to take Atlantic bottlenose dolphins by harassment incidental to training exercises at the Cherry Point Range Complex, North Carolina **Recommendation:** The Commission recommended that the National Marine Fisheries Service require the Marine Corps to describe in detail the environmental and operational parameters and methods used to determine the zones of exposure and to estimate the associated number of takes and ensure that the Marine Corps has determined the zones of exposure and associated number of takes for all types of ordnance (including practice bombs and 25-mm live rounds) prior to issuing the incidental harassment authorization. The Commission also recommended that the Service require the Marine Corps to specify in detail its mitigation, monitoring, and reporting measures before the Service considers the application to be complete; withhold the authorization until the Marine Corps develops and is prepared to implement a plan to evaluate the effectiveness of its mitigation and monitoring measures before initiating or, at the very latest, in conjunction with the exercises covered by the proposed incidental harassment authorization; and require the

	Marine Corps to use either direct strike or dynamic Monte Carlo models to determine probability of ordnance strike for future authorizations. **Agency Response:** The Service had not issued the incidental harassment authorization by the end of 2011.
14 December 2011	**To:** National Marine Fisheries Service **Issue:** Application for modifications to a letter of authorization issued to the Navy to govern the taking of marine mammals incidental to military training operations in the Hawaii Range Complex **Recommendations:** The Commission recommended that the National Marine Fisheries Service ensure the regulations that govern the taking of marine mammals in the Hawaii Range Complex are amended to allow for multi-year letters of authorization prior to renewing the letter of authorization in question for a two-year period; work with the Navy to investigate the underlying cause of the high rate of non-compliance with the respective letters of authorization and determine why it was not detected earlier; and work with the Navy to review the full scope of the applicable regulations and letters of authorization to ensure that the responsible Navy officials are aware of, understand, and are in compliance with all mitigation, monitoring, and reporting requirements. The Commission also recommended that the Service require the Navy to conduct empirical sound propagation measurements to verify the adequacy of the sizes of the exclusion zones for 5-, 10-, and 20-lb charges and to expand those zones and the buffer zones derived from those zones as necessary, if the National Marine Fisheries Service amends the letter of authorization as proposed; require the Navy to re-estimate the sizes of the buffer zones using the mean average swim speeds plus at least one standard deviation for marine mammals that inhabit the shallow-water areas where time-delay firing devices would be used, prior to amending the letter of authorization; and consider whether modifications to the letter of authorization alone are sufficient to satisfy the requirements of the Marine Mammal Protection Act and provide a thorough explanation of its rationale in the *Federal Register* notice taking final action on the proposed modifications, if it believes that regulatory modifications are not needed. Further, the Commission recommended that, with respect to false killer whales, the Service ask the Navy to enter into a conference pursuant to 50 C.F.R. § 402.10 and to consider requesting that the conference follow formal consultation procedures so that that opinion can be adopted as the biological opinion if the species is listed. **Agency Response:** The Service had not issued the letter of authorization by the end of 2011.
15 December 2011	**To:** National Marine Fisheries Service **Issue:** Application for a research and enhancement permit from SeaWorld, Inc., to conduct research on captive Hawaiian monk seals and to continue its related enhancement efforts **Recommendations:** The Commission recommended that the National Marine Fisheries Service (1) issue the research permit, provided it advises SeaWorld of the need to have its IACUC review and approve its research protocol prior to initiating the proposed activities and (2) issue the enhancement permit under section 10(a)(1)(A) of the endangered Species Act, but clarify that authorization for continued maintenance of the non-releasable monk seals stems from section 109(h)(1) of the Marine Mammal Protection Act, rather than section 104(c)(4). **Agency Response:** The Service had not issued the permit by the end of 2011.
19 December 2011	**To:** National Marine Fisheries Service **Issue:** Application to amend a research permit from Rachel Cartwright, Ph.D., to allow tagging of female humpback whales with calves and yearlings in Hawaii

Recommendation: The Commission recommended that the National Marine Fisheries Service require Dr. Cartwright to (1) report her data regarding possible short- and long-term effects from tagging to the Permit Office and (2) consult with Dr. Robin Baird regarding co-principal investigator Mark Deakos's experience instrumenting cetaceans with suction-cup and satellite tags prior to issuing the permit amendment and condition the permit amendment to allow tagging by either method only if Mr. Deakos has demonstrated a proficiency with said method; otherwise, the Service should require Mr. Deakos to gain experience with marine mammal biologists adept at the proposed method before authorizing him to tag cetaceans using that method. The Commission also recommended that the Service ensure that activities to be conducted under this permit and those of other permit holders who might be conducting research on the same species in the same areas are coordinated and, as possible, data and samples shared to avoid duplicative research and unnecessary disturbance of animals; advise Dr. Cartwright of the need to have an IACUC review and approve the research protocol prior to initiating the proposed tagging activities; and advise Dr. Cartwright of the need to consult with the National Marine Sanctuary to determine if a permit is required before conducting the proposed activities.
Agency Response: The Service had not issued the permit amendment by the end of 2011.

19 December 2011

To: National Marine Fisheries Service
Issue: Application to amend a research permit from Brandon Southall, Ph.D., to add potential focal species and increase the number of controlled exposure experiments on cetaceans and pinnipeds in waters off Southern California
Recommendations: The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided that the conditions currently contained in the permit as amended remain in effect and the Service advises Dr. Southall of the need to have his IACUC approve the research protocol modifications prior to initiating those activities.
Agency Response: The Service had not issued the permit amendment by the end of 2011.

19 December 2011

To: National Marine Fisheries Service
Issue: Application from the U.S. Army Corps of Engineers to take small numbers of Atlantic bottlenose dolphins by harassment incidental to blasting operations in the Port of Miami, Florida
Recommendations: The Commission recommended that the National Marine Fisheries Service issue the incidental harassment authorization, provided it require the Army Corps of Engineers to conduct empirical sound propagation measurements during two detonation events per day using various delay weights and numbers of delays to verify that the danger and exclusion zones are sufficient to protect marine mammals from sound exposure levels, including the 182- and 177-dB re 1 μPa^2-sec thresholds—the zones then should be adjusted accordingly and all activities should be suspended if the authorized number of takes is reached.
Agency Response: The Service had not issued the incidental harassment authorization by the end of 2011.

20 December 2011

To: National Marine Fisheries Service
Issue: Application for a research permit from Ann Pabst, Ph.D., to conduct systematic line transect surveys for marine mammals off the U.S. east coast during a five-year period
Recommendation: The Commission recommended that the National Marine Fisheries Service issue the permit, but require the applicant to minimize disturbing the animals by using caution when approaching them, especially female/calf pairs, and stopping an approach if there is evidence that the activity may be interfering with female/calf behavior,

	feeding, or other vital functions **Agency Response:** The Service had not issued the permit by the end of 2011.
20 December 2011	**To:** National Marine Fisheries Service **Issue:** Application for a research permit from the Northwest Fisheries Science Center to conduct research on numerous cetacean and pinniped species **Recommendation:** The Commission recommended that the National Marine Fisheries Service issue the permit, provided that it ensure that activities to be conducted under this permit and those of other permit holders who might be conducting research on the same species in the same areas are coordinated and, as possible, data and samples shared to avoid duplicative research and unnecessary disturbance of animals. The Commission also recommended that the Service advise the Center of the need to (1) obtain IACUC approval of the amended protocols prior to initiating the proposed activities; (2) obtain permits under the CITES to import or export parts of marine mammals listed in the Convention's appendices; and (3) consult with the relevant entity (e.g., National Marine Sanctuary, National Ocean Service, Marine National Monument, U.S. Fish and Wildlife Service) and obtain any required permits prior to conducting the proposed activities in a sanctuary, monument, or refuge. **Agency Response:** The Service had not issued the permit by the end of 2011.
22 December 2011	**To:** National Marine Fisheries Service **Issue:** Application from the Lamont-Doherty Earth Observatory to take small numbers of marine mammals by harassment incidental to a marine geophysical survey in the waters of the Northern Mariana Islands **Recommendations:** The Commission recommended that, before issuing the incidental harassment authorization, the National Marine Fisheries Service (1) require the Observatory to re-estimate the proposed exclusion and buffer zones and associated takes of marine mammals using site-specific information—if the exclusion and buffer zones and numbers of takes are not re-estimated, require the Observatory to provide a detailed justification (a) for basing the exclusion and buffer zones for the proposed survey in the Northern Mariana Islands on empirical data collected in the Gulf of Mexico or on modeling that relies on measurements from the Gulf of Mexico and (b) that explains why simple ratios were used to adjust for tow depth and (2) use species-specific maximum densities (i.e., estimated by multiplying the existing best density estimates by a precautionary correction factor) and then re-estimate the anticipated number of takes. The Commission also recommended that the Service condition the authorization to prohibit the use of a shortened pause before ramping up after a power-down or shut-down of the airguns based on the presence of a marine mammal in the exclusion zone and the R/V *Langseth's* movement (speed and direction); extend the 30-minute period following a marine mammal sighting in the exclusion zone to cover the maximum dive times of all species likely to be encountered; and provide additional justification for its preliminary determination that the proposed monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified exclusion and buffer zones. In addition, the Commission recommended that the Service consult with the funding agency (i.e., the National Science Foundation) and individual applicants (e.g., Lamont-Doherty Earth Observatory and the U.S. Geological Survey) to develop, validate, and implement a monitoring program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal taking and the number of marine mammals taken. Lastly, the Commission recommended that the Service require the applicant to (1) report the number of marine mammals that were detected acoustically and for which a power-down or shut-down of the airguns was initiated, (2) specify if such

	animals also were detected visually, (3) compare the results from the two monitoring methods (visual versus acoustic) to help identify their respective strengths and weaknesses, and (4) use that information to improve mitigation and monitoring methods and work with the National Science Foundation to analyze those data to help determine the effectiveness of ramp-up procedures as a mitigation measure for geophysical surveys after the data are compiled and quality control measures have been completed. **Agency Response:** The Service had not issued an incidental harassment authorization by the end of 2011.
23 December 2011	**To:** National Marine Fisheries Service **Issue:** Application to amend a research permit from Peter Tyack, Ph.D., to add procedures and focal species to projects in the Atlantic Ocean and Mediterranean Sea and to add a new project in the Pacific Ocean **Recommendations:** The Commission recommended that the National Marine Fisheries Service issue the permit amendment, provided that the conditions currently contained in the permit as amended remain in effect and the Service advise Dr. Tyack of the need to have his IACUC review and approve the research protocol modifications prior to initiating those activities. **Agency Response:** The Service had not issue the permit by the end of 2011.

Appendix B

2010–2011 PUBLICATIONS FROM COMMISSION-SPONSORED ACTIVITIES

Au, W.W.L. 2010. A short biography of Whitlow W.L. Au. Aquatic Mammals Historical Perspectives Series 36(2): 205-212. (MMC grant E4047339)

Balcomb III, K.C. 2010. Whales in a changing world. Aquatic Mammals Historical Perspectives Series 36(4): 400-408. (MMC grant E4047339)

Braulik, G., O.S. Savadkouhi, S. Fadakar, H. Mohammadi, R.L. Brownell, Jr., R.R. Reeves, M.B. Nabavi, A. Fernandez. 2010. A retrospective investigation of two dolphin mass mortality events in Iran, autumn 2007. Zoology in the Middle East 49: 13-26. (MMC grant E4041083)

Gentry, R.L. 2010. Marine mammal research then and now. Aquatic Mammals Historical Perspectives Series 36(4):388-399. (MMC grant E4047339)

Ivashchenko, Y.V., and P.J. Clapham. 2010. Bowhead whales *Balaena mysticetus* in the Okhotsk Sea. Mammal Review 40: 65-89. (Sub-contract to MMC grant EE0009726)

McCormick-Ray, J., R.M. Warwick, and G.C. Ray. 2011. Benthic macrofaunal compositional variations in the northern Bering Sea. Marine Biology 158(6):1365-1376. (MMC grant E4061828)

Naito, Y. 2010. What is "Bio-Logging"? Aquatic Mammals Historical Perspectives Series 36(3): 307-322. (MMC grant E4047339)

National Research Council. 2011. Critical infrastructure for ocean research and societal needs in 2030. The National Academies Press, Washington, D.C. (MMC grant E4047467)

Ray, G.C., J.E. Overland, and G.L. Hufford. 2010. Seascape as an organizing principle for evaluating walrus and seal sea-ice habitat in Beringia. Geophysical Research Letters 37, L20504, 6 pages. (MMC grant E4061828)

Robards, M.D., and R.R. Reeves. 2011. The global extent and character of marine mammal consumption by humans: 1970-2009. Biological Conservation 144: 2770-2786. (MMC grant E4026048)

Rosel, P.E., K.D. Mullin, L. Garrison, L. Schwacke, J. Adams, B. Balmer, P. Conn, M.J. Conroy, T. Eguchi, A. Gorgone, A. Hohn, M. Mazzoil, C. Schwartz, C. Sinclair, T. Speakman, K. Urian, N. Vollmer, P. Wade, R. Wells and E. Zolman. 2011. Photo-identification capture-mark-recapture techniques for estimating abundance of bay, sound and estuary populations of bottlenose dolphins along the U.S. East Coast and Gulf of Mexico: A Workshop Report. NOAA Technical Memorandum NMFS-SEFSC-621. 30 pages. (MMC grant E4061832)

Schusterman, R.J. 2010. Pinniped psychobiology: The early years. Aquatic Mammals Historical Perspectives Series 36(1):84-110. (MMC grant E4047339)

Turvey, S.T., L.A. Barrett, T. Hart, B. Collen, H. Yujiang, Z. Lei, Z. Xinqiao, W. Xianyan, H. Yadong, Z. Kaiya, and W. Ding. 2010. Spatial and temporal extinction dynamics in a freshwater cetacean. Proceedings of the Royal Society B 277:3139-3148. (MMC grant E4041038)

Turvey, S.T., L.A. Barrett, H. Yujiang, Z. Lei, Z. Xinqiao, W. Xianyan, H. Yadong, Z. Kaiya, T. Hart, W. Ding. 2010. Rapidly shifting baselines in Yangtze fishing communities and local memory of extinct species. Conservation Biology 24(3):778-787. (MMC grant E4041038)

Vongraven, D., and E. Peacock. Development of a pan-Arctic monitoring plan for polar bears: background paper. Circumpolar Biodiversity Monitoring Programme, CAFF Monitoring Series Report No.1, January 2011, CAFF International Secretariat, Akureyri, Iceland. ISBN 978-9935-431-01-1. (MMC grant E4061734)

Zerbini, A.N., E.R. Secchi, D. Danilewicz, A. Andriolo, J. Laake, A. Azevedo. 2010. Abundance and distribution of the Franciscana (*Pontoporia blainvillei*) in the Franciscana Management Area II (southeastern and southern Brazil). International Whaling Commission SC/62/SM7. (MMC grant E4026227)